Kenosha Unified School District

MONTHLY SCHOOL BOARD STANDING COMMITTEE MEETINGS

April 12, 2016

6:15 P.M. Planning/Facilities/Equipment

6:45 P.M. Joint Planning/Facilities/Equipment & Audit/Budget/Finance

7:15 P.M. Audit/Budget/Finance

7:30 P.M. Personnel/Policy

7:50 P.M. Curriculum/Program

Please Note: Committee meetings may start early if preceding meeting adjourns early.

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Kenosha Unified School District

Standing Committee Meetings
April 12, 2016
Educational Support Center

There may be a quorum of the board present at these Standing Committee meetings; however, under no circumstances will a board meeting be convened nor board action taken as part of the committee process. The three board members who have been appointed to each committee and the community advisors are the only voting members of the Standing Committees.

KENOSHA UNIFIED SCHOOL BOARD
PLANNING/FACILITIES/EQUIPMENT MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A meeting of the Kenosha Unified Planning/Facilities/Equipment Committee chaired by Mr. Falkofske was called to order at 5:30 P.M. with the following committee members present: Mr. Flood, Ms. Stevens, Mrs. Bothe, Mr. Zielinski, Mr. Thomey, Mr. Wicklund, Mr. Schaffrick, and Mr. Falkofske. Mr. Butts was absent.

Approval of Minutes – October 13, 2015 Planning/Facilities/Equipment

Mr. Falkofske noted that Mr. Thomey's name should be stricken from the second paragraph of the October 13, 2015 minutes.

Ms. Stevens moved to approve the minutes with the striking of Mr. Thomey's name from the second paragraph. Mr. Flood seconded the motion. Unanimously approved.

Outdoor Athletic Facility Project Bid Summary

Mr. Patrick Finnemore, Director of Facility Services, presented the Outdoor Athletic Facility Project Bid Summary. He indicated that the table contained in the report summarizes the low bids and selected contractor by bid section. Areas highlighted in gray have not yet been awarded; therefore, the bid amount total shown is considered to be a worst case amount by Camosy. Final contractor selection and bid amounts should be finalized and presented to the full Board at their February meeting. Mr. Finnemore answered questions from Committee members.

Ms. Stevens moved to forward the Outdoor Athletic Facility Project Bid Summary to the full Board for consideration. Mr. Wicklund seconded the motion. Unanimously approved.

Storm Water Easements – Outdoor Athletic Projects

Mr. Finnemore presented the Storm Water Easements Outdoor Athletic Projects. He indicated that the City of Kenosha requires that KUSD provide an easement on a portion of Ameche Field/Anderson Park, Bradford High School, and the Bullen Middle School properties. This easement will allow the City access to the storm water management facilities being installed at the three sites which will allow City staff or contractors to perform necessary maintenance and inspections. He noted that it is recommended that the Board authorize him to represent the district in the review of the final agreement. Once the agreement is finalized, it will be provided to the School Board President for final signature.

Mr. Finnemore further indicated that since the printing of the report, an additional easement for the sanitary sewer line on the Bradford High School property had been received. He requested that the Committee also forward that additional easement to the full Board. Mr. Finnemore answered questions from Committee members.

Ms. Stevens moved to forward the proposed storm water easements with the City of Kenosha described in the report along with the additional sanitary sewer line easement located on the Bradford High School property to the full Board for their consideration. Mrs. Bothe seconded the motion. Unanimously approved.

2016-2017 Capital Projects Plan

Mr. Finnemore presented the 2016-2017 Capital Projects Plan and updated the Committee on the Bradford parking lot replacement project, Washington Middle School renovation project, Grewenow window and door replacement project, Forest Park hallway flooring replacement project, and contingency projects. Mr. Finnemore answered questions from Committee members.

Ms. Stevens moved to forward the 2016-2017 Capital Projects Plan to the full Board for consideration. Mr. Zielinski seconded the motion. Unanimously approved.

Information Item

Mr. Finnemore presented the Utility and Energy Savings Program Report. He noted that only 39% of the overall utility budget as compared to 43% last year has been spent this year. He indicated the mild winter along with the reduced price have attributed to the savings.

Mr. Finnemore noted that in April the Utility and Energy Savings Program Report will provide an update on the five schools that had major energy projects performed.

Mr. Thomey requested a report on the age of the district's various mechanical systems. Mr. Falkofske asked Mr. Thomey to send his request via email to the Superintendent's Office.

Future Agenda Items

Mr. Finnemore noted that the ESC/Employee Safety, the Capital Projects Update, and the Utility and Energy Savings Program Report would be presented in April as noted in the agenda.
Mr. Wicklund moved to adjourn the meeting. Ms. Stevens seconded the motion. Unanimously approved.

Meeting adjourned at 6:04 P.M.

Stacy Schroeder Busby
School Board Secretary

April 12, 2016
Planning/Facilities/Equipment Standing Committee

EDUCATIONAL SUPPORT CENTER/EMPLOYEE SAFETY

Background:

Given recent world events and the decision to move forward with ALiCE training for District staff, the leadership council assembled an Educational Support Center (ESC) safety committee. This committee was designed to discuss and recommend safety topics/precautions that could be implemented at the ESC in order to provide a safer working environment for ESC employees, as well as safe place for those visiting and/or utilizing the building for meetings.

The committee was led by Patrick Finnemore and Tanya Ruder and consisted of the following members: Kevin Christoun, Keith Ebener, Jessica Doyle-Rudin, Annie Fredriksson, Beth Ormseth , Linda Ruffalo and Jerry Theama. All of the members of the committee work at the ESC and have a stake in employee safety.

The committee met to discuss a variety of safety options, including when to lock doors during and after hours, safety equipment options, off-duty officers at board meetings, ALiCE training for ESC staff and others.

While the ESC is a public building owned by the community, the District has an obligation to provide a safe working environment for all employees. At this current time, all schools in the district are locked during school hours. Employees must have a key card to enter and visitors must be buzzed in after being vetted by a member of the school office. The only building not following these procedures in Kenosha Unified is the ESC.

The following items are recommendations that came from the committee's discussions in an effort to provide a safer working environment for all ESC staff. The committee unanimously approved the following initiatives:

- Lock ESC doors during work hours (7:30 a.m. – 4:30 p.m.). This would have little to no impact on current ESC employees as each already has access to the building with a key card. The only change would be that ESC employees would now need their card to enter the front doors as well as all other doors. All other KUSD staff will be provided access through the front doors only from 6 a.m. – 7:30 p.m. with the use of their key card.

  For visitors who are not employees, new phones with digital video screens would be installed for the lobby desk, two in the Superintendent's Office and one in the School Leadership Office that will allow visitors to be buzzed into the building. These phones are much like

those currently used in our school buildings. This cost, roughly $1,500, would be covered by the Facilities Department budget.

To ensure safety of all, any staff on administrative leave would have their access revoked. This will be determined by the Office of Human Resources and communicated to the Facilities Department for implementation.

On voting days the doors would be unlocked.

- Leave doors locked after work hours. The greatest impact would be on the ESC departments hosting trainings before 7:30 a.m. and after 4:30 p.m. It was suggested that they station someone at the front to welcome guests prior to the start of the meeting. After the start of the meeting a sign should be posted asking participants to call the landline in the training room (i.e. 359-5944 for room 190B, etc.) so someone can personally let in late guests.

- On board meeting nights it is suggested that the front doors be unlocked at 6:30 p.m. and locked immediately following the end of the meeting.

  On committee meeting nights it is suggested that the front doors be unlocked at 5 p.m. and locked immediately following the end of the meeting.

- For additional safety during board meetings, it is also suggested that the board consider hiring one or two off duty officers to be stationed between the front doors and boardroom. The intent is to have someone in/around the room and to keep an eye on people coming and going from the building during meetings. Without this in place anyone could come and go through the front doors while the meeting is in session without anyone knowing.

  Should the board decide to do this, the approximate cost would be $1,143.36* for one officer. This cost could vary greatly depending upon the length of the standing committee and board meetings held throughout the year.

  ** This amount is based on hiring one officer for two meetings per month lasting two hours each. This amount would change if meetings ran longer or additional meetings were held.*

Attached are results from a survey of surrounding districts regarding their central office safety procedures and results from an ESC staff survey.

Administration Recommendation:

Administration recommends that the Planning/Facilities/Equipment committee forward these recommendations to the school board as an informational item on March 22, 2016.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Tanya Ruder
Executive Director of Community Partnerships and Media Relations

Patrick Finnemore
Director of Facilities

7 responses

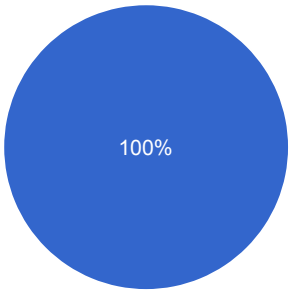
Publish analytics

Summary

District name

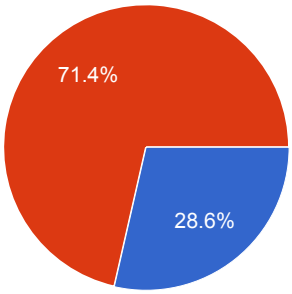
Kiimberly
Milwaukee Public Schools
West Allis-West Milwaukee
School District of Beloit
Green Bay

Is your central office a stand alone building?



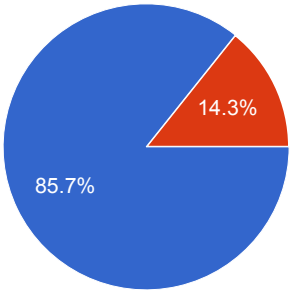
Yes (please continue to the next question)	**7**	100%
No (thank you for your response)	**0**	0%

Do you lock your doors during the day?



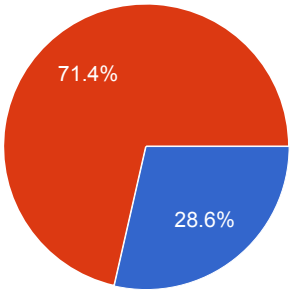
Yes	**2**	28.6%
No	**5**	71.4%

Do employees have key cards, fabs or keys to enter the building?



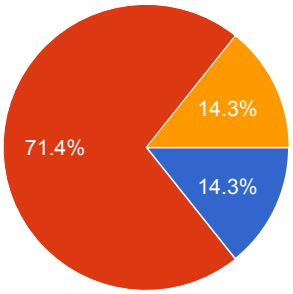
Yes	**6**	85.7%
No	**1**	14.3%

Do visitors use a buzzer to enter the building?



Yes	**2**	28.6%
No	**5**	71.4%

Do you hire security for board meetings?



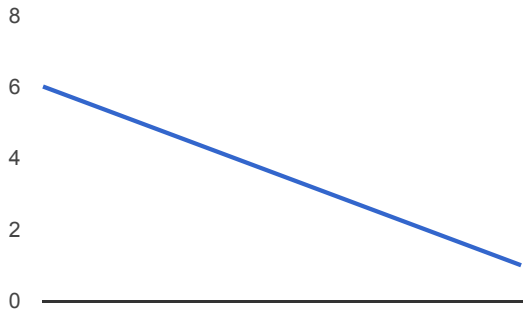
Yes	**1**	14.3%
No	**5**	71.4%
Sometimes	**1**	14.3%

Is there anything else you'd like to share?

Cards used after hrs only
Some employees have key cards to enter after normal hours of operation.
Our two main entrances, which have safety staff assigned to them, are open during the day. Three other secondary doors are locked at all times, but accessible by key fob. We have safety assigned to the building during normal business hours and whenever we have a board meeting. We are in the process of reviewing safety measures and have had "shelter in place" drills for staff.

We have just developed a protocol for intruder/lockdown situations at our central office. We're planning a drill for this month. Prior, we only had procedures for our schools.
Our front main door is open to the public with a receptionist greeting visitors when the Admin. Office is open, however the side doors and back doors require a badge to buzz in 24/7.
We are currently going through the same process. Would be interested to find out what you learn. One of the things we are looking into is whether there should be cameras in the building, since Board meetings are held at our central office and so the front doors are left unlocked during the Board meeting - which is held on the third floor. Lori Blakeslee

Number of daily responses



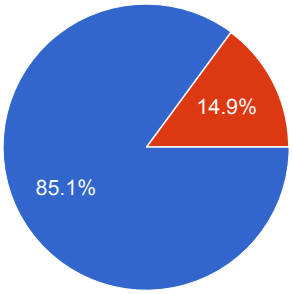
truder@teachers.kusd.edu Edit this form

161 responses

View all responses Publish analytics

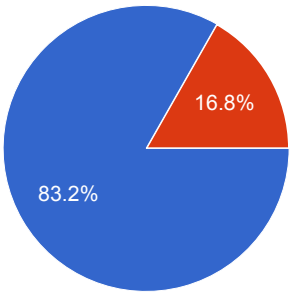
Summary

Would you support the ESC locking the doors and requiring a key card for entry during business hours (7:30 am - 4:30 pm)?



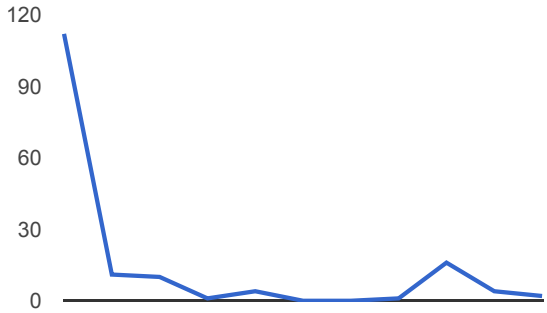
Support	**137**	85.1%
Do not support	**24**	14.9%

Would you support the ESC using a buzzer system with a video screen (like the schools use) to vet visitors before they enter the building?



Support	**134**	83.2%
Do not support	**27**	16.8%

Number of daily responses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KENOSHA UNIFIED SCHOOL DISTRICT
Kenosha, Wisconsin

April 12, 2016
Planning/Facilities/Equipment Standing Committee

OUTDOOR ATHLETIC PROJECT UPDATE

Background:

On April 7, 2015, the voting public approved a $16,700,000 referendum to construct major upgrades to the outdoor athletic facilities for Bradford (including those at Bullen), Indian Trail and Tremper High Schools. In May of 2015, the school board interviewed and selected Partners in Design Architects and Camosy Construction to help the district design and construct the new facilities. The construction bids for the Outdoor Athletic Facility Project were received on February 2, 2016, by Camosy Construction and representatives of our Facilities Department staff, and were approved by the School Board on February 23, 2016.

Highlights This Month:

The key accomplishments this past month on the project include:

- Finalizing subcontractor scopes and associated proposals for all trades.

- Review and approval of shop drawings for all major components of the project such as bleachers, synthetic turf, track surfaces, mechanical equipment, etc.

- Construction of the stadium bleachers has begun offsite.

- Preparation for construction has taken place at Bradford and Bullen including removal of irrigation sprinkler heads and other equipment, emptying of athletic storage sheds, and removal of fencing.

- Construction at Bradford is slated to begin the week of March 21st in preparation for installation of the underground storm water retention system under the north parking lot over spring break.

- Minor design changes have been made to the baseball/softball press box buildings for construction efficiencies and those changes are under review by the City of Kenosha.

- All State reviews and approvals have taken place including building approvals, bleacher approvals, DNR storm water management approvals, etc.

This is an informational report.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Mr. Patrick Finnemore, PE
Director of Facilities

KENOSHA UNIFIED SCHOOL DISTRICT
Kenosha, Wisconsin

April 12, 2016
Planning/Facilities/Equipment Standing Committee

UTILITY & ENERGY SAVINGS PROGRAM REPORT

The purpose of this report is to provide the regular update on the 2015-16 utilities budget and the operational energy savings program through February.

Utilities Budget Update:

The following is a brief summary of the costs incurred for natural gas, electricity, and the entire utilities budget.

- We have spent $254,320 less on natural gas this year as compared to last year.
- We have spent $26,568 less on electricity this year as compared to last year.
- We have spent 57% of the overall utility budget as compared to 62% last year at this time.

Operational Energy Program Update:

The following is a brief summary of the amount of energy saved as of February. Please see the attachment for energy savings by school:

	2015-16	**2014-15**
Electricity Saved (KWh)	4,933,509	5,103,436
Gas Saved (Therms)	270,925	434,673
Dollars Saved	**$653,020**	**$810,044**

The great news with the warmer than normal winter has resulted in tremendous savings in our utility budget. The counter to that is that our operational energy savings is not as good as it has been in the past. Much of this can be attributed to the warmer than normal weather. We do take the heating degree day information related to weather into account in our calculations, but that data does not completely reflect operational realities in buildings like schools. We do have a couple of issues at specific schools that are being investigated such as gas

usage at Bradford, Washington and Curtis Strange, and electricity usage issues at Dimensions of Learning and Southport.

This is an informational report.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Mr. Patrick Finnemore, PE
Director of Facilities

Mr. John Allen
Distribution and Utilities Manager

Mr. Kevin Christoun
Maintenance Supervisor

Monthly Energy Efficiency Program Tracking Summary

UTILITY INFORMATION (10 months of gas and electric data)

September 2015 through Februrary 2016

End of FY - **Jun-16** **Current Month: Feb-16** **Degree Days (Sep-Feb) Last Year: HTG 5343: CLNG 58.5** **Degree Days (Sep-Feb) This Year: HTG 4216: CLNG 131**

BUILDING	ACTUAL USE FY2016				Last Year FY2015 SAVINGS*					FY2016 SAVINGS*				
	kWh	kW	therms	$	kWh	kW	therms	$	% Savings	kWh	kW	therms	$	% Savings
Bradford	1,366,823	3,900	118,669	$200,753	539,452	949	26,350	$68,971	23.4%	478,221	1,008	(5,129)	$46,426	18.8%
Hillcrest	46,720	-	8,201	$10,698	15,545	-	1,336	$2,799	17.3%	10,220	0	(494)	$1,034	8.8%
Indian Trail	1,652,000	5,760	61,041	$229,832	822,107	2,899	24,605	$118,671	33.1%	773,123	2,427	12,608	$98,024	29.9%
LakeView Tec	204,320	875	4,836	$31,027	229,639	237	379	$18,467	36.7%	219,033	165	989	$16,077	34.1%
Reuther	429,480	2,255	82,426	$98,573	122,360	483	22,746	$29,486	19.9%	141,221	88	13,981	$16,783	14.5%
Tremper	1,033,180	2,924	115,909	$161,108	463,937	744	35,747	$61,160	23.5%	506,699	898	12,505	$48,810	23.3%
HS Total:	**4,732,523**	**15,714**	**391,082**	**$731,992**	**2,193,040**	**5,311**	**111,163**	**$299,553**	**26.6%**	**2,128,517**	**4,585**	**34,460**	**$227,153**	**23.7%**
Bullen	356,089	1,179	29,508	$58,059	229,831	233	34,062	$38,965	35.7%	242,767	289	27,163	$32,477	35.9%
Lance	298,490	1,135	35,404	$56,618	75,824	174	10,770	$13,166	16.6%	82,764	232	5,466	$11,303	16.6%
Lincoln Middl	412,876	1,688	44,687	$74,309	142,867	297	19,553	$26,137	21.5%	185,182	441	12,333	$24,166	24.5%
Mahone	624,600	2,676	30,492	$99,472	316,163	296	34,853	$45,996	30.1%	261,877	490	25,067	$33,427	25.2%
KTEC West	236,400	798	34,513	$45,588	200,669	648	12,570	$38,237	40.0%	148,480	577	13,453	$25,486	35.9%
Washington	239,252	903	39,540	$51,317	94,486	450	3,189	$14,913	20.4%	91,950	495	(5,009)	$11,341	18.1%
MS Total:	**2,167,707**	**8,379**	**214,144**	**$385,362**	**1,059,840**	**2,097**	**114,997**	**$177,415**	**28.1%**	**1,013,020**	**2,522**	**78,473**	**$138,199**	**26.4%**
Bain School c	379,800	1,668	21,291	$65,105	64,407	(101)	9,667	$8,505	11.0%	59,974	245	7,049	$11,110	14.6%
Bose	74,560	326	10,174	$15,893	133,282	282	16,303	$25,535	54.2%	137,156	318	13,735	$23,092	59.2%
Brass	228,960	900	13,195	$37,546	33,046	231	9,131	$17,150	28.9%	42,163	354	5,865	$10,962	22.6%
Dimensions o	49,095	-	12,931	$13,366	4,849	-	2,596	$2,509	13.8%	(2,076)	0	(248)	($292)	-2.2%
Forest	96,780	379	12,714	$20,200	30,924	42	24,368	$18,174	42.0%	35,847	58	18,498	$13,860	40.7%
Frank	305,400	1,098	19,759	$50,059	128,553	244	4,201	$14,968	21.1%	133,386	299	1,561	$13,759	21.6%
Grant	73,360	276	11,258	$15,901	13,364	96	16,172	$13,320	40.5%	19,304	119	11,201	$8,737	35.5%
Grewenow	103,680	356	21,277	$24,753	81,909	181	15,630	$19,214	41.5%	76,421	179	7,326	$12,704	33.9%
Harvey	85,945	311	13,734	$18,663	53,901	160	16,486	$17,093	42.0%	50,052	181	14,032	$13,885	42.7%
Jefferson	93,691	254	14,135	$20,294	52,359	145	7,357	$10,896	26.5%	53,868	165	11,880	$13,098	39.2%
Jeffery	117,742	435	9,181	$20,477	86,275	205	2,418	$12,006	30.1%	78,849	226	3,951	$12,018	37.0%
KTEC	99,360	446	10,626	$19,605	11,800	53	4,969	$4,650	17.0%	11,707	50	3,679	$3,586	15.5%
McKinley Eler	71,600	340	15,840	$18,738	26,422	47	4,848	$6,025	20.9%	28,702	40	2,619	$4,555	19.6%
Charles Nash	221,710	938	12,421	$38,687	29,125	211	11,214	$11,812	22.1%	40,074	234	12,229	$12,163	23.9%
Pleasant Prai	323,200	1,136	18,351	$50,031	64,898	30	(793)	$3,434	5.9%	65,512	23	(916)	$3,576	6.7%
Prairie Lane	148,860	686	14,394	$28,290	72,113	78	5,746	$11,699	28.1%	55,838	(53)	2,957	$7,024	19.9%
Roosevelt	100,560	334	12,692	$19,709	47,594	142	4,716	$8,793	23.9%	36,744	151	8,883	$9,711	33.0%
Somers	228,160	728	21,849	$38,678	81,273	280	9,498	$15,875	28.1%	59,609	271	2,435	$9,518	19.7%
Southport	142,240	638	17,263	$28,873	44,934	61	1,936	$5,994	15.9%	34,735	57	141	$4,000	12.2%
Stocker	214,240	800	12,825	$34,451	118,902	308	2,173	$14,384	27.5%	125,080	383	707	$14,317	29.4%
Strange	137,405	528	18,854	$28,509	95,344	134	2,614	$11,956	27.6%	88,997	153	(1,581)	$8,860	23.7%
Vernon	222,008	752	33,502	$43,996	115,804	270	13,143	$17,970	23.9%	81,188	295	21,377	$20,119	31.4%
Whittier	172,800	798	6,354	$28,390	200,052	449	4,337	$22,841	38.4%	196,775	492	1,633	$20,912	42.4%
Wilson	69,240	322	20,899	$21,096	51,304	117	11,819	$13,370	35.2%	51,676	133	4,695	$8,481	28.7%
ELEM Total:	**3,760,396**	**14,450**	**375,519**	**$701,311**	**1,642,434**	**3,664**	**200,549**	**$308,175**	**27.4%**	**1,561,581**	**4,372**	**153,708**	**$259,755**	**27.0%**
Cesar Chave	80,720	277	4,696	$13,946	65,566	97	2,238	$8,632	33.9%	61,789	120	1,598	$7,713	35.6%
ESC	601,520	1,795	34,123	$85,037	136,464	230	5,347	$15,212	13.8%	157,088	498	2,842	$18,799	18.1%
Recreation	38,448	-	3,826	$7,325	6,092	-	379	$1,057	9.2%	11,514	0	(156)	$1,399	16.0%
Other Total:	**720,688**	**2,072**	**42,645**	**$106,307**	**208,122**	**327**	**7,964**	**$24,901**	**16.9%**	**230,391**	**618**	**4,284**	**$27,912**	**20.8%**
Totals:	**11,381,314**	**40,616**	**1,023,390**	**$1,924,973**	**5,103,436**	**11,399**	**434,673**	**$810,044**	**26.7%**	**4,933,509**	**12,096**	**270,925**	**$653,020**	**25.3%**

* Savings are based on the comparison of actual billed use to the baseline model. The model is based on utility data from calendar year 2003 (typically) and adjusts for weather, occupancy and school year data.

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KENOSHA UNIFIED SCHOOL DISTRICT NO. 1
Kenosha, Wisconsin

April 12, 2016
Joint Audit/Budget/Finance and Planning/Facilities/Equipment Standing Committees

ENERGY EFFICIENCY REVENUE LIMIT EXEMPTION PROJECTS

Background:

The purpose of this report is two-fold, the first portion of the report provides a recap of the projects performed in 2014 and 2015 at nine elementary schools, and the second portion of the project provides a proposal for a second phase focused on four middle and high schools.

Phase 1 Recap:

As part of the past four biennium budgets (2009, 2011, 2013, and 2015) approved by the State of Wisconsin, rules were established and refined related to the performance of energy efficiency projects in PK-12 schools. The legislation most often referenced when discussing these projects is 2011 Wisconsin Act 32 which modified the original rule (2009 Wisconsin Act 28) to include payment of debt service on bonds issued to finance the energy efficiency projects provided:

- The projects result in energy or operational cost reductions or avoidance
- The projects are completed through the use of a performance contract as governed by State Statute 66.0133
- The bonds or notes used to finance the project are issued for periods not exceeding 20 years

Essentially the law provided an opportunity for school districts to implement large energy efficiency projects that they otherwise would not be able to fund with annual operations and maintenance budgets which are constrained by revenue limits. The law allows for a revenue limit exemption if a school board adopts a resolution to increase the revenue limit by an amount spent on these energy projects. This exemption can be used to pay for the project in a single year or to repay debt used to finance the project.

The KUSD School Board approved a $16,689,540 project at nine elementary schools at the June 25, 2013 meeting, and further approved the hiring of a performance contractor to meet the requirements of the law at the August 27, 2013 meeting. The projects were split over a two year window with the vast majority of work occurring in the summers of 2014 and 2015. The nine schools were chosen based on their EPA Energy Star ratings, and essentially were the schools evaluated to be the least energy efficient using that rating system. The following is a list of the nine schools and the year in which the work was performed at the school:

- Bose Elementary – 2014
- Forest Park Elementary – 2014
- Grant Elementary – 2014
- Grewenow Elementary – 2014 and 2015
- Harvey Elementary – 2014
- Jefferson Elementary – 2015
- Jeffery Elementary – 2015
- Roosevelt Elementary – 2015
- Vernon Elementary – 2015

From a construction cost, energy savings, building life expectancy and even aesthetic perspective, the projects at the nine schools have been very successful. Overall the total cost of the projects came in right on budget. The overall project cost was funded primarily by the bonded amount, but that was supplemented by $236,905.90 in rebates awarded to the district by Wisconsin Focus on Energy as well as a small amount of the interest earned from the borrowing. The borrowing of the funds generated $52,784.80 in interest of which only $294.07 was spent. The remainder of the interest income will be used to expedite repayment of the debt associated with the borrowing for this project.

One of the requirements of the law is to formally track the savings annually for the life of the borrowing, and to use any measured utility savings to directly repay the loan each year. Because of the 20 year duration of this tracking, we decided to start the formal tracking as of January 1, 2015 for the first 5 schools and January 1, 2016 for the remaining 4 schools. Attachment 1 to this report is the first of many annual reports that we will receive from Performance Services. The report is generated through an independent 3rd party review of our energy usage data as well as direct monitoring of the control systems for the mechanical equipment at each of the schools. The overall first twelve month savings for the five schools completed in 2014 was a whopping 31.4%. This savings calculation was performed by normalizing the weather data so that we did not benefit or be penalized for differences in weather before and after the projects were completed. The table below provides a summary of the annual savings for each of the five schools.

School	Savings
Bose	39.0%
Forest Park	44.0%
Grant	29.4%
Grewenow	14.7%
Harvey	26.7%
Total	31.4%

The savings at Grewenow is expected to increase in year 2 as that was the project that we split up the construction activities over multiple years.

Attachment 2 to this report provides a pictorial summary of the work performed at the 9 schools. The scope of work differed from school to school but generally involved

replacement of the heating and ventilation systems, new lighting, roof and exterior envelop replacement and major repairs, installation of vestibules at entrances to schools and window replacement projects. The picture below is a typical new boiler installation showing the boiler room at Jane Vernon Elementary School.

The following picture shows one of the window replacement projects; this is the main entrance to Roosevelt Elementary School.

The net result of the phase 1 projects is 9 schools with upgraded infrastructures that will certainly significantly extend the life of the buildings as well as save energy and improve building comfort. In addition, the 5 schools that also had window and exterior envelop improvements have been substantially improved aesthetically.

Proposed Phase 2 Projects:

In light of the dramatic success of the Phase 1 projects, and the amount of debt that will be retired over the next several years, we are proposing that KUSD implement a second phase of projects. This Phase 2 would consist of 3 separate projects performed over a six year period. The three projects would be performed independently of one another, each being approximately 2 years in duration. The projects would be:

- Project 1 - Bullen Middle School and Lance Middle School
- Project 2 - Tremper High School
- Project 3 - Bradford High School

Facilities Department staff members have performed detailed evaluations of the 4 schools proposed for the three projects with the help of a number of contractors, engineers and architects. The evaluations focused on energy efficiency related work as allowed by the revenue limit exemption statutes, but also included other improvements that should be performed at the same time funded by our major maintenance budget similar to what was done in Phase 1. The tables on the next two pages summarize the proposed energy efficiency scope of work. Each of the three projects would be large projects and slightly larger than the Phase 1 project, with budgets totaling:

- Bullen Middle School and Lance Middle School - $28,493,230
- Tremper High School - $22,105,204
- Bradford High School - $22,406,000

One of the major benefits of the three projects would be replacing the existing mechanical systems, all which are original to the building construction. In most cases those systems are on the order of 50 years old (similar to the systems at the 9 schools in Phase 1). In addition, the replacement of the air conditioning equipment at Bradford looms as one of the major unfunded investments that the district will need to tackle soon. That equipment is over 35 years old and is at the end of its useful life. These projects would provide a number of benefits in addition to massive energy savings at the four schools. One of the most notable would be the addition of air conditioning at Tremper High School, Bullen and Lance. The statutes allow for the addition of air conditioning if the entire heating and ventilation system is being replaced due to the dramatic energy savings in those areas plus the major overlap in equipment that serves the full array of HVAC. Another major improvement would be the addition of vestibules at the main entrances to the four schools. These vestibules would provide for significant energy savings as well as improved security and an aesthetic improvement to the front of each school. These entrances in combination with window

replacement projects will have a similar impact as the aesthetic appeal of the projects performed at Forest park, Grewenow, Harvey, Roosevelt and Jane Vernon.

Bullen Middle School

Building Improvement Measure (BIM) Description	Revenue Limit Exemption Funding
HVAC & Control Replacement (including complete building A/C)	$ 5,784,285
Lighting & Ceilings Replacement	$ 2,032,161
Roofing Replacement & Repairs	$ 1,882,748
New Secure Main Entrance Vestibule (Entrance 1)	$ 1,078,658
Window & Door Replacement	$ 772,201
Full Restroom Refurbishment	$ 432,393
Exterior Building Envelope Improvements	$ 369,823
Asbestos Remediation (To support HVAC and Window Projects)	$ 295,000
Electrical System Modifications	$ 276,848
Plumbing System Modifications	$ 108,427
BULLEN MS - ENERGY SAVINGS PROJECT TOTAL	$ 13,032,544

Lance Middle School

Building Improvement Measure (BIM) Description	Revenue Limit Exemption Funding
HVAC & Control Replacement (including complete building A/C)	$ 7,260,825
Roofing Replacement & Repairs	$ 2,031,792
Window & Door Replacement	$ 1,952,726
Lighting & Ceilings Replacement	$ 1,618,969
Full Restroom Refurbishment	$ 768,684
New Secure Main Entrance Vestibule (Entrance 1)	$ 493,386
Plumbing System Modifications	$ 454,766
Electrical System Modifications	$ 445,900
Exterior Building Envelope Improvements	$ 268,638
Asbestos Remediation (To support HVAC and Window Projects)	$ 165,000
LANCE MS - ENERGY SAVINGS PROJECT TOTAL:	$ 15,460,686

Tremper High School

Building Improvement Measure (BIM) Description	Revenue Limit Exemption Funding
HVAC & Control Replacement (including complete building A/C)	$ 11,202,820
Lighting & Ceilings Replacement	$ 2,514,760
Window & Door Replacement	$ 2,459,423
Electrical System Modifications	$ 1,742,729
Plumbing System Modifications	$ 1,498,827
Full Restroom Refurbishment	$ 1,038,259
Roofing Replacement & Repairs	$ 745,803
Asbestos Remediation (To support HVAC and Window Projects)	$ 298,000
New Secure Main Entrance Vestibule (Entrance 1)	$ 242,752
West Side Entrance Vestibule (Entrance 21)	$ 236,151
New Vestibules (Four Academic Entrances 1, 25, 28 & 29)	$ 125,680
TREMPER HS - ENERGY SAVINGS PROJECT TOTAL:	$ 22,105,204

Bradford High School

Building Improvement Measure (BIM) Description	Revenue Limit Exemption Funding
HVAC & Controls Replacement	$ 8,587,000
Window & Door Replacement	$ 2,999,000
Lighting & Ceilings Replacement	$ 2,240,000
Exterior Building Envelope Improvements	$ 1,634,000
Electrical System Modifications	$ 1,417,000
Roofing Replacement & Repairs	$ 1,283,000
Sprinkler System (inc. Booster Pump)	$ 1,118,000
Full Restroom Refurbishment	$ 1,039,000
Plumbing System Modifications	$ 898,000
West Vestibule Addition	$ 690,000
Asbestos Remediation (To support HVAC and Window Projects)	$ 273,000
East Vestibule Addition	$ 228,000
BRADFORD HS - ENERGY SAVINGS PROJECT TOTAL:	$ 22,406,000

The budgetary cost estimates provided in the tables are based on 2016 dollars, and so some level of inflation should be used as we evaluate the projects due to the six year implementation. It is proposed that a 3% inflation factor be applied to the second project (Tremper) and a 6% inflation factor be applied to the third project (Bradford). As mentioned earlier, we will also be performing other upgrades to the schools concurrently funded by our major maintenance budget. These projects will include major flooring replacements including removal of the asbestos floor tile at Lance, replacement of casework, and in some case locker replacement and resolving problems with classroom entrances. These projects will be detailed each year as part of the capital plan proposal provided to the Board in the January-

February timeframe. Another improvement that would be implemented would be the expansion of the cafeteria at Lance which would be funded by the Food Service budget (Fund 50).

Project implementation would be done very similar to Phase 1. It would start with a Request for Proposal (RFP) that we would issue to interested performance contractors. We used one performance contractor for Phase 1 because of the size of the project. We have not made any decisions on Phase 2, but expect that we may very well have more than one performance contractor involved in Phase 2 since it is three separate large projects. A final recommendation on the selection of a performance contractor(s) will be brought before the Board for approval as part of the overall approval process.

Proposed Timeline:

The following is a general timeline for Phase 2 that meets the requirements of the State Statutes as well as implementation philosophy of this being three separate projects.

1. Committee Meeting Presentation – April 12, 2016
2. Board Meeting Presentation – April 25, 2016
3. Approval of Initial Resolution – Tentatively May 10 or 24, 2016
4. Issue RFP for Performance Contractor – May 2016
5. Publication of Notice to Electors (within 10 days of adoption of Initial Resolution) – TBD
6. Public Hearing (within 10 days of publication of Notice) – TBD
7. 30-day Petition Period begins the day after the Public Hearing – TBD
8. Final Approval by Board – TBD
9. Design Project 1 (Bullen & Lance) – June 2016 through January 2017
10. Bid Project 1 – Jan/Feb 2017
11. Start construction for Project 1 – April 2017
12. Design Project 2 (Tremper) – April through December 2018
13. Complete construction for Project 1 – September 2018
14. Guaranteed savings monitoring begins for Project 1 – January 1, 2019
15. Bid Project 2 – Dec 2018/Jan 2019
16. Start construction for Project 2 – April 2019
17. Design Project 3 (Bradford) – April through December 2020
18. Complete construction for Project 2 – September 2020
19. Guaranteed savings monitoring begins for Project 2 – January 1, 2021
20. Bid Project 3 – Dec 2020/Jan 2021
21. Start construction for Project 3 – April 2021
22. Complete construction for Project 3 – September 2022
23. Complete project financials – December 31, 2022
24. Guaranteed savings monitoring begins for Project 3 – January 1, 2023

Financing:

As mentioned earlier in the report, the energy efficiency revenue limit exemption rule allows school districts to issue bonds or notes to finance the energy efficiency projects.

The proposed energy efficiency projects total $73,004,434 ($74,990,000 when including inflation). If KUSD wishes to finance these projects with long-term debt, the debt can be issued under revenue limits in Fund 38. Debt issued in Fund 38 does not require a referendum, but does require a 30-day petition period. Further, if the maturity of the debt exceeds ten years, a Public Hearing is also required.

The process for issuing Fund 38 debt would begin with an Initial Resolution. Upon Board approval of the Initial Resolution, a Notice to Electors is published in KUSD's official newspaper. Within 10 days of publication of the Notice, a Public Hearing is held for informational purposes. From the date of the Public Hearing, the electorate has 30 days to file a petition to stop the process. The petition must be signed by 20% of the school district electors (as determined by the number of voters at the last gubernatorial election), or 7,500 electors, whichever is less.

If no petition is filed, KUSD can issue the bonds to finance the projects. If the three parameters defined in 2011 Wisconsin Act 32 are met, the KUSD Board can levy for the debt service on the bonds within revenue limits and apply the energy efficiency exemption.

On a preliminary basis, we are contemplating a 20-year bond issue with a "wraparound" structure. As shown on Attachment 3, this methodology attempts to minimize the tax impact by taking advantage of the future decreases in KUSD's debt service payments, which decrease dramatically in 2017 (a decrease of approximately $4,600,000). This structure may make that decision easier as it likely will have a minimal impact on the overall tax levy.

Administration Recommendation:

Administration recommends that both the Audit, Budget and Finance and the Planning, Facilities, and Equipment Committees forward the Energy Efficiency Revenue Limit Exemption Project Phase 1 Recap and Phase 2 Proposal as summarized in this report to the full Board for their consideration.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Mr. Tarik Hamdan
Chief Financial Officer

Mr. Patrick M. Finnemore, PE
Director of Facilities

Mr. John E. Setter, AIA
Project Architect

Link below to appendices 1, 2 & 3 below
http://www.kusd.edu/docs/Energy-Efficiency-Revenue-Limit-Exemption-Projects-Attachment-Complete.pdf

KENOSHA UNIFIED SCHOOL BOARD
AUDIT/BUDGET/FINANCE MEETING
Educational Support Center – Room 110
January 12, 2016
MINUTES

A meeting of the Kenosha Unified Audit/Budget/Finance Committee chaired by Mr. Wade was called to order at 5:32 P.M. with the following committee members present: Mr. Falkofske, Mr. Kent, Mrs. Dawson, Mr. Battle, Mr. Leipski, and Mr. Wade. Dr. Savaglio-Jarvis was also present. Mr. Flood arrived later. Mr. Aceto and Mr. Holdorf were excused. Mr. Lawler was absent.

Approval of Minutes – December 1, 2015 Audit/Budget/Finance

Mr. Kent moved to approve the minutes as contained in the agenda. Mr. Leipski seconded the motion. Unanimously approved.

Informational Items

Dr. Savaglio-Jarvis noted that the Charter Funding Report was being provided as an informational item in order to answer the following questions submitted by Mr. Flood:

- What percentage of each charter school's budget has gone unspent each year for the past three years?
- What is the average class size of each subject area at each charter school?
- How long is the waitlist at each charter school?
- What actual methods does each school use to raise the portion of their budget that they must fund?
- Please provide the most recent budget for each charter school.
- When is each charter school up for renewal?

Mr. Flood arrived at 5:36 P.M.

Dr. Bethany Ormseth, Assistant Superintendent of Secondary School Leadership; Mr. Daniel Tenuta, Principal at eSchool; Mrs. Suzanne Loewen, Principal at Brompton; Mrs. Angela Andersson, Principal at Kenosha School of Technology Enhanced Curriculum (KTEC); and Mr. William Haithcock, Principal at Harborside Academy; were present to answer questions from Committee members in regards to the Charter Funding Report.

Mr. Tarik Hamdan, Chief Financial Officer, presented the monthly financial statements. He noted that the grant funded administrative salary variance is due to a pending budget adjustment and indicated that once the adjustment is finalized, the budget will align.

Future Agenda Items

Mr. Wade noted that the Monthly Financial Statements would be presented in February as noted on the agenda.

Mr. Leipski moved to adjourn the meeting. Mr. Flood seconded the motion. Unanimously approved.

Meeting adjourned at 5:45 P.M.

Stacy Schroeder Busby
School Board Secretary

KENOSHA UNIFIED SCHOOL BOARD
AUDIT/BUDGET/FINANCE MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A meeting of the Kenosha Unified Audit/Budget/Finance Committee chaired by Mrs. Coleman was called to order at 6:27 P.M. with the following committee members present: Mr. Flood, Mr. Falkofske, Mr. Kent, Mr. Aceto, Mr. Lawler, and Mrs. Coleman. Mr. Hamdan was also present. Mr. Wade, Mrs. Dawson, Mr. Holdorf, Mr. Battle, and Mr. Leipski were excused.

Approval of Minutes – January 12, 2016 Audit/Budget/Finance
Mrs. Coleman noted that due to lack of a quorum, no action would be taken on the minutes and they would be brought back at the next Committee meeting.

Informational Items
Mr. Tarik Hamdan, Chief Financial Officer, presented the Cash and Investment Quarterly Report as of December 31, 2015 and answered questions from Committee members.

Mr. Hamdan presented the Summary of Grant Activity as of December 31, 2015 and answered questions from Committee members.

Mr. Hamdan presented the Monthly Financial Statements and noted approximately 20 teaching vacancies which have resulted in a surplus of approximately $800,000. He then answered questions from Committee members.

Future Agenda Items
No future agenda items were noted.

Mr. Kent moved to adjourn the meeting. Mr. Flood seconded the motion. Unanimously approved.

Meeting adjourned at 6:45 P.M.

Stacy Schroeder Busby
School Board Secretary

KENOSHA UNIFIED SCHOOL BOARD
JOINT AUDIT/BUDGET/FINANCE AND
CURRICULUM/PROGRAM MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A joint meeting of the Kenosha Unified Audit/Budget/Finance and Curriculum/Program Committees chaired by Mrs. Snyder was called to order at 6:47 P.M. with the following committee members present: Mr. Flood, Mr. Falkofske, Mr. Kent, Mr. Aceto, Mr. Lawler, Mr. Kunich, Mr. Karabetsos, Mrs. Wickersheim, Ms. Riese, and Mrs. Snyder. Mr. Hamdan was also present. Mr. Wade, Mrs. Dawson, Mr. Holdorf, Mr. Battle, Mr. Leipski, and Ms. Nielsen were excused. Mrs. Santoro and Mr. Wojciechowicz were absent.

Mrs. Snyder noted that due to lack of a quorum no action would be taken.

Mary Frost Ashley Charitable Trust

Mrs. Patricia Demos, Community School Relations Coordinator, presented the Mary Frost Ashley Charitable Trust. She indicated that permission is requested for submission to the Mary Frost Ashley Charitable Trust for a one-year grant proposal titled framework for Health Youth Development: Expanding Family Learning and Student Engagement Program in the amount of $125,000 to further develop the District Family Engagement Training and Education Programs as well as provide meaningful and engaging learning opportunities for student to increase achievement and attendance. Mrs. Demos answered questions from Committee members.

Mrs. Snyder indicated that no vote could be taken due to lack of a quorum and that the item would be forwarded to the full Board for consideration.

Future Agenda Items

No future agenda items were noted.

Meeting adjourned at 6:54 P.M.

Stacy Schroeder Busby
School Board Secretary

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Kenosha Unified School District
Kenosha, Wisconsin

April 12, 2016
Audit/Budget/Finance Standing Committee

Monthly Financial Statement Highlights (As of 2/29/2016)

As requested by committee members, the KUSD Finance Department is providing a brief cover report with notable highlights to accompany the standard monthly financial statements.

Revenues:

- General State Aid (Equalization Aid = $152.6 MM): Expected 39.3%, Actual 39.3%
- Categorical Aid ($150/pupil = $3.3 MM): Expected 0%, Actual 0%
- State High Poverty Aid ($1.49 MM): Expected 0%, Actual 0%
- Tax Levy Collections ($89.4 MM): Expected 63.90%, Actual 64.15%
- Medicaid Payments ($3.64 MM): Year to date $93,887

Expenses (includes operating funds 10 and 27 only):

- Salaries
    - District Funded
        - Teachers (Budget $101,852,000): Expected 59.40%, Actual 59.32%
        - Administration (Budget $11,755,000):Expected 62.70%, Actual 62.15%
    - Grant Funded
        - Teachers (Budget $3,480,000): Expected 59.40%, Actual 56.55%
        - Administration (Budget $519,000): Expected 62.70% Actual 64.71%
- Benefits
    - District Funded
        - Health (Budget $39,970,000): Expected 60%, Actual 59.40%
        - Dental (Budget $2,412,000): Expected 60%, Actual 59.33%
    - Grant Funded
        - Health (Budget $2,036,000): Expected 60%, Actual 54.49%
        - Dental (Budget $118,000: Expected 60%, Actual 53.89%

Notable Items:

- The next equalization aid payment is expected on March 28, 2016.
- The $150/pupil Categorical Aid payment is being delayed for 2015-16 per WI Act 55. This aid amount was previously paid in March; it will be delayed until July, 2016.
- With the exception of grant funded positions, salaries and benefits are tracking consistent to expected values.
- Medicaid payments are inconsistent and subject to delays. Prior year cost settlements are expected to be recorded as revenue in fund 10 ($2.64 MM) and current year claims are expected to be recorded in fund 27 ($1 MM).

Administrative Recommendation

Administration requests that the Audit/Budget/Finance Standing Committee review and accept the attached reports.

Dr. Sue Savaglio-Jarvis	Tarik Hamdan	Lisa M. Salo, CPA
Superintendent of Schools	Chief Financial Officer	Accounting Manager

Kenosha Unified School District No 1

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 10 General Fund

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	42,222,192	42,222,192			36,805,631	36,805,631			
200	Local revenues	73,143,331	72,596,867	546,465	99.25	75,148,855	74,373,603	775,252	98.97	75,074,875
300	Interdistrict revenues	400,000	0	400,000	0.00	350,000	0	350,000	0.00	487,120
500	Intermediate revenues	15,000	15,000	0	100.00	35,383	128	35,254	0.36	21,478
600	State aid	159,822,199	60,356,494	99,465,705	37.76	157,603,981	59,686,261	97,917,720	37.87	157,625,534
700	Federal aid	12,889,109	3,974,613	8,914,496	30.84	12,881,356	1,174,365	11,706,991	9.12	11,151,377
800	Debt proceeds	0	54,686	-54,686		0	141,665	-141,665		185,463
900	Revenue adjustments	470,532	446,171	24,360	94.82	490,375	488,246	2,129	99.57	683,748
	Total Revenues	**246,740,171**	**137,443,831**	**109,296,341**	**55.70**	**246,509,950**	**135,864,268**	**110,645,682**	**55.12**	**245,229,596**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	119,446,309	71,339,370		48,106,939	59.73	119,846,997	69,971,521		49,875,476	58.38	116,659,708
200	Benefits	59,924,668	33,749,187	1,056	26,174,425	56.32	57,897,804	31,877,556	1,410	26,018,838	55.06	56,583,847
300	Purchased Services	20,599,805	10,927,775	1,098,321	8,573,709	58.38	21,863,491	11,893,971	1,181,587	8,787,933	59.81	21,273,428
400	Supplies	9,664,880	5,774,638	788,553	3,101,688	67.91	11,039,404	7,121,476	955,728	2,962,201	73.17	10,471,201
500	Capital Outlay	1,933,920	1,203,712	75,917	654,291	66.17	2,274,185	1,285,340	159,312	829,533	63.52	1,896,499
600	Debt Services	272,615	141,461		131,154	51.89	326,676	152,966		173,710	46.82	197,742
700	Insurance	718,584	660,792		57,792	91.96	736,164	522,726	0	213,438	71.01	576,337
800	Operating Transfers Out	33,577,430	14,986,701		18,590,728	44.63	33,065,188	18,363,561		14,701,627	55.54	31,645,286
900	Other objects	1,054,596	284,594	9,914	760,088	27.93	679,052	195,271	33,051	450,730	33.62	508,899
	Total Expenditures	**247,192,806**	**139,068,232**	**1,973,761**	**106,150,814**	**57.06**	**247,728,961**	**141,384,388**	**2,331,087**	**104,013,486**	**58.01**	**239,812,946**
	Net Revenue/Expenses	**-452,635**	**-1,624,401**				**-1,219,012**	**-5,520,120**				**5,416,650**
	Fund Balance - Ending	**41,769,558**	**40,597,791**				**35,586,620**	**31,285,511**				**42,222,282**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016 /Bitech-gl_bs_mgmt02_rpt

Fund 21 Special Revenue Trust

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	10,347	10,347			0	0			
200	Local revenues	2,097	6,292	-4,195	300.05	0	0	0		0
900	Revenue adjustments	101,032	145,659	-44,626	144.17	0	0	0		10,347
	Total Revenues	**103,129**	**151,951**	**-48,821**	**147.34**	**0**	**0**	**0**		**10,347**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	0	2,282		-2,282		0	0		0		0
200	Benefits	0	271		-271		0	0		0		0
300	Purchased Services	0	8,680	0	-8,680		0	0		0		0
400	Supplies	101,032	19,696	1,550	79,786	21.03	0	0		0		0
500	Capital Outlay	2,097	0	3,000	-903	143.06	0	0		0		0
900	Other objects	0	2,335		-2,335		0	0		0		0
	Total Expenditures	**103,129**	**33,264**	**4,550**	**65,315**	**36.67**	**0**	**0**		**0**		**0**
	Net Revenue/Expenses	**0**	**118,686**				**0**	**0**				**10,347**
	Fund Balance - Ending	**10,347**	**129,033**				**0**	**0**				**10,347**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 25 Head Start

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	0	0			0	0			
700	Federal aid	1,987,371	903,190	1,084,181	45.45	1,989,486	958,142	1,031,344	48.16	1,934,953
	Total Revenues	**1,987,371**	**903,190**	**1,084,181**	**45.45**	**1,989,486**	**958,142**	**1,031,344**	**48.16**	**1,934,953**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	1,038,372	566,793		471,579	54.58	1,013,920	636,613		377,307	62.79	1,015,137
200	Benefits	622,871	393,282		229,589	63.14	784,612	425,252		359,359	54.20	701,765
300	Purchased Services	192,384	55,468	26,398	110,518	42.55	138,198	57,680	25,160	55,358	59.94	169,762
400	Supplies	122,643	23,859	11,304	87,480	28.67	41,719	25,088	521	16,110	61.38	37,598
500	Capital Outlay	9,000	6,018		2,982	66.86	9,036	5,555		3,481	61.48	8,564
900	Other objects	2,101	0		2,101	0.00	2,001	150		1,851	7.49	2,126
	Total Expenditures	**1,987,371**	**1,045,420**	**37,701**	**904,250**	**54.50**	**1,989,486**	**1,150,339**	**25,681**	**813,466**	**59.11**	**1,934,953**
	Net Revenue/Expenses	**0**	**-142,229**				**0**	**-192,197**				**0**
	Fund Balance - Ending	**0**	**-142,229**				**0**	**-192,197**				**0**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 27 Special Education

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	Fiscal
	Fund Balance - Beginning	0	0			0	0			
100	Operating Transfers In	33,077,430	14,486,701	18,590,728	43.80	32,565,188	17,863,561	14,701,627	54.85	31,132,806
200	Local revenues	9,000	5,694	3,306	63.27	8,000	5,226	2,774	65.33	9,438
600	State aid	10,683,620	6,376,163	4,307,457	59.68	10,791,667	6,288,259	4,503,408	58.27	10,829,724
700	Federal aid	8,871,570	1,908,822	6,962,748	21.52	8,595,101	1,618,197	6,976,904	18.83	3,971,966
	Total Revenues	**52,641,620**	**22,777,380**	**29,864,240**	**43.27**	**51,959,956**	**25,775,243**	**26,184,713**	**49.61**	**45,943,934**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	Fiscal
100	Salaries	28,424,812	16,411,344		12,013,468	57.74	28,736,444	16,100,698		12,635,745	56.03	27,145,934
200	Benefits	16,232,511	8,994,518		7,237,993	55.41	15,963,373	8,447,015		7,516,357	52.91	15,203,429
300	Purchased Services	3,516,308	2,385,733	636,243	494,331	85.94	4,726,963	2,352,522	448,765	1,925,676	59.26	3,254,505
400	Supplies	1,001,484	198,861	25,513	777,110	22.40	1,941,438	159,994	48,952	1,732,492	10.76	313,271
500	Capital Outlay	0	1,874	1,679	-3,553		11,739	18,708	0	-6,969	159.37	22,302
900	Other objects	3,466,504	2,955	183	3,463,366	0.09	580,000	4,133	0	575,867	0.71	4,582
	Total Expenditures	**52,641,620**	**27,995,286**	**663,619**	**23,982,714**	**54.44**	**51,959,956**	**27,083,071**	**497,717**	**24,379,168**	**53.08**	**45,944,023**
	Net Revenue/Expenses	**0**	**-5,217,907**				**0**	**-1,307,828**				**-89**
	Fund Balance - Ending	**0**	**-5,217,907**				**0**	**-1,307,828**				**-89**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 30-39 Debt Services Fund

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	2,240,383	2,240,383			3,278,974	3,278,974			
100	Operating Transfers In	850,000	850,000	0	100.00	500,000	500,000	0	100.00	500,000
200	Local revenues	16,825,595	16,829,096	-3,501	100.02	15,021,203	15,020,015	1,188	99.99	15,022,587
800	Debt proceeds	15,589,240	15,589,246	-6	100.00	0	0	0		0
900	Revenue adjustments	1,024,221	757,348	266,873	73.94	1,044,705	796,835	247,871	76.27	1,056,395
	Total Revenues	**34,289,056**	**34,025,690**	**263,366**	**99.23**	**16,565,909**	**16,316,850**	**249,059**	**98.50**	**16,578,982**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
600	Debt Services	32,802,755	17,209,430		15,593,326	52.46	17,617,572	2,422,574		15,194,999	13.75	17,617,572
800	Operating Transfers Out	350,000	350,000		0	100.00	0	0		0		0
	Total Expenditures	**33,152,755**	**17,559,430**		**15,593,326**	**52.97**	**17,617,572**	**2,422,574**		**15,194,999**	**13.75**	**17,617,572**
	Net Revenue/Expenses	**1,136,301**	**16,466,260**				**-1,051,664**	**13,894,276**				**-1,038,591**
	Fund Balance - Ending	**3,376,684**	**18,706,644**				**2,227,310**	**17,173,250**				**2,240,383**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 40-49 Capital Project Fund

		2016					2015					
	Source	**Budget**	**Actual**		**Balance**	**% Rec**	**Budget**	**Actual**		**Balance**	**% Rec**	**Fiscal**
	Fund Balance - Beginning	3,464,984	3,464,984				13,490,260	13,490,260				
200	Local revenues	17,700	28,424		-10,724	160.59	10,000	13,443		-3,443	134.43	25,572
800	Debt proceeds	16,700,000	16,700,000		0	100.00	0	0		0		0
900	Revenue adjustments	0	138,281		-138,281		0	12,000		-12,000		98,625
	Total Revenues	**16,717,700**	**16,866,705**		**-149,005**	**100.89**	**10,000**	**25,443**		**-15,443**	**254.43**	**124,197**

		2016					2015					
	Object	**Budget**	**Actual**	**Encumbered**	**Balance**	**% Used**	**Budget**	**Actual**	**Encumbered**	**Balance**	**% Used**	**Fiscal**
300	Purchased Services	8,115,823	3,944,659	93,960	4,077,205	49.76	12,735,000	5,585,805	65,460	7,083,736	44.38	10,146,227
400	Supplies	0	0		0		0	3,246		-3,246		3,246
	Total Expenditures	**8,115,823**	**3,944,659**	**93,960**	**4,077,205**	**49.76**	**12,735,000**	**5,589,051**	**65,460**	**7,080,490**	**44.40**	**10,149,474**
	Net Revenue/Expenses	**8,601,877**	**12,922,047**				**-12,725,000**	**-5,563,608**				**-10,025,276**
	Fund Balance - Ending	**12,066,861**	**16,387,031**				**765,260**	**7,926,653**				**3,464,984**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 50 Food Service

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	2,579,425	2,579,425			2,763,872	2,763,872			
100	Operating Transfers In	0	0	0		0	0	0		12,480
200	Local revenues	2,647,201	1,290,959	1,356,243	48.77	2,647,964	1,232,464	1,415,500	46.54	1,943,626
600	State aid	140,000	0	140,000	0.00	140,000	0	140,000	0.00	138,075
700	Federal aid	5,676,395	3,206,353	2,470,042	56.49	5,731,383	3,006,674	2,724,709	52.46	6,372,775
900	Revenue adjustments	0	0	0		0	0	0		-144
	Total Revenues	**8,463,596**	**4,497,312**	**3,966,284**	**53.14**	**8,519,347**	**4,239,139**	**4,280,209**	**49.76**	**8,466,812**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	2,146,898	1,252,601		894,297	58.34	2,132,708	1,226,377		906,331	57.50	2,173,138
200	Benefits	797,206	461,185		336,021	57.85	795,474	447,090		348,384	56.20	777,877
300	Purchased Services	268,275	452,169	69,897	-253,790	194.60	268,275	91,502	177,461	-688	100.26	352,738
400	Supplies	5,027,106	2,551,752	1,409,945	1,065,409	78.81	5,098,780	2,488,809	2,200,246	409,724	91.96	4,428,091
500	Capital Outlay	104,000	62,086	294,692	-252,778	343.06	104,000	693,315	21,008	-610,323	686.85	853,435
900	Other objects	120,111	1,899	0	118,212	1.58	120,111	36,461		83,649	30.36	65,980
	Total Expenditures	**8,463,596**	**4,781,692**	**1,774,534**	**1,907,370**	**77.46**	**8,519,347**	**4,983,554**	**2,398,715**	**1,137,078**	**86.65**	**8,651,260**
	Net Revenue/Expenses	**0**	**-284,380**				**0**	**-744,416**				**-184,447**
	Fund Balance - Ending	**2,579,425**	**2,295,045**				**2,763,872**	**2,019,457**				**2,579,425**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

Fund 60 Student Activity Fund

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
300	Purchased Services	0	0		0		0	0		0		0
400	Supplies	0	-267,485	25,723	241,763		0	-307,604	27,135	280,469		0
900	Other objects	0	0		0		0	0		0		0
	Total Expenditures	**0**	**-267,485**	**25,723**	**241,763**		**0**	**-307,604**	**27,135**	**280,469**		**0**
	Net Revenue/Expenses	**0**	**267,485**				**0**	**307,604**				**0**
	Fund Balance - Ending	**0**	**267,485**				**0**	**307,604**				**0**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 70-79 Trust Funds

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	14,668,573	14,668,573			11,692,538	11,692,538			
200	Local revenues	19,000	10,806	8,194	56.87	18,000	13,820	4,180	76.78	19,471
900	Revenue adjustments	9,981,000	2,418,221	7,562,779	24.23	10,025,000	3,379,996	6,645,004	33.72	11,957,160
	Total Revenues	**10,000,000**	**2,429,026**	**7,570,974**	**24.29**	**10,043,000**	**3,393,816**	**6,649,184**	**33.79**	**11,976,631**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
200	Benefits	0	4,138,232	47,478	-4,185,710		0	4,231,685	62,641	-4,294,326		0
300	Purchased Services	0	510		-510		0	0		0		23,937
900	Other objects	9,500,000	5		9,499,995	0.00	9,500,000	0		9,500,000	0.00	8,978,386
	Total Expenditures	**9,500,000**	**4,138,747**	**47,478**	**5,313,775**	**44.07**	**9,500,000**	**4,231,685**	**62,641**	**5,205,674**	**45.20**	**9,002,323**
	Net Revenue/Expenses	**500,000**	**-1,709,721**				**543,000**	**-837,870**				**2,974,308**
	Fund Balance - Ending	**15,168,573**	**12,958,852**				**12,235,538**	**10,854,669**				**14,666,374**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016 /Bitech-gl_bs_mgmt02_rpt

Fund 81 Recreation Services Program

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	52,711	52,711			186,560	186,560			
200	Local revenues	550,000	523,478	26,522	95.18	420,000	396,623	23,377	94.43	418,279
	Total Revenues	**550,000**	**523,478**	**26,522**	**95.18**	**420,000**	**396,623**	**23,377**	**94.43**	**418,279**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	312,039	185,965		126,075	59.60	312,039	184,491		127,548	59.12	293,869
200	Benefits	146,216	86,794		59,422	59.36	151,828	92,563		59,265	60.97	154,032
300	Purchased Services	53,200	19,338	9,124	24,739	53.50	51,360	24,575	10,038	16,747	67.39	55,224
400	Supplies	23,839	2,967	1,827	19,046	20.11	23,839	1,864	1,193	20,782	12.82	6,289
500	Capital Outlay	0	673	0	-673		1,840	14,396	9,898	-22,454	1,320.32	40,862
900	Other objects	4,000	776	0	3,224	19.40	4,000	857	0	3,143	21.42	1,853
	Total Expenditures	**539,295**	**296,512**	**10,950**	**231,832**	**57.01**	**544,907**	**318,746**	**21,128**	**205,032**	**62.37**	**552,129**
	Net Revenue/Expenses	**10,705**	**226,966**				**-124,907**	**77,877**				**-133,850**
	Fund Balance - Ending	**63,416**	**279,676**				**61,654**	**264,438**				**52,711**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016 /Bitech-gl_bs_mgmt02_rpt

Fund 82 Athletic Venues

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	0	0			5,059	5,059			
200	Local revenues	0	23,117	-23,117		29,125	26,778	2,347	91.94	28,378
	Total Revenues	**0**	**23,117**	**-23,117**		**29,125**	**26,778**	**2,347**	**91.94**	**28,378**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	0	11,549		-11,549		10,000	8,593		1,407	85.93	11,628
200	Benefits	0	1,434		-1,434		0	477		-477		661
300	Purchased Services	0	5,099		-5,099		10,000	6,716		3,284	67.16	10,652
400	Supplies	0	0		0		380	2,000	0	-1,619	525.88	4,695
900	Other objects	0	0		0		0	0		0		5,802
	Total Expenditures	**0**	**18,082**		**-18,082**		**20,380**	**17,786**	**0**	**2,594**	**87.27**	**33,437**
	Net Revenue/Expenses	**0**	**5,034**				**8,745**	**8,992**				**-5,059**
	Fund Balance - Ending	**0**	**5,034**				**13,804**	**14,051**				**0**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 83 Community Services Program

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	2,275,477	2,275,477			1,768,941	1,768,941			
200	Local revenues	1,000,000	1,000,000	0	100.00	1,130,000	1,130,000	0	100.00	1,130,000
	Total Revenues	**1,000,000**	**1,000,000**	**0**	**100.00**	**1,130,000**	**1,130,000**	**0**	**100.00**	**1,130,000**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
100	Salaries	233,347	142,932		90,415	61.25	241,143	137,593		103,551	57.06	231,487
200	Benefits	90,406	52,397		38,010	57.96	67,808	38,530		29,278	56.82	75,284
300	Purchased Services	281,312	126,355	151,291	3,666	98.70	280,289	136,183	133,483	10,623	96.21	279,583
400	Supplies	35,274	21,288	7,020	6,966	80.25	38,220	14,553	14,162	9,506	75.13	31,822
500	Capital Outlay	396,932	0		396,932	0.00	396,932	0		396,932	0.00	0
900	Other objects	0	0		0		0	0		0		5,288
	Total Expenditures	**1,037,271**	**342,971**	**158,312**	**535,988**	**48.33**	**1,024,392**	**326,857**	**147,645**	**549,889**	**46.32**	**623,464**
	Net Revenue/Expenses	**-37,271**	**657,029**				**105,608**	**803,143**				**506,536**
	Fund Balance - Ending	**2,238,206**	**2,932,506**				**1,874,549**	**2,572,083**				**2,275,477**

Budget to Actual Comparison Report by Fund Groups

2015 - 2016 Fund Summary Budget

For the Period Ended 2/29/2016

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Fund 85 CLC After School Program

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	2015 Fiscal
	Fund Balance - Beginning	40,660	40,660			72,465	72,465			
500	Intermediate revenues	0	0	0		0	350	-350		350
	Total Revenues	**0**	**0**	**0**		**0**	**350**	**-350**		**350**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	2015 Fiscal
300	Purchased Services	35,000	0		35,000	0.00	16,400	0		16,400	0.00	32,154
	Total Expenditures	**35,000**	**0**		**35,000**	**0.00**	**16,400**	**0**		**16,400**	**0.00**	**32,154**
	Net Revenue/Expenses	**-35,000**	**0**				**-16,400**	**350**				**-31,804**
	Fund Balance - Ending	**5,660**	**40,660**				**56,065**	**72,814**				**40,660**

Kenosha Unified School District No 1

Budget to Actual Comparison Report

2015 - 2016 District Summary Budget

For the Period Ended 2/29/2016

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All Funds

	Source	2016 Budget	2016 Actual	2016 Balance	2016 % Rec	2015 Budget	2015 Actual	2015 Balance	2015 % Rec	Fiscal
	Fund Balance - Beginning	67,554,752	67,554,752			70,064,301	70,064,301			
100	Operating Transfers In	33,927,430	15,336,701	18,590,728	45.20	33,065,188	18,363,561	14,701,627	55.54	31,645,286
200	Local revenues	94,213,924	92,314,731	1,899,193	97.98	94,433,147	92,211,973	2,221,174	97.65	93,672,227
300	Interdistrict revenues	400,000	0	400,000	0.00	350,000	0	350,000	0.00	487,120
500	Intermediate revenues	15,000	15,000	0	100.00	35,383	478	34,905	1.35	21,828
600	State aid	170,645,819	66,732,657	103,913,162	39.11	168,535,648	65,974,520	102,561,128	39.15	168,593,333
700	Federal aid	29,424,445	9,992,978	19,431,467	33.96	29,197,326	6,757,378	22,439,948	23.14	23,431,072
800	Debt proceeds	32,289,240	32,343,932	-54,692	100.17	0	141,665	-141,665		185,463
900	Revenue adjustments	11,576,785	3,905,680	7,671,105	33.74	11,560,081	4,677,077	6,883,004	40.46	13,806,130
	Total Revenues	**372,492,643**	**220,641,680**	**151,850,964**	**59.23**	**337,176,773**	**188,126,651**	**149,050,121**	**55.79**	**331,842,459**

	Object	2016 Budget	2016 Actual	2016 Encumbered	2016 Balance	2016 % Used	2015 Budget	2015 Actual	2015 Encumbered	2015 Balance	2015 % Used	Fiscal
100	Salaries	151,601,778	89,912,836		61,688,942	59.31	152,293,251	88,265,886		64,027,366	57.96	147,530,900
200	Benefits	77,813,878	47,877,300	48,534	29,888,044	61.59	75,660,897	45,560,169	64,050	30,036,678	60.30	73,496,896
300	Purchased Services	33,062,107	17,925,786	2,085,233	13,051,087	60.53	40,089,976	20,148,954	2,041,953	17,899,069	55.35	35,598,210
400	Supplies	15,976,259	8,325,576	2,271,436	5,379,248	66.33	18,183,780	9,509,425	3,247,937	5,426,418	70.16	15,296,213
500	Capital Outlay	2,445,949	1,274,363	375,288	796,298	67.44	2,797,732	2,017,315	190,217	590,200	78.90	2,821,663
600	Debt Services	33,075,370	17,350,891		15,724,479	52.46	17,944,248	2,575,539		15,368,709	14.35	17,815,314
700	Insurance	718,584	660,792		57,792	91.96	736,164	522,726	0	213,438	71.01	576,337
800	Operating Transfers Out	33,927,430	15,336,701		18,590,728	45.20	33,065,188	18,363,561		14,701,627	55.54	31,645,286
900	Other objects	14,147,312	292,564	10,097	13,844,651	2.14	10,885,164	236,872	33,051	10,615,241	2.48	9,572,917
	Total Expenditures	**362,768,667**	**198,956,810**	**4,790,588**	**159,021,269**	**56.16**	**351,656,401**	**187,200,447**	**5,577,209**	**158,878,746**	**54.82**	**334,353,734**
	Net Revenue/Expenses	**9,723,976**	**21,684,870**				**-14,479,629**	**926,204**				**-2,511,275**
	Fund Balance - Ending	**77,278,729**	**89,239,622**				**55,584,672**	**70,990,505**				**67,552,554**

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KENOSHA UNIFIED SCHOOL BOARD
PERSONNEL/POLICY MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A meeting of the Kenosha Unified Personnel/Policy Committee chaired by Mr. Kunich was called to order at 6:06 P.M. with the following committee members present: Mrs. Snyder, Ms. Stevens, Mrs. Hamilton, Mr. Moore, Mr. Jenewein, and Mr. Kunich. Mr. Keckler was also present. Mrs. Stephens was excused and Mrs. Dahl was absent.

Approval of Minutes – December 1, 2015 Personnel/Policy
Mrs. Snyder moved to approve the minutes as presented in the agenda. Ms. Stevens seconded the motion. Unanimously approved.

Policies and Rules 1213, 3535, and 4226
Mrs. Tanya Ruder, Executive Director of Community Partnerships and Media Relations, presented Policies and Rules 1213 - Web Publication, 3535 - Technology Acceptable Use, and 4226 - Online Forum and explained that each policy and rule currently refer to the appropriate use of technology and the content that is posted on online forums, including websites, social media, blogs and other various forums. While each of the policies independently served a purpose in the past, the district's legal advisors recommend streamlining the three policies into one to better allow the district to uphold what is contained within them. By streamlining, the district will have one policy regarding acceptable use of technology for staff. The major changes consist of cleaning up language to delineate between an employee's personal use and professional use of social media, discourage the use of personal email and social media accounts as a tool to communicate with students, to allow the District to post/share appropriate student information as allowable under FERPA, Wis. Stat. 118.25 and the District's Student Records Policy, and to restrict solicitation for personal commercial use as well as for outside organizations.

Mrs. Snyder moved to forward revised Policy and Rule 4226 – Staff Technology Acceptable Use Policy to the full Board for consideration. Ms. Stevens seconded the motion. Unanimously approved.

Policy and Rule 6633 – Student Technology Acceptable Use Policy
Mr. Kristopher Keckler, Executive Director of Information and Accountability, presented Policy and Rule 6633 – Student Technology Acceptable Use Policy. He noted that the policy refers to the expectations for district students and their various interactions with technology. The policy has been revised to align with other district policies related to overall technology and to remove redundant phrases. There were no questions from Committee members.

Mr. Moore moved to forward Policy and Rule 6633 – Student Technology Acceptable Use Policy to the full Board for approval. Ms. Stevens seconded the motion. Unanimously approved.

Information Item
Mr. Keckler presented the School Year 2016-2017 Preliminary Enrollment Projections. He noted that the projections are composed by utilizing enrollment trends, birth rates and cohort survival

rates. He explained that an enrollment decline for the next three years is expected due mainly to declining birth rates. Mr. Keckler answered questions from Committee members.

There were no questions on the Recommendations Concerning Appointments, Leaves of Absence, Retirements and Resignations.

Future Agenda Items

Mrs. Ruder noted that Policy 4200 – General Personnel Policies would be presented in April as noted in the agenda.

Ms. Stevens moved to adjourn the meeting. Mrs. Snyder seconded the motion. Unanimously approved.

Meeting adjourned at 6:24 P.M.

Stacy Schroeder Busby
School Board Secretary

April 12, 2016

Personnel/Policy Standing Committee

POLICY 4200 – GENERAL PERSONNEL POLICIES

Background:

Policy 4200 must be updated to reflect the District's move from collectively bargained agreements to an Employee Handbook as of November 2014. This update will require all 4000 series policies to include a cross reference of the Employee Handbook effective upon approval the updated policy.

In addition, this policy would benefit from requiring all policies to include any applicable state and federal laws and/or guidelines in the legal reference section.

Administration Recommendation:

Administration recommends that the Personnel/Policy committee forward these recommendations to the school board for a first read on April 25, 2016, and a second read on May 24, 2016.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Tanya Ruder
Executive Director of Community Partnerships and Media Relations

POLICY 4200

GENERAL PERSONNEL POLICIES

Personnel **District** policies ~~for the various categories of employees~~ shall ~~include the respective School Board agreements~~.**include a cross reference to the current Employee Handbook.**

All District policies, regardless of series, shall include legal references for all applicable state and federal laws and/or guidelines.

CROSS REF.: ~~Current Employee Agreements~~**Employee Handbook**

ADMINISTRATIVE REGULATIONS: None

AFFIRMED: April 22, 1991

REVISED: June 27, 2000

KENOSHA UNIFIED SCHOOL DISTRICT

April 12, 2016
Personnel/Policy Standing Committee

Policy and Rule 5434 – Alcohol and Other Drugs - Students

Rationale

It is critical that principals are enabled with flexibility in suspending or expelling students for infractions of this policy due to varying degrees and circumstances of the violation.

Background

Policy and Rule 5434 - Alcohol and Other Drugs – Students was last revised in 2009. Revisions to this policy were developed with input from the Community Council Committee. This committee is comprised of representatives from local law enforcement, the judicial system, Kenosha County Children and Family Services, parents, KUSD teachers and administrators. This committee researched AODA policies from school districts in Wisconsin and near the Illinois border. Districts that were reviewed included Racine, Milwaukee, Janesville, Green Bay, Waukesha, Beloit, Fond du Lac, Madison, Lake Forest, Waukegan, and Chicago. In all of our research, we found that Kenosha Unified's AODA policy is a comprehensive policy. However, the committee felt that there is a need for administrators to have flexibility with the determination for suspension and/or expulsion of students. The current policy has a mandatory suspension of three days or five days listed in it. The updated policy would allow principals/administrators to determine the need for a suspension and/or expulsion for up to three days or five days.

Administrative Recommendation

Administration recommends that the Personnel/Policy Committee forward Policy and Rule 5434 to the School Board for a first reading at the April 25, 2016, regular meeting and a second reading at the May 24, 2016, regular meeting.

Sue Savaglio-Jarvis
Superintendent

Susan Valeri
Director of Special Education/Student Support

POLICY 5434
ALCOHOL AND OTHER DRUGS - STUDENTS

The District is committed to providing a school environment free of alcohol and drugs. These substances interfere with the learning environment and performance of students. For purposes of this policy, "drugs" include all controlled substances, inhalants covered under the state Uniform Controlled Substances Act and any other substance that alters perception or behavior reducing that individual's ability to function appropriately in the academic environment. This prohibition does not apply to students who are using prescribed or over-the-counter medication according to district policy and guidelines.

The following actions are expressly prohibited by students on school property, on school buses, and at school sponsored activities:

1. Use or possession of alcoholic beverages, drugs or drug paraphernalia, or is suspected to be under the influence of alcoholic beverages or drugs.
2. Sale, delivery, manufacture, or intent to sell, deliver or manufacture alcohol, drugs or drug paraphernalia. Intent may be shown by evidence of the quantity and monetary value of the substance or materials possessed.
3. Use, possession, delivery, sale or intent to sell or deliver over-the-counter medication or other substance~~s~~ that is believed to be or is represented as a drug or alcohol regardless of the true nature of the substance. The intent to sell or deliver may be shown by evidence of the quantity and monetary value of above indicated substances.
4. Sale, delivery, or intent to sell or deliver prescription drugs. Intent may be shown by evidence of the quantity and/or monetary value of the substance or materials possessed.

Students who violate this policy will be referred to law enforcement officials and shall be subject to disciplinary action. School officials and teachers are not liable for referring students to law enforcement or for removing a student from school grounds or activities because of suspected alcohol or controlled substance possession, distribution, delivery, or consumption.

LEGAL REF.: Wisconsin Statutes Sections:

118.127	Peace officers' records
118.257	Liability for referral to police
118.45	Student alcohol breath testing
120.13(1)	School board powers: school government; suspension, expulsion
125.O2(8m)	Definitions – "legal drinking age"
125.O37	Underage and intoxicated persons; presence on licensed premises
125.O9	General restriction

Chapter 961 State Controlled Substances Law

CROSS REF.: 5430 Student Conduct and Discipline
5473 Suspensions
5474 Student Expulsion
5475 Students with Disabilities
5534 Medication

AFFIRMED: August 13, 1991

REVISED: October 8, 1996
September 9, 1997
July 23, 2002
June 23, 2009
March 3, 2016

RULE 5434
ALCOHOL AND OTHER DRUGS - STUDENTS

1. Use or Possession of Alcoholic Beverages, Drugs or Drug Paraphernalia, or Suspected to be Under the Influence of Alcoholic Beverages or Drugs, or Inappropriate Use of Prescription Drugs

The principal/designee will remove students using, or in possession of alcohol, drugs (as defined by Board Policy) or drug paraphernalia, suspected to be under the influence of alcohol or drugs, or for inappropriate use of prescription drugs from contact with other students. The parent/guardian/caregiver will be contacted immediately by the principal/designee and the **Office of** Student Support ~~staff member~~ will ~~also~~ be notified. **In the instance of any drug violation, ~~T~~the** police will be notified by the principal/designee. ~~Students will face immediate suspension from school for three days with referral to the Administrative Review Committee for expulsion consideration.~~ **The students may be referred to the Administrative Review Committee**.

- In making a referral to the Administrative Review Committee, the building principal may present a signed Abeyance Request/Refusal form for first offense student violations. Through this process the student will have the opportunity to request that the Administrative Review Committee recommendation be held in abeyance while the student voluntarily completes a District alcohol or other drug abuse screening (AODA) education, counseling program and/or AODA assessment by a certified AODA counselor. AODA assessment and recommendations for treatments must be submitted within 60 days. Written proof of completion of the recommended treatment plan will be provided to the principal/designee within established timeframes. Failure to complete an AODA education, counseling program and/or AODA assessment as outlined above shall result in an Administrative Review Committee recommendation for expulsion consideration on the original policy violation.
- Subsequent violations of Policy 5434 shall result in referral to the Administrative Review Committee for expulsion consideration.
- When a student is suspected to be under the influence of alcohol, but the student denies alcohol use, the student may be required by a principal/designee to submit to an alcohol breath test to determine the presence of alcohol. A Wisconsin Department of Transportation approved screening device must be used by an authorized employee, agent or officer. The results of the test for the presence of alcohol or the fact that a student refuses to submit to required breath testing may be used in any hearing or proceeding regarding the discipline, ~~suspension~~ ~~expulsion~~ of a student due to alcohol use.
- Under circumstances where a student denies alcohol use and a breath screening test is not used, the student may arrange an appropriate test to determine the presence of alcohol or provide other evidence explaining the behavior within three hours of the incident.
- When a student is suspected to be under the influence of drugs other than alcohol, but the student denies drug use, the student may arrange an appropriate test to determine the presence of other drugs or present other evidence explaining the behavior within 24 hours of the incident. All drug tests must follow the guidelines set forth by the District.
- In cases when a breath screening device is used or where student elected testing is chosen, no penalty will be imposed if testing is negative. If testing is positive or the student elects not to participate in the breath screening, the student will be subject to the procedures stated above.

2. Inappropriate Use or Possession of Over-The-Counter Medication or Other Substance and Believed to be or is Represented as a Drug or Alcohol Regardless of the True Nature of the Substance

   The principal/designee will remove student using or possessing substances that are believed to be or are represented as a drug or alcohol, regardless of the nature of the substances, from contact with other students. The parent/guardian/caregiver will be contacted immediately by the principal/designee and the Student Support staff member will also be notified. Students ~~will~~ **may** face a suspension from school ~~for~~ **up to** three days with referral to the Administrative Review Committee for expulsion consideration.

   - In making a referral to the Administrative Review committee, the building principal may present a signed Abeyance Request/Refusal form for first offense student violations. Through this process, a student will have the opportunity to request that the Administrative Review Committee recommendation process be held in abeyance while the student voluntarily completes a District alcohol or other drug abuse screening (AODA) education, counseling program and/or AODA assessment by a certified AODA counselor. AODA assessment and recommendations for treatment must be submitted within 60 calendar days. Written proof of AODA assessment and completion of the recommended treatment plan will be provided to the principal within established timeframes. Failure to complete an AODA education, counseling program and/or AODA assessment as outlined above shall result in an Administrative Review Committee recommendation for expulsion consideration on the original policy violation.
   - Subsequent violations of Policy 5434 shall result in referral to the Administrative Review Committee for expulsion consideration.

3. Sale, Delivery, Manufacture, or Intent to Sell, Deliver, or Manufacture Alcohol, Drugs (as defined by Board policy) or Drug Paraphernalia

   The principal/designee will remove the student from contact with other students. Police will be notified by the principal/designee. The parent/guardian/caregiver will be contacted immediately by the principal/designee. Students ~~will~~ **may** face ~~immediate~~ suspension from school ~~for~~ **up to** five days **for delivery or intent to sell** with referral to the Administrative Review Committee for expulsion consideration.

4. Sale, Delivery, or Intent to Sell or Deliver Over-The-Counter Medication or other Substances That is Believed to be or is Represented as a Drug or Alcohol Regardless of the True Nature of the Substance.

   The principal/designee will remove students from contact with other students. The parent/guardian/caregiver will be notified immediately by the principal/designee and the Student Support staff will also be notified. The police will be notified by the principal/designee. Students will face up to a five day suspension from school with referral to the Administrative Review Committee for expulsion consideration.

5. Sale, Delivery or Intent to Sell or Deliver Prescription Drugs

   Sale, delivery or intent to sell or deliver prescription drugs**,** will result in removal from contact with other students. The parent/guardian/caregiver will be contacted immediately by the principal/designee. The police will be notified by the principal/designee. Students will face a suspension from school ~~for~~ **up to** five days with referral to the Administrative Review Committee for expulsion consideration.

Kenosha Unified School District
Kenosha, WI
April 12, 2016

The Human Resources recommendations regarding the following actions:

ACTION	LAST NAME	FIRST NAME	SCHOOL/DEPT	POSITION	STAFF	DATE	FTE	SALARY
Appointment	Salazar	Beatriz	Cesar Chavez Learning Station	Family Literacy/Service Provider	Miscellaneous	04/04/2016	1	$14.73
Appointment	Ayers	Bianca	Prairie Lane Elementary School	Special Education	ESP	04/04/2016	0.5	$15.33
Early Retirement	Wood	Diane	Roosevelt Elementary School	Anchor Teacher	Instructional	06/10/2016	1	$70,157.00
Early, Early Retirement	Boles	Helena	Somers Elementary School	Grade 5	Instructional	06/10/2016	1	$78,396.00
Early, Early Retirement	Hoskin	Mark	Nash Elementary School	Grade 5	Instructional	06/10/2016	1	$70,015.00
Resignation	De Witt	Matthew	Lincoln Middle School	Science	Instructional	03/14/2016	1	$43,069.00
Resignation	Peterson	MaryJo	Bullen Middle School	Secretary I (10 Month)	Secretarial	04/27/2016	1	$17.32
Resignation	Perez	Henry	Bradford High School	Security	ESP	04/10/2016	1	$15.33
Separation	Akalin	Roberta	Bullen Middle School	Guidance	Instructional	03/12/2016	1	$78,396.00

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KENOSHA UNIFIED SCHOOL BOARD
JOINT AUDIT/BUDGET/FINANCE AND
CURRICULUM/PROGRAM MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A joint meeting of the Kenosha Unified Audit/Budget/Finance and Curriculum/Program Committees chaired by Mrs. Snyder was called to order at 6:47 P.M. with the following committee members present: Mr. Flood, Mr. Falkofske, Mr. Kent, Mr. Aceto, Mr. Lawler, Mr. Kunich, Mr. Karabetsos, Mrs. Wickersheim, Ms. Riese, and Mrs. Snyder. Mr. Hamdan was also present. Mr. Wade, Mrs. Dawson, Mr. Holdorf, Mr. Battle, Mr. Leipski, and Ms. Nielsen were excused. Mrs. Santoro and Mr. Wojciechowicz were absent.

Mrs. Snyder noted that due to lack of a quorum no action would be taken.

Mary Frost Ashley Charitable Trust

Mrs. Patricia Demos, Community School Relations Coordinator, presented the Mary Frost Ashley Charitable Trust. She indicated that permission is requested for submission to the Mary Frost Ashley Charitable Trust for a one-year grant proposal titled framework for Health Youth Development: Expanding Family Learning and Student Engagement Program in the amount of $125,000 to further develop the District Family Engagement Training and Education Programs as well as provide meaningful and engaging learning opportunities for student to increase achievement and attendance. Mrs. Demos answered questions from Committee members.

Mrs. Snyder indicated that no vote could be taken due to lack of a quorum and that the item would be forwarded to the full Board for consideration.

Future Agenda Items

No future agenda items were noted.

Meeting adjourned at 6:54 P.M.

Stacy Schroeder Busby
School Board Secretary

KENOSHA UNIFIED SCHOOL BOARD
CURRICULUM/PROGRAM MEETING
Educational Support Center – Room 110
February 9, 2016
MINUTES

A meeting of the Kenosha Unified Curriculum/Program Committee chaired by Mrs. Snyder was called to order at 6:56 P.M. with the following committee members present: Mr. Kunich, Mrs. Karabetsos, Mrs. Wickersheim, Ms. Riese, and Mrs. Snyder. Mrs. Housaman was also present. Mr. Wade and Mrs. Nielsen were excused. Mrs. Santoro and Mr. Wojciechowicz were absent.

Approval of Minutes – January 12, 2016 Curriculum/Program

Mr. Kunich moved to approve the minutes as presented in the agenda. Mrs. Karabetsos seconded the motion. Unanimously approved.

Head Start Semi-Annual Report

Ms. Belinda Grantham, Director of Early Education, presented the Head Start Semi-Annual Report. She noted that site revisions were made at Jefferson Elementary and at Just Kid Inn Childcare with only a PM session being offered at Jefferson and the elimination of the Just Kid Inn Childcare site. The mandated enrollment number of 389 has not been met this school year. As of December 30, 338 students were enrolled. Families will continue to be recruited and progress will be monitored through the monthly HS22 report that is provided to the School Board. 401 families were identified as needing services resulting in 464 referrals to various community agencies in the past five months. Compliance with mandated physical and dental exams were not met as only 74% of students were in compliance opposed to the mandated 90%. The Kenosha Community Health Center (KCHC) continues to be the main provider for exams and support from additional clinics and private providers continue to be sought to bring the program into compliance. Ms. Grantham answered questions from Committee members.

Course Change Proposals for LakeView Technology Academy

Mrs. Julie Housaman, Assistant Superintendent of Teaching and Learning, presented the Course Change Proposal for LakeView Technology Academy and explained that the rise of cloud services provides companies with cheaper alternatives to maintain their own networks. As a result, the market in networking is becoming oversaturated and certifications in networking are diminishing in value. However, computer programming and web development are predicted to be among the most in-demand jobs in 2016. Therefore, beginning with the 2016-2017 school year LakeView, under the guidance of Gateway Technical College, is proposing a shift in instructional foci in the Information Technology Academy from networking to computer programing and web development. The transition will take two years to implement. Mrs. Housaman answered questions from Committee members.

Mr. Kunich moved to forward the course proposals and course elimination requests to shift the instructional foci from networking to computer programming and web development in the Information Technology Academy at LakeView Technology Academy to the full Board for consideration. Mrs. Karabetsos seconded the motion. Unanimously approved.

New Course Proposal: Foundations of Algebra

Mrs. Housaman presented the New Course Proposal: Foundations of Algebra and explained that despite efforts at the middle school level to improve readiness for high school mathematics, failure rates remain high. Therefore, the new course proposal is being brought forward for approval. The course is designed to support students who, based on several indicators, are likely to struggle in their 9th grade Algebra 1 class by addressing conceptual understanding in key areas as well as skill gaps in key foundational areas that are essential for success in Algebra 1. Mrs. Housaman and Mrs. Jennifer Lawler, Coordinator of Mathematics, answered questions from Committee members.

Mr. Kunich moved to forward the proposal for the addition of Foundations of Algebra course to the full Board for consideration. Mr. Wickersheim seconded the motion. Unanimously approved.

New Course Proposal: Computer Science Fundamentals

Mrs. Housaman presented the New Course Proposal: Computer Science Fundamentals and explained that in the United States it is estimated that 1.2 million workers will be needed in the fields of computer science and mathematics over the next five years. However, the number of students seeking this pathway will only fill approximately 40% of the openings. The addition of the course will provide an opportunity for middle school students to explore career options in computer science. If the course is approved, the curriculum for the course will be developed using multiple resources and teachers will attend training for it.

Mr. Kunich moved to forward the proposal for the addition of the Computer Science Fundamentals course to the full Board for consideration. Mr. Wickersheim seconded the motion. Unanimously approved.

Course Removal and Name Change Proposal: Precalculus

Mrs. Housaman presented the Course Removal and Name Change Proposal: Precalculus. She indicated that in 2006 Advanced Math Analysis-Honors was renamed to Precalculus-Honors; however, Math Analysis was not renamed Precalculus at that time. Therefore, to be consistent with course naming practices, this request is being brought forward to formally happen.

Mr. Kunich moved to forward the proposal for the change of the Math Analysis course to Precalculus to the full Board for consideration. Mr. Wickersheim seconded the motion. Unanimously approved.

Future Agenda Items

Mrs. Snyder noted that the Math Applications along with the Talent Development Long Range Plan could be presented in April.

Mr. Wickersheim moved to adjourn the meeting. Mr. Kunich seconded the motion. Unanimously approved.

Meeting adjourned at 7:23 P.M.

Stacy Schroeder Busby
School Board Secretary

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KENOSHA UNIFIED SCHOOL DISTRICT
KENOSHA, WI

April 12, 2016

NEW COURSE PROPOSAL: AP COMPUTER SCIENCE PRINCIPLES

Background

In the United States it is estimated that 1.2 million workers will be needed in the fields of computer science and mathematics over the next five years. While the demand for employees with this training is rapidly increasing, the number of students seeking this pathway in technical and four-year colleges will only fill approximately 40 percent of the openings. In December 2015 the school board approved the addition of Exploring Computer Science for the senior high schools to begin in 2016-17. Additionally for the 2015-16 school year, the school board approved AP Computer Science A, which is currently taught at LakeView Technology Academy. The proposed course, AP Computer Science Principles, will be offered at LakeView Technology Academy in the fall 2016 and at all comprehensive high schools beginning with the 2017-18 academic year.

Course Change Proposal

In order to implement this additional course in the 2016-17 school year, the Office of Teaching and Learning is providing, for the Board of Education approval, the course addition form (Appendix A). The attached form is completed in full and explains the rationale for the new course addition.

The following table provides the proposed sequence of computer science opportunities for high school students through 2018-19:

Computer Science Opportunities 2015-16	
Lakeview Technology Academy	AP Computer Science A
Computer Science Opportunities 2016-17	
Tremper, Bradford, Indian Trail	Exploring Computer Science
Lakeview Technology Academy	AP Computer Science A
Lakeview Technology Academy	AP Computer Science Principles
Computer Science Opportunities 2017-18	
Tremper, Bradford, Indian Trail	Exploring Computer Science
Tremper, Bradford, Indian Trail, Lakeview Technology Academy	AP Computer Science Principles

Computer Science Opportunities 2018-19	
Tremper, Bradford, Indian Trail	Exploring Computer Science
Tremper, Bradford, Indian Trail, Lakeview Technology Academy	AP Computer Science Principles
Tremper, Bradford, Indian Trail, Lakeview Technology Academy	AP Computer Science A

Recommendation

Administration recommends that the Curriculum/Program Standing Committee forward the proposal for the addition of the AP Computer Science Principles course to the full School Board for consideration.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Ms. Julie Housaman
Assistant Superintendent of Teaching and Learning

Mrs. Jennifer Lawler
Coordinator of Mathematics

Ms. Marsha Nelson
Coordinator of Career and Technical Education

APPENDIX A

COURSE/PROGRAM CHANGE PROPOSAL: SENIOR HIGH SCHOOL

Return this form to your department chair by no later than May 15 for building & committee signatures. Completed forms must be returned to the Director of Instruction by June 15. Type responses on additional sheets when appropriate and attach to this form.

Date Initiated February 18, 2016 Name Marsha Nelson

Department & School Career & Technical Education

Proposed or Removed Course Name **AP Computer Science Principles**

_X_ New Course ___ New Name Length: ___Semester Credits: ___½ Credit

___ Removal/Replacement of Course _X_ Year _X_ 1 Credit

Recommended Prerequisites (if any) **Algebra 1**

Rationale for Course: Explain why this course is needed – It fills a curricular gap, extends course sequence, and addresses needs of a particular learner. How does this course support the district focus on achievement for all students? *Does this course fit the District's approved curriculum cycle?*

This course addresses both the Mission and Vision of the Kenosha Unified School District. AP Computer Science Principles will help prepare our students for what is one of the most in demand occupations in the American economy. The area of Computer Science/Mathematics and people trained to work in this area is of the highest priority to the American economy. The demand for trained people in this field of top paying careers is at a critical state. Our Mission addresses challenging learning opportunities and experiences that will prepare each student for success. AP Computer Science Principles clearly addresses our mission. Kenosha Unified School District currently offers AP Computer Science A (advanced JAVA) and along with AP Computer Science Principles KUSD will be the first, or one of the first school districts in the area to offer both of these courses.

Proposed Course Description: In three or four sentences, write a course overview appropriate for the Course Description Booklet.

AP Computer Science Principles offers a multidisciplinary approach to teaching the underlying principles of computation. The course will introduce students to the creative aspects of programming, abstractions, algorithms, large data sets, the Internet, cybersecurity concerns, and computing impacts. This course gives students the opportunity to use technology to address real-world problems and build relevant solutions.

Content Standards and Benchmarks: List the primary content standards and benchmarks students will be expected to understand and be able to apply as a result of taking this course.

1) Standard: Digital Representation of Information Exploring the technical challenges and questions that arise from the need to represent digital information in computers and transfer it between people and computational devices. (Benchmarks) sending binary messages, encoding and sending numbers, encoding and sending text, and compression and encoding images.
2) Standard: The Internet Discover the structure and design of the Internet and the implications of those design decisions including the reliability of network communication, the security of data, and personal privacy. (Benchmarks) IP addresses, packets, and redundancy, internet algorithms and routing, protocols and abstraction, security and symmetric encryption, hard problems and public key cryptography.

3) Standard: Programming Learn how to program the JAVA Script language and create small applications (apps) that live on the WEB and App Lab. Click and drag visual blocks or just type text, switching back and forth at will. (Benchmarks) procedural abstraction and top down design, reading documentation and loops, event driven programming and apps, variables and strings, conditionals and Boolean logic, loops and arrays and processing arrays and data.
4) Standard: Data Collect, analyze, and extract knowledge from data by programming and building apps. Process data imported from other sources and also pull data from live data APIs. (Benchmarks) interpreting visual data, communication and visualization, big data and the real world.
5) Standard: Performance Tasks Design a project plan, then work independently and collaboratively to complete performance tasks for submission to the College Board. (Benchmarks) preparing for the explore PT and preparing for the create PT.

Pacing Guide/Scope and Sequence: Outline the planned structure for the course, including a tentative timeline for instruction.

- Unit 1: Digital Information (approx. 6 weeks Sept/Oct) Sending Binary Messages, Encoding and sending Numbers, Encoding and Sending Text, Compressing and Encoding Images, and a Performance Task of Encoding an Experience
- Unit 2: The Internet (approx.. 6 weeks Oct/Nov/Dec) IP Addresses, Packets, and Redundancy, Internet Algorithms and Routing, Protocols and Abstractions and a Performance Task of The Internet and Society, and Security and Symmetric Encryption, Hard Problems and Public Key Cryptography and a Performance Task of Cybersecurity Innovations
- Unit 3: Programming (approx. 8 weeks Dec/Jan/Feb) Procedural Abstractions and Top Down Design, Reading Documentation and Loops, and a Performance Task of Design a digital Scene, and Event Driven programming and Apps, Variables and Strings, Conditions and Boolean Logic, Loops and Arrays, Processing Arrays of Data and a Performance Task Improve you App
- Unit 4: Data (approx. 4 weeks Mar/Apr) Interpreting Visual Data, Communicating with Visualization and a Performance Task Tell a Data Story, Big Data in the Real World and a Performance Task of Propose an Innovation
- Unit 5: Performance Tasks (approx. 8 weeks May/Jun) Preparing for the Explore Performance Task and a Performance Task of 8 hours, Preparing for the Create a Performance Task and Create a Performance Task of 12 hours

AP Computer Science Curriculum Framework (Appendix B)
Code.org Syllabus and Overview (Appendix C)

Cost Associated with the Course: Estimate the costs involved in offering this course. List desired texts and materials on a separate sheet. Also list and explain other needs.

a. Teaching Staff $ 0

c. Supplementary $ 1500 training (Talent Dev. Budget)

b. Textbooks/kits $ 0 (code.org) free student resources

d. Facilities/Space $ 0

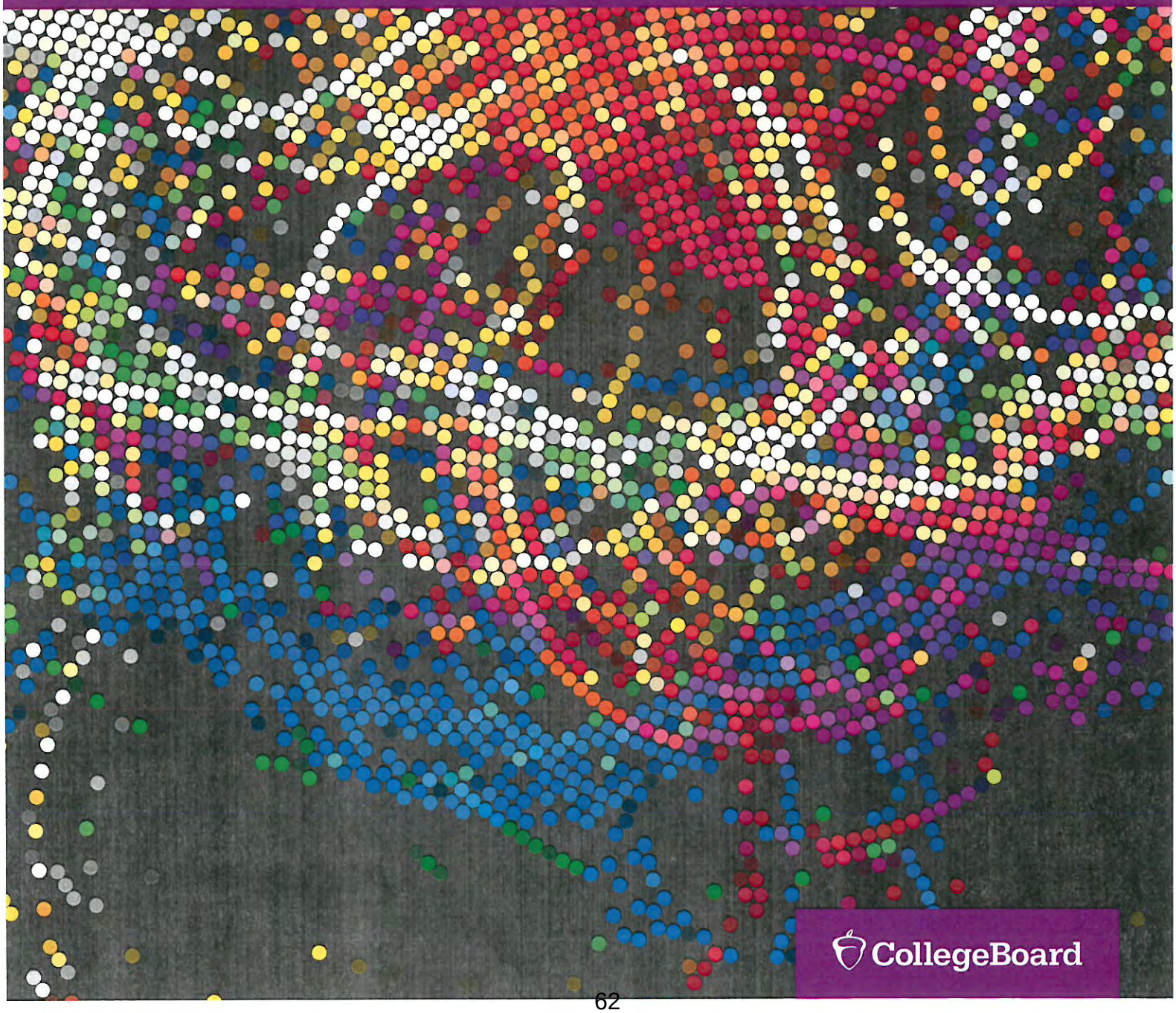
Approvals:	Name(s)	Date
Department head & Principal	_____/_____	_____
Building Review Committee	_____	_____
District Review Committee	_____	_____
Central Office	_____	_____

Revised 2/14/14

AP Curriculum Framework

AP Computer Science Principles

2016–2017



CollegeBoard

AP® Computer Science Principles

Curriculum Framework

2016–2017

CollegeBoard
New York, NY

About the College Board

The College Board is a mission-driven not-for-profit organization that connects students to college success and opportunity. Founded in 1900, the College Board was created to expand access to higher education. Today, the membership association is made up of over 6,000 of the world's leading educational institutions and is dedicated to promoting excellence and equity in education. Each year, the College Board helps more than seven million students prepare for a successful transition to college through programs and services in college readiness and college success — including the SAT® and the Advanced Placement Program®. The organization also serves the education community through research and advocacy on behalf of students, educators, and schools. For further information, visit www.collegeboard.org.

AP® Equity and Access Policy

The College Board strongly encourages educators to make equitable access a guiding principle for their AP programs by giving all willing and academically prepared students the opportunity to participate in AP. We encourage the elimination of barriers that restrict access to AP for students from ethnic, racial, and socioeconomic groups that have been traditionally underserved. Schools should make every effort to ensure their AP classes reflect the diversity of their student population. The College Board also believes that all students should have access to academically challenging course work before they enroll in AP classes, which can prepare them for AP success. It is only through a commitment to equitable preparation and access that true equity and excellence can be achieved.

The *AP Computer Science Principles Curriculum Framework* is designed to provide educators with a first look at essential information needed to understand the design and intent of the AP Computer Science Principles course in advance of its implementation in schools in the 2016-2017 academic year. Please be advised that the information contained in this publication is subject to change. The final course and exam information will be available in the *AP Computer Science Principles Course and Exam Description*, which will be published in early 2016.

Contents

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AP Curriculum and Content Development Senior Director for AP Computer Science Principles

Lien Diaz, *Senior Director, AP Curriculum and Content Development*

Introduction

AP® Computer Science Principles introduces students to the central ideas of computer science, instilling the ideas and practices of computational thinking and inviting students to understand how computing changes the world. The rigorous course promotes deep learning of computational content, develops computational thinking skills, and engages students in the creative aspects of the field.

The course is unique in its focus on fostering students to **be creative**. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using simulations to explore questions that interest them. Rather than teaching a particular programming language or tool, the course focuses on using technology and programming as a means to solve computational problems and create exciting and personally relevant artifacts. Students design and implement innovative solutions using an iterative process similar to what artists, writers, computer scientists, and engineers use to bring ideas to life.

To appeal to a broader audience, including those often underrepresented in computing, this course highlights the relevance of computer science by emphasizing the vital impact advances in computing have on people and society. By focusing the course beyond the study of machines and systems, students also have the opportunity to investigate the innovations in other fields that computing has made possible and examine the ethical implications of new computing technologies.

Students who take an AP Computer Science Principles course using this curriculum framework as its foundation will develop a range of skills vital to success in subsequent college courses, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize, and draw conclusions from trends.They will also develop effective communication and collaboration skills, working individually and collaboratively to solve problems, and discussing and writing about the importance of these problems and the impacts to their community, society, and the world.

The *AP Computer Science Principles Curriculum Framework* specifies the course curriculum — the concepts and computational thinking practices central to the discipline of computer science — and is organized around the investigation of seven big ideas, all of which are fundamental principles essential to thrive in future college courses and a variety of computing and STEM (science, technology, engineering, mathematics) careers. Emphasizing these key big ideas helps students build a solid understanding and facility with computing and computational thinking. These integral understandings can be applied in further studies of computer science and provide a pathway for becoming a well-educated and informed citizen who understands how computer science impacts people and society.

Overview of the Curriculum Framework

The AP Computer Science Principles course is designed to be equivalent to a first-semester introductory college computing course. This curriculum framework provides a detailed description of the course content. The key sections of this framework are described in the following text.

- The **computational thinking practices** capture important aspects of the work that computer scientists engage in at the level of competence expected of AP Computer Science Principles students. The computational thinking practices help students coordinate and make sense of knowledge to accomplish a goal or task. They enable students to engage with the course content by developing computational artifacts and analyzing data, information, or knowledge represented for computational use. In addition, the computational thinking practices require students to learn to collaborate to build computational artifacts and communicate their purpose. Because the AP Computer Science Principles content and the computational thinking practices are equally important, each learning objective directly correlates to a computational thinking practice. This correlation to a computational thinking practice is denoted at the end of a learning objective. For example, [P1] represents a correlation to Computational Thinking Practice 1, which is Connecting Computing.
- The major areas of study in the course are organized around seven **big ideas**, which encompass ideas foundational to studying computer science. These big ideas connect students to a curriculum scope that includes the art of programming but is not programming-centric. A set of **essential questions** are included under each big idea. These questions are large in scope and are provided to help students consider connections to the content of the big ideas. They highlight what is needed for learning the core content in each big idea. Additionally, each of the big ideas contain **enduring understandings**, which specify core concepts that students should retain from their learning experiences.
- Each enduring understanding is aligned with at least one or more **learning objectives (LO)** that provide a detailed articulation of what students are expected to be able to do by the end of the course. The learning objectives integrate a computational thinking practice or skill with specific content, and provide clear information about how students will be expected to demonstrate their knowledge and abilities. They are numbered to correspond with the big ideas and enduring understandings (e.g., LO 7.2.1 means it is from Big Idea 7, Enduring Understanding 7.2, and it is the first learning objective in this section). **The learning objectives will be the target of assessment on the AP Computer Science Principles performance tasks and AP Exam**.
- Next to each learning objective is a listing of **essential knowledge statements**. These statements specify facts or content that students must know in order to be able to successfully demonstrate understanding of the learning objectives. These essential knowledge (EK) statements are listed numerically in the column next to the correlated learning objective, and each one includes one or more statements describing further content details. All examples and content references are considered to be required and may be the focus of exam questions. For example, the following essential knowledge statements correspond to Learning Objective 1.1.1, *Apply a creative development process when creating computational artifacts.* [P2]:
  - **1.1.1A** A creative process in the development of a computational artifact could include, but is not limited to, employing nontraditional, nonprescribed techniques; the use of novel combinations of artifacts, tools, and techniques; and the exploration of personal curiosities.

- **1.1.1B** Creating computational artifacts employs an iterative and often exploratory process to translate ideas into tangible form.

- **Exclusion statements** are included in various locations of the framework. These statements provide further clarity about the scope of a particular learning objective or essential knowledge statement. They specify content that will not be assessed on the exam because it is outside the scope of the course. For example:

  - **Exclusion Statement (LO 4.2.1):** Any discussion of nondeterministic polynomial (NP) is beyond the scope of this course and the AP Exam.

  This statement applies to learning objective (LO) 4.2.1 and it specifies content that is outside the scope of the course and exam.

Relationship between the Curriculum Framework and Assessment

The learning objectives (including the essential knowledge statements and computational thinking practices) will be the targets of assessment for the AP Computer Science Principles course. This assessment comprises two parts: the end-of-course AP Exam and the through-course AP assessment.

The AP Computer Science Principles Exam will be a multiple-choice, paper and pencil exam in which students will demonstrate achievement of the course learning objectives.

The through-course assessment comprises two AP Computer Science Principles performance tasks, which require students to explore the impacts of computing and create computational artifacts through programming. Like the AP Exam, the performance tasks are designed to gather evidence of student learning with regard to the learning objectives. Performance tasks assess student achievement in more robust ways than are available on a timed exam. Additionally, there are learning objectives that are more effectively measured in an authentic, "real-world" performance task.

For more information about the AP Computer Science Principles performance tasks, go to http://www.collegeboard.com/html/computerscience/index.html?MTG77-ED-1-apcs

On both the AP Computer Science Principles Exam and the through-course assessment (performance tasks), students will be asked to apply their understanding of the course learning objectives, including the essential knowledge statements and computational thinking practices.

Computational Thinking Practices

P1: Connecting Computing

Developments in computing have far-reaching effects on society and have led to significant innovations. The developments have implications for individuals, society, commercial markets, and innovation. Students in this course study these effects, and they learn to draw connections between different computing concepts. Students are expected to:

- Identify impacts of computing.
- Describe connections between people and computing.
- Explain connections between computing concepts.

P2: Creating Computational Artifacts

Computing is a creative discipline in which creation takes many forms, such as remixing digital music, generating animations, developing Web sites, and writing programs. Students in this course engage in the creative aspects of computing by designing and developing interesting computational artifacts as well as by applying computing techniques to creatively solve problems. Students are expected to:

- Create an artifact with a practical, personal, or societal intent.
- Select appropriate techniques to develop a computational artifact.
- Use appropriate algorithmic and information management principles.

P3: Abstracting

Computational thinking requires understanding and applying abstraction at multiple levels, such as privacy in social networking applications, logic gates and bits, and the human genome project. Students in this course use abstraction to develop models and simulations of natural and artificial phenomena, use them to make predictions about the world, and analyze their efficacy and validity. Students are expected to:

- Explain how data, information, or knowledge is represented for computational use.
- Explain how abstractions are used in computation or modeling.
- Identify abstractions.
- Describe modeling in a computational context.

P4: Analyzing Problems and Artifacts

The results and artifacts of computation and the computational techniques and strategies that generate them can be understood both intrinsically for what they are as well as for what they produce. They can also be analyzed and evaluated by applying aesthetic, mathematical, pragmatic, and other criteria. Students in this course design and produce solutions, models, and artifacts, and they evaluate and analyze their own computational work as well as the computational work others have produced. Students are expected to:

- Evaluate a proposed solution to a problem.
- Locate and correct errors.
- Explain how an artifact functions.
- Justify appropriateness and correctness of a solution, model, or artifact.

P5: Communicating

Students in this course describe computation and the impact of technology and computation, explain and justify the design and appropriateness of their computational choices, and analyze and describe both computational artifacts and the results or behaviors of such artifacts. Communication includes written and oral descriptions supported by graphs, visualizations, and computational analysis. Students are expected to:

- Explain the meaning of a result in context.
- Describe computation with accurate and precise language, notations, or visualizations.
- Summarize the purpose of a computational artifact.

P6: Collaborating

Innovation can occur when people work together or independently. People working collaboratively can often achieve more than individuals working alone. Learning to collaborate effectively includes drawing on diverse perspectives, skills, and the backgrounds of peers to address complex and open-ended problems. Students in this course collaborate on a number of activities, including investigation of questions using data sets and in the production of computational artifacts. Students are expected to:

- Collaborate with another student in solving a computational problem.
- Collaborate with another student in producing an artifact.
- Share the workload by providing individual contributions to an overall collaborative effort.
- Foster a constructive, collaborative climate by resolving conflicts and facilitating the contributions of a partner or team member.
- Exchange knowledge and feedback with a partner or team member.
- Review and revise their work as needed to create a high-quality artifact.

Concept Outline

Big Idea 1: Creativity

Computing is a creative activity. Creativity and computing are prominent forces in innovation; the innovations enabled by computing have had and will continue to have far-reaching impact. At the same time, computing facilitates exploration and the creation of computational artifacts and new knowledge that help people solve personal, societal, and global problems. This course emphasizes the creative aspects of computing. Students in this course use the tools and techniques of computer science to create interesting and relevant artifacts with characteristics that are enhanced by computation.

Essential Questions:

- How can a creative development process affect the creation of computational artifacts?
- How can computing and the use of computational tools foster creative expression?
- How can computing extend traditional forms of human expression and experience?

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 1.1 Creative development can be an essential process for creating computational artifacts.	**LO 1.1.1** Apply a creative development process when creating computational artifacts. [P2]	**EK 1.1.1A** A creative process in the development of a computational artifact can include, but is not limited to, employing nontraditional, nonprescribed techniques; the use of novel combinations of artifacts, tools, and techniques; and the exploration of personal curiosities.
		EK 1.1.1B Creating computational artifacts employs an iterative and often exploratory process to translate ideas into tangible form.
EU 1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem.	**LO 1.2.1** Create a computational artifact for creative expression. [P2]	**EK 1.2.1A** A computational artifact is something created by a human using a computer and can be, but is not limited to, a program, an image, audio, video, a presentation, or a Web page file.
		EK 1.2.1B Creating computational artifacts requires understanding of and use of software tools and services.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem. *(continued)*		**EK 1.2.1C** Computing tools and techniques are used to create computational artifacts and can include, but are not limited to, programming integrated development environments (IDEs), spreadsheets, 3D printers, or text editors.
		EK 1.2.1D A creatively developed computational artifact can be created by using nontraditional, nonprescribed computing techniques.
		EK 1.2.1E Creative expressions in a computational artifact can reflect personal expressions of ideas or interests.
	LO 1.2.2 Create a computational artifact using computing tools and techniques to solve a problem. [P2]	**EK 1.2.2A** Computing tools and techniques can enhance the process of finding a solution to a problem.
		EK 1.2.2B A creative development process for creating computational artifacts can be used to solve problems when traditional or prescribed computing techniques are not effective.
	LO 1.2.3 Create a new computational artifact by combining or modifying existing artifacts. [P2]	**EK 1.2.3A** Creating computational artifacts can be done by combining and modifying existing artifacts or by creating new artifacts.
		EK 1.2.3B Computation facilitates the creation and modification of computational artifacts with enhanced detail and precision.
		EK 1.2.3C Combining or modifying existing artifacts can show personal expression of ideas.
	LO 1.2.4 Collaborate in the creation of computational artifacts. [P6]	**EK 1.2.4A** A collaboratively created computational artifact reflects effort by more than one person.
		EK 1.2.4B Effective collaborative teams consider the use of online collaborative tools.
		EK 1.2.4C Effective collaborative teams practice interpersonal communication, consensus building, conflict resolution, and negotiation.
		EK 1.2.4D Effective collaboration strategies enhance performance.
		EK 1.2.4E Collaboration facilitates the application of multiple perspectives (including sociocultural perspectives) and diverse talents and skills in developing computational artifacts.
		EK 1.2.4F A collaboratively created computational artifact can reflect personal expressions of ideas.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem. *(continued)*	**LO 1.2.5** Analyze the correctness, usability, functionality, and suitability of computational artifacts. [P4]	**EK 1.2.5A** The context in which an artifact is used determines the correctness, usability, functionality, and suitability of the artifact.
		EK 1.2.5B A computational artifact may have weaknesses, mistakes, or errors depending on the type of artifact.
		EK 1.2.5C The functionality of a computational artifact may be related to how it is used or perceived.
		EK 1.2.5D The suitability (or appropriateness) of a computational artifact may be related to how it is used or perceived.
EU 1.3 Computing can extend traditional forms of human expression and experience.	**LO 1.3.1** Use computing tools and techniques for creative expression. [P2]	**EK 1.3.1A** Creating digital effects, images, audio, video, and animations has transformed industries.
		EK 1.3.1B Digital audio and music can be created by synthesizing sounds, sampling existing audio and music, and recording and manipulating sounds, including layering and looping.
		EK 1.3.1C Digital images can be created by generating pixel patterns, manipulating existing digital images, or combining images.
		EK 1.3.1D Digital effects and animations can be created by using existing software or modified software that includes functionality to implement the effects and animations.
		EK 1.3.1E Computing enables creative exploration of both real and virtual phenomena.

Big Idea 2: Abstraction

Abstraction reduces information and detail to facilitate focus on relevant concepts. Everyone uses abstraction on a daily basis to effectively manage complexity. In computer science, abstraction is a central problem-solving technique. It is a process, a strategy, and the result of reducing detail to focus on concepts relevant to understanding and solving problems. This course requires students to use abstractions to model the world and communicate with people as well as with machines. Students in this course learn to work with multiple levels of abstraction while engaging with computational problems and systems; use models and simulations that simplify complex topics in graphical, textual, and tabular formats; and use snapshots of models and simulation outputs to understand how data changes, identify patterns, and recognize abstractions.

Essential Questions:

- How are vastly different kinds of data, physical phenomena, and mathematical concepts represented on a computer?
- How does abstraction help us in writing programs, creating computational artifacts, and solving problems?
- How can computational models and simulations help generate new understanding and knowledge?

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 2.1 A variety of abstractions built on binary sequences can be used to represent all digital data.	**LO 2.1.1** Describe the variety of abstractions used to represent data. [P3]	**EK 2.1.1A** Digital data is represented by abstractions at different levels.
		EK 2.1.1B At the lowest level, all digital data are represented by bits.
		EK 2.1.1C At a higher level, bits are grouped to represent abstractions, including but not limited to numbers, characters, and color.
		EK 2.1.1D Number bases, including binary, decimal, and hexadecimal, are used to represent and investigate digital data.
		EK 2.1.1E At one of the lowest levels of abstraction, digital data is represented in binary (base 2) using only combinations of the digits zero and one.
		EXCLUSION STATEMENT (for EK 2.1.1E): Two's complement conversions are beyond the scope of this course and the AP Exam.
		EK 2.1.1F Hexadecimal (base 16) is used to represent digital data because hexadecimal representation uses fewer digits than binary.
		EK 2.1.1G Numbers can be converted from any base to any other base.
	LO 2.1.2 Explain how binary sequences are used to represent digital data. [P5]	**EK 2.1.2A** A finite representation is used to model the infinite mathematical concept of a number.
		EXCLUSION STATEMENT (for EK 2.1.2A): Binary representations of scientific notation are beyond the scope of this course and the AP Exam.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 2.1 A variety of abstractions built on binary sequences can be used to represent all digital data. *(continued)*		**EK 2.1.2B** In many programming languages, the fixed number of bits used to represent characters or integers limits the range of integer values and mathematical operations; this limitation can result in overflow or other errors. **EXCLUSION STATEMENT (for EK 2.1.2B):** Range limitations of any one language, compiler, or architecture are beyond the scope of this course and the AP Exam.
		EK 2.1.2C In many programming languages, the fixed number of bits used to represent real numbers (as floating-point numbers) limits the range of floating-point values and mathematical operations; this limitation can result in round off and other errors.
		EK 2.1.2D The interpretation of a binary sequence depends on how it is used.
		EK 2.1.2E A sequence of bits may represent instructions or data.
		EK 2.1.2F A sequence of bits may represent different types of data in different contexts.
EU 2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts.	**LO 2.2.1** Develop an abstraction when writing a program or creating other computational artifacts. [P2]	**EK 2.2.1A** The process of developing an abstraction involves removing detail and generalizing functionality.
		EK 2.2.1B An abstraction extracts common features from specific examples in order to generalize concepts.
		EK 2.2.1C An abstraction generalizes functionality with input parameters that allow software reuse. **EXCLUSION STATEMENT (for EK 2.2.1C):** An understanding of the difference between value and reference parameters is beyond the scope of this course and the AP Exam.
	LO 2.2.2 Use multiple levels of abstraction to write programs. [P3]	**EK 2.2.2A** Software is developed using multiple levels of abstractions, such as constants, expressions, statements, procedures, and libraries.
		EK 2.2.2B Being aware of and using multiple levels of abstraction in developing programs helps to more effectively apply available resources and tools to solve problems.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 2.2 Multiple levels of abstraction are used to write programs or create other computational artifacts. *(continued)*	**LO 2.2.3** Identify multiple levels of abstractions that are used when writing programs. [P3]	**EK 2.2.3A** Different programming languages offer different levels of abstraction. **EXCLUSION STATEMENT (for EK 2.2.3A):** Knowledge of the abstraction capabilities of all programming languages is beyond the scope of this course and the AP Exam.
		EK 2.2.3B High-level programming languages provide more abstractions for the programmer and make it easier for people to read and write a program.
		EK 2.2.3C Code in a programming language is often translated into code in another (lower level) language to be executed on a computer.
		EK 2.2.3D In an abstraction hierarchy, higher levels of abstraction (the most general concepts) would be placed toward the top and lower level abstractions (the more specific concepts) toward the bottom.
		EK 2.2.3E Binary data is processed by physical layers of computing hardware, including gates, chips, and components.
		EK 2.2.3F A logic gate is a hardware abstraction that is modeled by a Boolean function. **EXCLUSION STATEMENT (for EK 2.2.3F):** Memorization of specific gate visual representations is beyond the scope of this course and the AP Exam.
		EK 2.2.3G A chip is an abstraction composed of low-level components and circuits that perform a specific function.
		EK 2.2.3H A hardware component can be low level like a transistor or high level like a video card.
		EK 2.2.3I Hardware is built using multiple levels of abstractions, such as transistors, logic gates, chips, memory, motherboards, special purpose cards, and storage devices.
		EK 2.2.3J Applications and systems are designed, developed, and analyzed using levels of hardware, software, and conceptual abstractions.
		EK 2.2.3K Lower level abstractions can be combined to make higher level abstractions, such as short message services (SMS) or email messages, images, audio files, and videos.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 2.3 Models and simulations use abstraction to generate new understanding and knowledge.	**LO 2.3.1** Use models and simulations to represent phenomena. [P3]	**EK 2.3.1A** Models and simulations are simplified representations of more complex objects or phenomena.
		EK 2.3.1B Models may use different abstractions or levels of abstraction depending on the objects or phenomena being posed.
		EK 2.3.1C Models often omit unnecessary features of the objects or phenomena that are being modeled.
		EK 2.3.1D Simulations mimic real-world events without the cost or danger of building and testing the phenomena in the real world.
	LO 2.3.2 Use models and simulations to formulate, refine, and test hypotheses. [P3]	**EK 2.3.2A** Models and simulations facilitate the formulation and refinement of hypotheses related to the objects or phenomena under consideration.
		EK 2.3.2B Hypotheses are formulated to explain the objects or phenomena being modeled.
		EK 2.3.2C Hypotheses are refined by examining the insights that models and simulations provide into the objects or phenomena.
		EK 2.3.2D The results of simulations may generate new knowledge and new hypotheses related to the phenomena being modeled.
		EK 2.3.2E Simulations allow hypotheses to be tested without the constraints of the real world.
		EK 2.3.2F Simulations can facilitate extensive and rapid testing of models.
		EK 2.3.2G The time required for simulations is impacted by the level of detail and quality of the models and the software and hardware used for the simulation.
		EK 2.3.2H Rapid and extensive testing allows models to be changed to accurately reflect the objects or phenomena being modeled.

Big Idea 3: Data and Information

Data and information facilitate the creation of knowledge. Computing enables and empowers new methods of information processing, driving monumental change across many disciplines — from art to business to science. Managing and interpreting an overwhelming amount of raw data is part of the foundation of our information society and economy. People use computers and computation to translate, process, and visualize raw data and to create information. Computation and computer science facilitate and enable new understanding of data and information that contributes knowledge to the world. Students in this course work with data using a variety of computational tools and techniques to better understand the many ways in which data is transformed into information and knowledge.

Essential Questions:

- How can computation be employed to help people process data and information to gain insight and knowledge?
- How can computation be employed to facilitate exploration and discovery when working with data?
- What considerations and trade-offs arise in the computational manipulation of data?
- What opportunities do large data sets provide for solving problems and creating knowledge?

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 3.1 People use computer programs to process information to gain insight and knowledge.	**LO 3.1.1** Use computers to process information, find patterns, and test hypotheses about digitally processed information to gain insight and knowledge. [P4]	**EK 3.1.1A** Computers are used in an iterative and interactive way when processing digital information to gain insight and knowledge.
		EK 3.1.1B Digital information can be filtered and cleaned by using computers to process information.
		EK 3.1.1C Combining data sources, clustering data, and data classification are part of the process of using computers to process information.
		EK 3.1.1D Insight and knowledge can be obtained from translating and transforming digitally represented information.
		EK 3.1.1E Patterns can emerge when data is transformed using computational tools.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 3.1 People use computer programs to process information to gain insight and knowledge. *(continued)*	**LO 3.1.2** Collaborate when processing information to gain insight and knowledge. [P6]	**EK 3.1.2A** Collaboration is an important part of solving data-driven problems.
		EK 3.1.2B Collaboration facilitates solving computational problems by applying multiple perspectives, experiences, and skill sets.
		EK 3.1.2C Communication between participants working on data-driven problems gives rise to enhanced insights and knowledge.
		EK 3.1.2D Collaboration in developing hypotheses and questions, and in testing hypotheses and answering questions, about data helps participants gain insight and knowledge.
		EK 3.1.2E Collaborating face-to-face and using online collaborative tools can facilitate processing information to gain insight and knowledge.
		EK 3.1.2F Investigating large data sets collaboratively can lead to insight and knowledge not obtained when working alone.
	LO 3.1.3 Explain the insight and knowledge gained from digitally processed data by using appropriate visualizations, notations, and precise language. [P5]	**EK 3.1.3A** Visualization tools and software can communicate information about data.
		EK 3.1.3B Tables, diagrams, and textual displays can be used in communicating insight and knowledge gained from data.
		EK 3.1.3C Summaries of data analyzed computationally can be effective in communicating insight and knowledge gained from digitally represented information.
		EK 3.1.3D Transforming information can be effective in communicating knowledge gained from data.
		EK 3.1.3E Interactivity with data is an aspect of communicating.
EU 3.2 Computing facilitates exploration and the discovery of connections in information.	**LO 3.2.1** Extract information from data to discover and explain connections, patterns, or trends. [P1]	**EK 3.2.1A** Large data sets provide opportunities and challenges for extracting information and knowledge.
		EK 3.2.1B Large data sets provide opportunities for identifying trends, making connections in data, and solving problems.
		EK 3.2.1C Computing tools facilitate the discovery of connections in information within large data sets.
		EK 3.2.1D Search tools are essential for efficiently finding information.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 3.2 Computing facilitates exploration and the discovery of connections in information. *(continued)*		**EK 3.2.1E** Information filtering systems are important tools for finding information and recognizing patterns in the information.
		EK 3.2.1F Software tools, including spreadsheets and databases, help to efficiently organize and find trends in information.
		EXCLUSION STATEMENT (for EK 3.2.1F): Students are not expected to know specific formulas or options available in spreadsheet or database software packages.
		EK 3.2.1G Metadata is data about data.
		EK 3.2.1H Metadata can be descriptive data about an image, a Web page, or other complex objects.
		EK 3.2.1I Metadata can increase the effective use of data or data sets by providing additional information about various aspects of that data.
	LO 3.2.2. Use large data sets to explore and discover information and knowledge. [P3]	**EK 3.2.2A** Large data sets include data such as transactions, measurements, texts, sounds, images, and videos.
		EK 3.2.2B The storing, processing, and curating of large data sets is challenging.
		EK 3.2.2C Structuring large data sets for analysis can be challenging.
		EK 3.2.2D Maintaining privacy of large data sets containing personal information can be challenging.
		EK 3.2.2E Scalability of systems is an important consideration when data sets are large.
		EK 3.2.2F The size or scale of a system that stores data affects how that data set is used.
		EK 3.2.2G The effective use of large data sets requires computational solutions.
		EK 3.2.2H Analytical techniques to store, manage, transmit, and process data sets change as the size of data sets scale.
EU 3.3 There are trade-offs when representing information as digital data.	**LO 3.3.1** Analyze how data representation, storage, security, and transmission of data involve computational manipulation of information. [P4]	**EK 3.3.1A** Digital data representations involve trade-offs related to storage, security, and privacy concerns.
		EK 3.3.1B Security concerns engender trade-offs in storing and transmitting information.
		EK 3.3.1C There are trade-offs in using lossy and lossless compression techniques for storing and transmitting data.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 3.3 There are trade-offs when representing information as digital data. *(continued)*		**EK 3.3.1D** Lossless data compression reduces the number of bits stored or transmitted but allows complete reconstruction of the original data.
		EK 3.3.1E Lossy data compression can significantly reduce the number of bits stored or transmitted at the cost of being able to reconstruct only an approximation of the original data.
		EK 3.3.1F Security and privacy concerns arise with data containing personal information.
		EK 3.3.1G Data is stored in many formats depending on its characteristics (e.g., size and intended use).
		EK 3.3.1H The choice of storage media affects both the methods and costs of manipulating the data it contains.
		EK 3.3.1I Reading data and updating data have different storage requirements.

Big Idea 4: Algorithms

Algorithms are used to develop and express solutions to computational problems. Algorithms are fundamental to even the most basic everyday task. Algorithms realized in software have affected the world in profound and lasting ways. Secure data transmission and quick access to large amounts of relevant information are made possible through the implementation of algorithms. The development, use, and analysis of algorithms are some of the most fundamental aspects of computing. Students in this course work with algorithms in many ways: They develop and express original algorithms, they implement algorithms in a language, and they analyze algorithms analytically and empirically.

Essential Questions:

- How are algorithms implemented and executed on computers and computational devices?
- Why are some languages better than others when used to implement algorithms?
- What kinds of problems are easy, what kinds are difficult, and what kinds are impossible to solve algorithmically?
- How are algorithms evaluated?

Enduring Understandings	Learning Objectives (Students will be able to ...)	Essential Knowledge (Students will know that ...)
EU 4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	**LO 4.1.1** Develop an algorithm for implementation in a program. [P2]	**EK 4.1.1A** Sequencing, selection, and iteration are building blocks of algorithms.
		EK 4.1.1B Sequencing is the application of each step of an algorithm in the order in which the statements are given.
		EK 4.1.1C Selection uses a Boolean condition to determine which of two parts of an algorithm is used.
		EK 4.1.1D Iteration is the repetition of part of an algorithm until a condition is met or for a specified number of times.
		EK 4.1.1E Algorithms can be combined to make new algorithms.
		EK 4.1.1F Using existing correct algorithms as building blocks for constructing a new algorithm helps ensure the new algorithm is correct.
		EK 4.1.1G Knowledge of standard algorithms can help in constructing new algorithms.
		EK 4.1.1H Different algorithms can be developed to solve the same problem.
		EK 4.1.1I Developing a new algorithm to solve a problem can yield insight into the problem.
	LO 4.1.2 Express an algorithm in a language. [P5]	**EK 4.1.2A** Languages for algorithms include natural language, pseudocode, and visual and textual programming languages.
		EK 4.1.2B Natural language and pseudocode describe algorithms so that humans can understand them.
		EK 4.1.2C Algorithms described in programming languages can be executed on a computer.
		EK 4.1.2D Different languages are better suited for expressing different algorithms.
		EK 4.1.2E Some programming languages are designed for specific domains and are better for expressing algorithms in those domains.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages. *(continued)*		**EK 4.1.2F** The language used to express an algorithm can affect characteristics such as clarity or readability but not whether an algorithmic solution exists. **EK 4.1.2G** Every algorithm can be constructed using only sequencing, selection, and iteration. **EK 4.1.2H** Nearly all programming languages are equivalent in terms of being able to express any algorithm. **EK 4.1.2I** Clarity and readability are important considerations when expressing an algorithm in a language.
EU 4.2 Algorithms can solve many, but not all, computational problems.	**LO 4.2.1** Explain the difference between algorithms that run in a reasonable time and those that do not run in a reasonable time. [P1] **EXCLUSION STATEMENT (for LO 4.2.1):** Any discussion of nondeterministic polynomial (NP) is beyond the scope of this course and the AP Exam.	**EK 4.2.1A** Many problems can be solved in a reasonable time. **EK 4.2.1B** Reasonable time means that as the input size grows, the number of steps the algorithm takes is proportional to the square (or cube, fourth power, fifth power, etc.) of the size of the input. **EK 4.2.1C** Some problems cannot be solved in a reasonable time, even for small input sizes. **EK 4.2.1D** Some problems can be solved but not in a reasonable time. In these cases, heuristic approaches may be helpful to find solutions in reasonable time.
	LO 4.2.2 Explain the difference between solvable and unsolvable problems in computer science. [P1] **EXCLUSION STATEMENT (for LO 4.2.2):** Determining whether a given problem is solvable or unsolvable is beyond the scope of this course and the AP Exam.	**EK 4.2.2A** A heuristic is a technique that may allow us to find an approximate solution when typical methods fail to find an exact solution. **EK 4.2.2B** Heuristics may be helpful for finding an approximate solution more quickly when exact methods are too slow. **EXCLUSION STATEMENT (for EK 4.2.2B):** Specific heuristic solutions are beyond the scope of this course and the AP Exam. **EK 4.2.2C** Some optimization problems such as "find the best" or "find the smallest" cannot be solved in a reasonable time but approximations to the optimal solution can. **EK 4.2.2D** Some problems cannot be solved using any algorithm.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 4.2 Algorithms can solve many, but not all, computational problems. *(continued)*	**LO 4.2.3** Explain the existence of undecidable problems in computer science. [P1]	**EK 4.2.3A** An undecidable problem may have instances that have an algorithmic solution, but there is no algorithmic solution that solves all instances of the problem. **EK 4.2.3B** A decidable problem is one in which an algorithm can be constructed to answer "yes" or "no" for all inputs (e.g., "is the number even?"). **EK 4.2.3C** An undecidable problem is one in which no algorithm can be constructed that always leads to a correct yes-or-no answer. **EXCLUSION STATEMENT (for EK 4.2.3C):** Determining whether a given problem is undecidable is beyond the scope of this course and the AP Exam.
	LO 4.2.4 Evaluate algorithms analytically and empirically for efficiency, correctness, and clarity. [P4]	**EK 4.2.4A** Determining an algorithm's efficiency is done by reasoning formally or mathematically about the algorithm. **EK 4.2.4B** Empirical analysis of an algorithm is done by implementing the algorithm and running it on different inputs. **EK 4.2.4C** The correctness of an algorithm is determined by reasoning formally or mathematically about the algorithm, not by testing an implementation of the algorithm. **EXCLUSION STATEMENT (for EK 4.2.4C):** Formally proving program correctness is beyond the scope of this course and the AP Exam. **EK 4.2.4D** Different correct algorithms for the same problem can have different efficiencies. **EK 4.2.4E** Sometimes, more efficient algorithms are more complex. **EK 4.2.4F** Finding an efficient algorithm for a problem can help solve larger instances of the problem. **EK 4.2.4G** Efficiency includes both execution time and memory usage. **EXCLUSION STATEMENT (for EK 4.2.4G):** Formal analysis of algorithms (Big-O) and formal reasoning using mathematical formulas are beyond the scope of this course and the AP Exam. **EK 4.2.4H** Linear search can be used when searching for an item in any list; binary search can be used only when the list is sorted.

Big Idea 5: Programming

Programming enables problem solving, human expression, and creation of knowledge. Programming and the creation of software has changed our lives. Programming results in the creation of software, and it facilitates the creation of computational artifacts, including music, images, and visualizations. In this course, programming enables exploration and is the object of study. This course introduces students to the concepts and techniques related to writing programs, developing software, and using software effectively. The particular programming language is selected based on appropriateness for a specific project or problem. The course acquaints students with fundamental concepts of programming that can be applied across a variety of projects and languages. As students learn language specifics for a given programming language, they create programs, translating human intention into computational artifacts.

Essential Questions:

- How are programs developed to help people, organizations, or society solve problems?
- How are programs used for creative expression, to satisfy personal curiosity, or to create new knowledge?
- How do computer programs implement algorithms?
- How does abstraction make the development of computer programs possible?
- How do people develop and test computer programs?
- Which mathematical and logical concepts are fundamental to computer programming?

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.1 Programs can be developed for creative expression, to satisfy personal curiosity, to create new knowledge, or to solve problems (to help people, organizations, or society).	**LO 5.1.1** Develop a program for creative expression, to satisfy personal curiosity, or to create new knowledge. [P2]	**EK 5.1.1A** Programs are developed and used in a variety of ways by a wide range of people depending on the goals of the programmer.
		EK 5.1.1B Programs developed for creative expression, to satisfy personal curiosity, or to create new knowledge may have visual, audible, or tactile inputs and outputs.
		EK 5.1.1C Programs developed for creative expression, to satisfy personal curiosity, or to create new knowledge may be developed with different standards or methods than programs developed for widespread distribution.
		EK 5.1.1D Additional desired outcomes may be realized independently of the original purpose of the program.
		EK 5.1.1E A computer program or the results of running a program may be rapidly shared with a large number of users and can have widespread impact on individuals, organizations, and society.
		EK 5.1.1F Advances in computing have generated and increased creativity in other fields.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.1 Programs can be developed for creative expression, to satisfy personal curiosity, to create new knowledge, or to solve problems (to help people, organizations, or society). *(continued)*	**LO 5.1.2** Develop a correct program to solve problems. [P2]	**EK 5.1.2A** An iterative process of program development helps in developing a correct program to solve problems.
		EK 5.1.2B Developing correct program components and then combining them helps in creating correct programs.
		EK 5.1.2C Incrementally adding tested program segments to correct working programs helps create large correct programs.
		EK 5.1.2D Program documentation helps programmers develop and maintain correct programs to efficiently solve problems.
		EK 5.1.2E Documentation about program components, such as blocks and procedures, helps in developing and maintaining programs.
		EK 5.1.2F Documentation helps in developing and maintaining programs when working individually or in collaborative programming environments.
		EK 5.1.2G Program development includes identifying programmer and user concerns that affect the solution to problems.
		EK 5.1.2H Consultation and communication with program users is an important aspect of program development to solve problems.
		EK 5.1.2I A programmer's knowledge and skill affects how a program is developed and how it is used to solve a problem.
		EK 5.1.2J A programmer designs, implements, tests, debugs, and maintains programs when solving problems.
	LO 5.1.3 Collaborate to develop a program. [P6]	**EK 5.1.3A** Collaboration can decrease the size and complexity of tasks required of individual programmers.
		EK 5.1.3B Collaboration facilitates multiple perspectives in developing ideas for solving problems by programming.
		EK 5.1.3C Collaboration in the iterative development of a program requires different skills than developing a program alone.
		EK 5.1.3D Collaboration can make it easier to find and correct errors when developing programs.
		EK 5.1.3E Collaboration facilitates developing program components independently.
		EK 5.1.3F Effective communication between participants is required for successful collaboration when developing programs.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.2 People write programs to execute algorithms.	**LO 5.2.1** Explain how programs implement algorithms. [P3]	**EK 5.2.1A** Algorithms are implemented using program instructions that are processed during program execution.
		EK 5.2.1B Program instructions are executed sequentially.
		EK 5.2.1C Program instructions may involve variables that are initialized and updated, read, and written.
		EK 5.2.1D An understanding of instruction processing and program execution is useful for programming.
		EK 5.2.1E Program execution automates processes.
		EK 5.2.1F Processes use memory, a central processing unit (CPU), and input and output.
		EK 5.2.1G A process may execute by itself or with other processes.
		EK 5.2.1H A process may execute on one or several CPUs.
		EK 5.2.1I Executable programs increase the scale of problems that can be addressed.
		EK 5.2.1J Simple algorithms can solve a large set of problems when automated.
		EK 5.2.1K Improvements in algorithms, hardware, and software increase the kinds of problems and the size of problems solvable by programming.
EU 5.3 Programming is facilitated by appropriate abstractions.	**LO 5.3.1** Use abstraction to manage complexity in programs. [P3]	**EK 5.3.1A** Procedures are reusable programming abstractions.
		EK 5.3.1B A procedure is a named grouping of programming instructions.
		EK 5.3.1C Procedures reduce the complexity of writing and maintaining programs.
		EK 5.3.1D Procedures have names and may have parameters and return values.
		EK 5.3.1E Parameterization can generalize a specific solution.
		EK 5.3.1F Parameters generalize a solution by allowing a procedure to be used instead of duplicated code.
		EK 5.3.1G Parameters provide different values as input to procedures when they are called in a program.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.3 Programming is facilitated by appropriate abstractions. *(continued)*		**EK 5.3.1H** Data abstraction provides a means of separating behavior from implementation.
		EK 5.3.1I Strings and string operations, including concatenation and some form of substring, are common in many programs.
		EK 5.3.1J Integers and floating-point numbers are used in programs without requiring understanding of how they are implemented.
		EK 5.3.1K Lists and list operations, such as add, remove, and search, are common in many programs.
		EK 5.3.1L Using lists and procedures as abstractions in programming can result in programs that are easier to develop and maintain.
		EK 5.3.1M Application program interfaces (APIs) and libraries simplify complex programming tasks.
		EK 5.3.1N Documentation for an API/library is an important aspect of programming.
		EK 5.3.1O APIs connect software components, allowing them to communicate.
EU 5.4 Programs are developed, maintained, and used by people for different purposes.	**LO 5.4.1** Evaluate the correctness of a program. [P4]	**EK 5.4.1A** Program style can affect the determination of program correctness.
		EK 5.4.1B Duplicated code can make it harder to reason about a program.
		EK 5.4.1C Meaningful names for variables and procedures help people better understand programs.
		EK 5.4.1D Longer code blocks are harder to reason about than shorter code blocks in a program.
		EK 5.4.1E Locating and correcting errors in a program is called debugging the program.
		EK 5.4.1F Knowledge of what a program is supposed to do is required in order to find most program errors.
		EK 5.4.1G Examples of intended behavior on specific inputs help people understand what a program is supposed to do.
		EK 5.4.1H Visual displays (or different modalities) of program state can help in finding errors.
		EK 5.4.1I Programmers justify and explain a program's correctness.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.4 Programs are developed, maintained, and used by people for different purposes. *(continued)*		**EK 5.4.1J** Justification can include a written explanation about how a program meets its specifications.
		EK 5.4.1K Correctness of a program depends on correctness of program components, including code blocks and procedures.
		EK 5.4.1L An explanation of a program helps people understand the functionality and purpose of it.
		EK 5.4.1M The functionality of a program is often described by how a user interacts with it.
		EK 5.4.1N The functionality of a program is best described at a high level by what the program does, not at the lower level of how the program statements work to accomplish this.
EU 5.5 Programming uses mathematical and logical concepts.	**LO 5.5.1** Employ appropriate mathematical and logical concepts in programming. [P1]	**EK 5.5.1A** Numbers and numerical concepts are fundamental to programming.
		EK 5.5.1B Integers may be constrained in the maximum and minimum values that can be represented in a program because of storage limitations.
		EXCLUSION STATEMENT (for EK 5.5.1B): Specific range limitations of all programming languages are beyond the scope of this course and the AP Exam.
		EK 5.5.1C Real numbers are approximated by floating-point representations that do not necessarily have infinite precision.
		EXCLUSION STATEMENT (for EK 5.5.1C): Specific sets of values that cannot be exactly represented by floating point numbers are beyond the scope of this course and the AP Exam.
		EK 5.5.1D Mathematical expressions using arithmetic operators are part of most programming languages.
		EK 5.5.1E Logical concepts and Boolean algebra are fundamental to programming.
		EK 5.5.1F Compound expressions using *and*, *or*, and *not* are part of most programming languages.
		EK 5.5.1G Intuitive and formal reasoning about program components using Boolean concepts helps in developing correct programs.
		EK 5.5.1H Computational methods may use lists and collections to solve problems.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 5.5 Programming uses mathematical and logical concepts. *(continued)*		**EK 5.5.1I** Lists and other collections can be treated as abstract data types (ADTs) in developing programs.
		EK 5.5.1J Basic operations on collections include adding elements, removing elements, iterating over all elements, and determining whether an element is in a collection.

Big Idea 6: The Internet

The Internet pervades modern computing. The Internet and the systems built on it have had a profound impact on society. Computer networks support communication and collaboration. The principles of systems and networks that helped enable the Internet are also critical in the implementation of computational solutions. Students in this course gain insight into how the Internet operates, study characteristics of the Internet and systems built on it, and analyze important concerns such as cybersecurity.

Essential Questions:

- What is the Internet? How is it built? How does it function?
- What aspects of the Internet's design and development have helped it scale and flourish?
- How is cybersecurity impacting the ever-increasing number of Internet users?

Enduring Understandings (Students will understand that ...)	Learning Objectives (Students will be able to ...)	Essential Knowledge (Students will know that ...)
EU 6.1 The Internet is a network of autonomous systems.	**LO 6.1.1** Explain the abstractions in the Internet and how the Internet functions. [P3]	**EK 6.1.1A** The Internet connects devices and networks all over the world.
		EK 6.1.1B An end-to-end architecture facilitates connecting new devices and networks on the Internet.
		EK 6.1.1C Devices and networks that make up the Internet are connected and communicate using addresses and protocols.
		EK 6.1.1D The Internet and the systems built on it facilitate collaboration.
		EK 6.1.1E Connecting new devices to the Internet is enabled by assignment of an Internet protocol (IP) address.

EXCLUSION STATEMENT (for LO 6.1.1): Specific devices used to implement the abstractions in the Internet are beyond the scope of this course and the AP Exam.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 6.1 The Internet is a network of autonomous systems. *(continued)*		**EK 6.1.1F** The Internet is built on evolving standards, including those for addresses and names. **EXCLUSION STATEMENT (for EK 6.1.1F):** Specific details of any particular standard for addresses are beyond the scope of this course and the AP Exam.
		EK 6.1.1G The domain name system (DNS) translates names to IP addresses.
		EK 6.1.1H The number of devices that could use an IP address has grown so fast that a new protocol (IPv6) has been established to handle routing of many more devices.
		EK 6.1.1I Standards such as hypertext transfer protocol (HTTP), IP, and simple mail transfer protocol (SMTP) are developed and overseen by the Internet Engineering Task Force (IETF).
EU 6.2 Characteristics of the Internet influence the systems built on it.	**LO 6.2.1** Explain characteristics of the Internet and the systems built on it. [P5]	**EK 6.2.1A** The Internet and the systems built on it are hierarchical and redundant.
		EK 6.2.1B The domain name syntax is hierarchical.
		EK 6.2.1C IP addresses are hierarchical.
		EK 6.2.1D Routing on the Internet is fault tolerant and redundant.
	LO 6.2.2 Explain how the characteristics of the Internet influence the systems built on it. [P4]	**EK 6.2.2A** Hierarchy and redundancy help systems scale.
		EK 6.2.2B The redundancy of routing (i.e., more than one way to route data) between two points on the Internet increases the reliability of the Internet and helps it scale to more devices and more people.
		EK 6.2.2C Hierarchy in the DNS helps that system scale.
		EK 6.2.2D Interfaces and protocols enable widespread use of the Internet.
		EK 6.2.2E Open standards fuel the growth of the Internet.
		EK 6.2.2F The Internet is a packet-switched system through which digital data is sent by breaking the data into blocks of bits called packets, which contain both the data being transmitted and control information for routing the data. **EXCLUSION STATEMENT (for EK 6.2.2F):** Specific details of any particular packet-switching system are beyond the scope of this course and the AP Exam.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 6.2 Characteristics of the Internet influence the systems built on it. *(continued)*		**EK 6.2.2G** Standards for packets and routing include transmission control protocol/Internet protocol (TCP/IP). **EXCLUSION STATEMENT (for EK 6.2.2G):** Specific technical details of how TCP/IP works are beyond the scope of this course and the AP Exam.
		EK 6.2.2H Standards for sharing information and communicating between browsers and servers on the Web include HTTP and secure sockets layer/transport layer security (SSL/TLS). **EXCLUSION STATEMENT (for EK 6.2.2H):** Understanding the technical aspects of how SSL/TLS works is beyond the scope of this course and the AP Exam.
		EK 6.2.2I The size and speed of systems affect their use.
		EK 6.2.2J The bandwidth of a system is a measure of bit rate—the amount of data (measured in bits) that can be sent in a fixed amount of time.
		EK 6.2.2K The latency of a system is the time elapsed between the transmission and the receipt of a request.
EU 6.3 Cybersecurity is an important concern for the Internet and the systems built on it.	**LO 6.3.1** Identify existing cybersecurity concerns and potential options to address these issues with the Internet and the systems built on it. [P1]	**EK 6.3.1A** The trust model of the Internet involves trade-offs.
		EK 6.3.1B The DNS was not designed to be completely secure.
		EK 6.3.1C Implementing cybersecurity has software, hardware, and human components.
		EK 6.3.1D Cyber warfare and cyber crime have widespread and potentially devastating effects.
		EK 6.3.1E Distributed denial-of-service attacks (DDoS) compromise a target by flooding it with requests from multiple systems.
		EK 6.3.1F Phishing, viruses, and other attacks have human and software components.
		EK 6.3.1G Antivirus software and firewalls can help prevent unauthorized access to private data.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 6.3 Cybersecurity is an important concern for the Internet and the systems built on it. *(continued)*		**EK 6.3.1H** Cryptography is essential to many models of cybersecurity.
		EK 6.3.1I Cryptography has a mathematical foundation. **EXCLUSION STATEMENT (for EK 6.3.1I):** Specific mathematical functions used in cryptography are beyond the scope of this course and the AP Exam.
		EK 6.3.1J Open standards help ensure cryptography is secure.
		EK 6.3.1K Symmetric encryption is a method of encryption involving one key for encryption and decryption. **EXCLUSION STATEMENT (for EK 6.3.1K):** The methods used in encryption are beyond the scope of this course and the AP Exam.
		EK 6.3.1L Public key encryption, which is not symmetric, is an encryption method that is widely used because of the functionality it provides. **EXCLUSION STATEMENT (for EK 6.3.1L):** The mathematical methods used in public key cryptography are beyond the scope of this course and the AP Exam.
		EK 6.3.1M Certificate authorities (CAs) issue digital certificates that validate the ownership of encrypted keys used in secured communications and are based on a trust model. **EXCLUSION STATEMENT (for EK 6.3.1M):** The technical details of the process CAs follow are beyond the scope of this course and the AP Exam.

Big Idea 7: Global Impact

Computing has global impact. Computation has changed the way people think, work, live, and play. Our methods for communicating, collaborating, problem solving, and doing business have changed and are changing due to innovations enabled by computing. Many innovations in other fields are fostered by advances in computing. Computational approaches lead to new understandings, new discoveries, and new disciplines. Students in this course become familiar with many ways in which computing enables innovation, and they analyze the potential benefits and harmful effects of computing in a number of contexts.

Essential Questions:

- How does computing enhance human communication, interaction, and cognition?
- How does computing enable innovation?
- What are some potential beneficial and harmful effects of computing?

- How do economic, social, and cultural contexts influence innovation and the use of computing?

Enduring Understandings (Students will understand that ...)	**Learning Objectives** (Students will be able to ...)	**Essential Knowledge** (Students will know that ...)
EU 7.1 Computing enhances communication, interaction, and cognition.	**LO 7.1.1** Explain how computing innovations affect communication, interaction, and cognition. [P4]	**EK 7.1.1A** Email, SMS, and chat have fostered new ways to communicate and collaborate.
		EK 7.1.1B Video conferencing and video chat have fostered new ways to communicate and collaborate.
		EK 7.1.1C Social media continues to evolve and fosters new ways to communicate.
		EXCLUSION STATEMENT (for EK 7.1.1C): Detailed knowledge of any social media site is beyond the scope of this course and the AP Exam.
		EK 7.1.1D Cloud computing fosters new ways to communicate and collaborate.
		EK 7.1.1E Widespread access to information facilitates the identification of problems, development of solutions, and dissemination of results.
		EK 7.1.1F Public data provides widespread access and enables solutions to identified problems.
		EK 7.1.1G Search trends are predictors.
		EK 7.1.1H Social media, such as blogs and Twitter, have enhanced dissemination.
		EK 7.1.1I Global Positioning System (GPS) and related technologies have changed how humans travel, navigate, and find information related to geolocation.
		EK 7.1.1J Sensor networks facilitate new ways of interacting with the environment and with physical systems.
		EK 7.1.1K Smart grids, smart buildings, and smart transportation are changing and facilitating human capabilities.
		EK 7.1.1L Computing contributes to many assistive technologies that enhance human capabilities.
		EK 7.1.1M The Internet and the Web have enhanced methods of and opportunities for communication and collaboration.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 7.1 Computing enhances communication, interaction, and cognition. *(continued)*		**EK 7.1.1N** The Internet and the Web have changed many areas, including e-commerce, health care, access to information and entertainment, and online learning.
		EK 7.1.1O The Internet and the Web have impacted productivity, positively and negatively, in many areas.
	LO 7.1.2 Explain how people participate in a problem-solving process that scales. [P4]	**EK 7.1.2A** Distributed solutions must scale to solve some problems.
		EK 7.1.2B Science has been impacted by using scale and "citizen science" to solve scientific problems using home computers in scientific research.
		EK 7.1.2C Human computation harnesses contributions from many humans to solve problems related to digital data and the Web.
		EK 7.1.2D Human capabilities are enhanced by digitally enabled collaboration.
		EK 7.1.2E Some online services use the contributions of many people to benefit both individuals and society.
		EK 7.1.2F Crowdsourcing offers new models for collaboration, such as connecting people with jobs and businesses with funding.
		EK 7.1.2G The move from desktop computers to a proliferation of always-on mobile computers is leading to new applications.
EU 7.2 Computing enables innovation in nearly every field.	**LO 7.2.1** Explain how computing has impacted innovations in other fields. [P1]	**EK 7.2.1A** Machine learning and data mining have enabled innovation in medicine, business, and science.
		EK 7.2.1B Scientific computing has enabled innovation in science and business.
		EK 7.2.1C Computing enables innovation by providing the ability to access and share information.
		EK 7.2.1D Open access and Creative Commons have enabled broad access to digital information.
		EK 7.2.1E Open and curated scientific databases have benefited scientific researchers.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 7.2 Computing enables innovation in nearly every field. *(continued)*		**EK 7.2.1F** Moore's law has encouraged industries that use computers to effectively plan future research and development based on anticipated increases in computing power.
		EK 7.2.1G Advances in computing as an enabling technology have generated and increased the creativity in other fields.
EU 7.3 Computing has a global affect — both beneficial and harmful — on people and society.	**LO 7.3.1** Analyze the beneficial and harmful effects of computing. [P4]	**EK 7.3.1A** Innovations enabled by computing raise legal and ethical concerns.
		EK 7.3.1B Commercial access to music and movie downloads and streaming raises legal and ethical concerns.
		EK 7.3.1C Access to digital content via peer-to-peer networks raises legal and ethical concerns.
		EK 7.3.1D Both authenticated and anonymous access to digital information raise legal and ethical concerns.
		EK 7.3.1E Commercial and governmental censorship of digital information raise legal and ethical concerns.
		EK 7.3.1F Open source and licensing of software and content raise legal and ethical concerns.
		EK 7.3.1G Privacy and security concerns arise in the development and use of computational systems and artifacts.
		EK 7.3.1H Aggregation of information, such as geolocation, cookies, and browsing history, raises privacy and security concerns.
		EK 7.3.1I Anonymity in online interactions can be enabled through the use of online anonymity software and proxy servers.
		EK 7.3.1J Technology enables the collection, use, and exploitation of information about, by, and for individuals, groups, and institutions.
		EK 7.3.1K People can have instant access to vast amounts of information online; accessing this information can enable the collection of both individual and aggregate data that can be used and collected.
		EK 7.3.1L Commercial and governmental curation of information may be exploited if privacy and other protections are ignored.
		EK 7.3.1M Targeted advertising is used to help individuals, but it can be misused at both individual and aggregate levels.

Enduring Understandings	Learning Objectives	Essential Knowledge
EU 7.3 Computing has a global affect – both beneficial and harmful – on people and society. *(continued)*		**EK 7.3.1N** Widespread access to digitized information raises questions about intellectual property.
		EK 7.3.1O Creation of digital audio, video, and textual content by combining existing content has been impacted by copyright concerns.
		EK 7.3.1P The Digital Millennium Copyright Act (DMCA) has been a benefit and a challenge in making copyrighted digital material widely available.
		EK 7.3.1Q Open source and free software have practical, business, and ethical impacts on widespread access to programs, libraries, and code.
EU 7.4 Computing innovations influence and are influenced by the economic, social, and cultural contexts in which they are designed and used.	**LO 7.4.1** Explain the connections between computing and economic, social, and cultural contexts. [P1]	**EK 7.4.1A** The innovation and impact of social media and online access varies in different countries and in different socioeconomic groups.
		EK 7.4.1B Mobile, wireless, and networked computing have an impact on innovation throughout the world.
		EK 7.4.1C The global distribution of computing resources raises issues of equity, access, and power.
		EK 7.4.1D Groups and individuals are affected by the "digital divide" – differing access to computing and the Internet based on socioeconomic or geographic characteristics.
		EK 7.4.1E Networks and infrastructure are supported by both commercial and governmental initiatives.

The AP Computer Science Principles Assessment

The AP Computer Science Principles assessment consists of two parts: a through-course assessment and the end-of-course AP Exam. Both of these parts will measure student achievement of the course learning objectives. For the through-course assessment, students will upload digital artifacts and written responses via a Web-based digital application. The end-of-course AP Exam will be a paper and pencil exam.

Through-Course Assessment

The through-course assessment is a set of performance tasks designed to gather evidence of student proficiency in the learning objectives. Performance tasks assess student achievement in more "real-world" ways than are available on a timed exam. In addition, there are learning objectives that are more effectively measured in a performance task, such as those included in the Creativity big idea.

The performance tasks are summative assessments, and will be completed in the classroom.

The two performance tasks are:

Explore – Implications of Computing Innovations
Students explore the impacts of computing on social, economic, and cultural areas of our lives.

Create – Applications from Ideas
Students create computational artifacts through the design and development of programs.

Prior to administering the performance tasks, teachers should prepare their students by teaching the skills embodied in the learning objectives and the content articulated in the essential knowledge statements. Instruction may include practicing the performance tasks before administering them to students. Once a teacher administers a performance task with the intent to submit student artifacts for AP scoring purposes, students must complete the task without assistance from the teacher.

Distinguishing features of the performance tasks include the following:

- Each performance task covers numerous learning objectives, distributed across several big ideas.
- The *Create* performance task requires both collaborative and individual effort as well as reflections on each student's contribution to the task.
- Each task requires students to describe or analyze their work, whether the work includes research, the creation of an artifact (e.g., a video, spreadsheet, graph, or electronic slide show), or the creation of a program.

For the latest pilot (DRAFT) versions of the AP Computer Science Principles performance tasks and rubrics, go to **http://www.collegeboard.com/html/computerscience/index.html?excmpid=MTG77-ED-1-apcs**

AP Exam

The AP Computer Science Exam is 100 minutes long and includes approximately 74 multiple-choice questions, presented as either discrete questions or in sets. There are two types of multiple-choice questions:

- Single-Select Multiple-Choice: *Students select 1 answer from among 4 options.*
- Multiple-Select Multiple-Choice: *Students select 2 answers from among 4 options.*

Sample Exam Questions

To elicit evidence of student achievement of the course learning objectives, exam questions assess both the application of the computational thinking practices and an understanding of the big ideas. Exam questions may assess achievement of multiple learning objectives. They may also address content from more than one essential knowledge statement. Exam questions may be accompanied by non-textual stimulus material such as diagrams, charts, or other graphical illustrations.

The sample questions that follow illustrate the relationship between the curriculum framework and the AP Computer Science Principles Exam and serve as examples of the types of questions that will appear on the exam.

Each question is accompanied by a table containing the enduring understandings, learning objectives and essential knowledge statements that the question addresses. Note that in the cases where multiple learning objectives are provided for a question, the primary one is listed first.

1. Which of the following are examples of how digital audio tools have transformed the music recording industry?

   I. Digital audio tools have made it easier to record professional-quality audio on a home computer instead of in a recording studio.

   II. Digital audio tools have made it easier to create new sounds by sampling existing sounds.

   III. Digital audio tools have made it easier to synthesize new sounds without having to first record them with a microphone.

   (A) I only

   (B) I and II only

   (C) II and III only

   (D) I, II, and III

Answer: D

Enduring Understandings	Learning Objectives	Essential Knowledge
1.3 Computing can extend traditional forms of human expression and experience.	**1.3.1** Use computing tools and techniques for creative expression. [P2]	**1.3.1A** Creating digital effects, images, audio, video, and animations has transformed industries.
		1.3.1B Digital audio and music can be created by synthesizing sounds, sampling existing audio and music, and recording and manipulating sounds, including layering and looping.
1.2 Computing enables people to use creative development processes to create computational artifacts for creative expression or to solve a problem.	**1.2.3** Create a new computational artifact by combining or modifying existing artifacts. [P2]	**1.2.3A** Creating computational artifacts can be done by combining and modifying existing artifacts or by creating new artifacts.
		1.2.3B Computation facilitates the creation and modification of computational artifacts with enhanced detail and precision.

2. The most common method for representing color with computing applications is to control the amounts of red, green, and blue that are mixed together to create a desired color. A color can be represented by an RGB (Red, Green, Blue) triplet, which consists of three numbers between 0 and 255. The first number in a triplet represents the amount of red, the second number represents the amount of green, and the third number represents the amount of blue. For example, the RGB triplet (88, 50, 250) represents a predominantly blue color because there is more blue than there is red or green.

   In many cases, the values in an RGB triplet are converted to a binary or hexadecimal representation.

   Which of the following RGB triplets represents a predominantly red color?

   (A) The decimal RGB values (42, 200, 30)

   (B) The decimal RGB values (250, 250, 250)

   (C) The hexadecimal RGB values (18, CA, 1E)

   (D) The binary RGB values (11101010, 01001000, 00011101)

Answer: D

Enduring Understandings	Learning Objectives	Essential Knowledge
2.1 A variety of abstractions built upon binary sequences can be used to represent all digital data.	**2.1.1** Describe the variety of abstractions used to represent data. [P3]	**2.1.1B** At the lowest level, all digital data are represented by bits.
		2.1.1C At a higher level, bits are grouped to represent abstractions, including but not limited to numbers, characters, and color.
		2.1.1D Number bases, including binary, decimal, and hexadecimal, are used to represent and investigate digital data.
		2.1.1E At one of the lowest levels of abstraction, digital data is represented in binary (base 2) using only combinations of the digits zero and one.
		2.1.1F Hexadecimal (base 16) is used to represent digital data because hexadecimal representation uses fewer digits than binary.
		2.1.1G Numbers can be converted from any base to any other base.

3. The music director of a college radio station gathered data to analyze the songs that were played on the station during the last year. A song was listed in the data every time it was played. The following data was collected for each song:

   - The name of the artist
   - The song title
   - The album title
   - The genre

   The music director wants to find the number of **unique** songs played in the jazz genre. Consider the two proposed algorithms below.

   Algorithm I: Filter the data by creating a list of songs only in the jazz genre. Sort the list of jazz songs by song title. Set a counter to 0. Iterate through the sorted list. If a song is different from the previous song in the list (or if it is the first song in the list), increment the counter by 1.

   Algorithm II: Create a new list of the data sorted by song title. Iterate through the sorted list. Every time a song is the same as the previous song in the list, delete the duplicate song from the list. Set a counter to 0. Iterate through the remaining list of songs. Each time jazz is listed as the genre, increment the counter by 1.

   Which algorithm, if any, can the music director use to find the number of **unique** songs played in the jazz genre?

   (A) I only

   (B) II only

   (C) Both I and II

   (D) Neither I nor II

Answer: C

Enduring Understandings	Learning Objectives	Essential Knowledge
3.2 Computing facilitates exploration and the discovery of connections in information.	**3.2.1** Extract information from data to discover and explain connections, patterns, or trends. [P1]	**3.2.1B** Large data sets provide opportunities for identifying trends, making connections in data, and solving problems.
		3.2.1C Computing tools facilitate the discovery of connections in information within large data sets.
		3.2.1E Information filtering systems are important tools for finding information and recognizing patterns in the information.
		3.2.1F Software tools, including spreadsheets and databases, help to efficiently organize and find trends in information.
3.1 People use computer programs to process information to gain insight and knowledge.	**3.1.1** Use computers to process information, find patterns, and test hypotheses about digitally processed information to gain insight and knowledge. [P4]	**3.1.1B** Digital information can be filtered and cleaned by using computers to process information.
		3.1.1D Insight and knowledge can be obtained from translating and transforming digitally represented information.
4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	**4.1.1** Develop an algorithm for implementation in a program. [P2]	**4.1.1A** Sequencing, selection, and iteration are building blocks of algorithms.
		4.1.1B Sequencing is the application of each step of an algorithm in the order in which the statements are given.
		4.1.1C Selection uses a Boolean condition to determine which of two parts of an algorithm is used.
		4.1.1D Iteration is the repetition of part of an algorithm until a condition is met or for a specified number of times.
		4.1.1H Different algorithms can be developed to solve the same problem.

4. Suppose that every personal music playing device will be modified so that whenever a song is played, the device will anonymously upload the following metadata to a shared centralized database:

   - The name of the song
   - The artist who recorded the song
   - The time of day that the song is played

   Which of the following would NOT be possible if only the database is used?

   (A) Music companies will be able to determine the artists who are rising in popularity.

   (B) Artists will be able to determine which of their songs are most popular.

   (C) Users will be able to compare their personal listening preferences to those of their friends.

   (D) Users will be able to compare their personal listening preferences to the listening trends of the entire database.

Answer: C

Enduring Understandings	Learning Objectives	Essential Knowledge
3.2 Computing facilitates exploration and the discovery of connections in information.	**3.2.1** Extract information from data to discover and explain connections, patterns, or trends. [P1]	**3.2.1G** Metadata is data about data. **3.2.1H** Metadata can be descriptive data about an image, a Web page, or other complex objects. **3.2.1I** Metadata can increase the effective use of data or data sets by providing additional information about various aspects of that data.
7.3 Computing has a global affect—both beneficial and harmful—on people and society.	**7.3.1** Analyze the beneficial and harmful effects of computing. [P4]	**7.3.1J** Technology enables the collection, use, and exploitation of information about, by, and for individuals, groups, and institutions. **7.3.1K** People can have instant access to vast amounts of information online; accessing this information can enable the collection of both individual and aggregate data that can be used and collected.

5. Suppose that every personal music playing device will be modified so that whenever a song starts playing, the device will anonymously upload the following metadata to a shared centralized database:

   - The name of the song
   - The artist who recorded the song
   - The time of the upload
   - The location of the device during the upload

   Which of the following pieces of information will be possible to determine if only the information in the database is used?

   Select two answers.

   (A) A list of individuals who enjoy listening to a particular artist

   (B) The artists who are rising in popularity

   (C) The amount of money made by a certain artist

   (D) The city with the greatest number of uploads

Answer: B, D

Enduring Understandings	Learning Objectives	Essential Knowledge
3.2 Computing facilitates exploration and the discovery of connections in information.	**3.2.1** Extract information from data to discover and explain connections, patterns, or trends. [P1]	**3.2.1G** Metadata is data about data.
		3.2.1H Metadata can be descriptive data about an image, Web page, or other complex objects.
		3.2.1I Metadata can increase the effective use of data or data sets by providing additional information about various aspects of that data.
7.3 Computing has a global affect—both beneficial and harmful—on people and society.	**7.3.1** Analyze the beneficial and harmful effects of computing. [P4]	**7.3.1J** Technology enables the collection, use, and exploitation of information about, by, and for individuals, groups, and institutions.
		7.3.1K People can have instant access to vast amounts of information online; accessing this information can enable the collection of both individual and aggregate data that can be used and collected.

6. The question below uses a simple programming language, with the following instructions.

Instruction	Explanation
`random(a, b)`	Generates a random integer between `a` and `b`, inclusive.
`a + b`	Evaluates to the sum of the numbers `a` and `b`.
`a ← b`	Assigns the value of `b` to the variable `a`.
`REPEAT n TIMES { }`	The block of instructions contained between the braces `{ }` is repeated `n` times.
`display(expression)`	Displays the value of `expression`.

Consider the goal of simulating the results of flipping a fair coin 10 times, and displaying the number of times the coin lands on heads. Which of the following code segments can be used to accomplish the goal?

(A)
```
sum ← 0
REPEAT 10 TIMES
{
     sum ← sum + random(0, 1)
}
display(sum)
```

(B)
```
REPEAT 10 TIMES
{
     sum ← 0
     sum ← sum + random(0, 1)
}
display(sum)
```

(C)
```
sum ← 0
REPEAT 10 TIMES
{
     sum ← sum + random(1, 2)
}
display(sum)
```

(D)
```
REPEAT 10 TIMES
{
     sum ← 0
     sum ← sum + random(1, 2)
}
display(sum)
```

Answer: A

Enduring Understandings	Learning Objectives	Essential Knowledge
4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	**4.1.2** Express an algorithm in a language. [P5]	**4.1.2A** Languages for algorithms include natural language, pseudocode, and visual and textual programming languages. **4.1.2B** Natural language and pseudocode describe algorithms so that humans can understand them. **4.1.2C** Algorithms described in programming languages can be executed on a computer.
2.3 Models and simulations use abstraction to generate new understanding and knowledge.	**2.3.1** Use models and simulations to represent phenomena. [P3]	**2.3.1A** Models and simulations are simplified representations of more complex objects or phenomena. **2.3.1B** Models may use different abstractions or levels of abstraction depending on the objects or phenomena being posed.
5.2 People write programs to execute algorithms.	**5.2.1** Explain how programs implement algorithms. [P3]	**5.2.1B** Program instructions are executed sequentially. **5.2.1C** Program instructions may involve variables that are initialized and updated, read, and written.
5.5 Programming uses mathematical and logical concepts.	**5.5.1** Employ appropriate mathematical and logical concepts in programming. [P1]	**5.5.1A** Numbers and numerical concepts are fundamental to programming. **5.5.1D** Mathematical expressions using arithmetic operators are part of most programming languages.

7. The question below uses a simple programming language, with the following instructions.

Instruction	Explanation
`random(a, b)`	Generates a random integer between `a` and `b`, inclusive.
`a + b`	Evaluates to the sum of the numbers `a` and `b`.
`a ← b`	Assigns the value of `b` to the variable `a`.
`REPEAT n TIMES { }`	The block of instructions contained between the braces `{ }` is repeated `n` times.
`display(expression)`	Displays the value of `expression`.

Consider the goal of simulating the results of rolling a number cube (numbered 1 to 6) two times, and displaying the sum of the values obtained from the two rolls. Which of the following code segments will produce the appropriate results?

I.
```
display (random(1, 12))
```

II.
```
display (random(1, 6) + random(1, 6))
```

III.
```
sum ← 0
REPEAT 2 TIMES
{
    sum ← sum + random(1, 6)
}
display(sum)
```

(A) I only

(B) I and III only

(C) II and III only

(D) I, II, and III

Answer: C

Enduring Understandings	Learning Objectives	Essential Knowledge
4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	**4.1.2** Express an algorithm in a language. [P5]	**4.1.2A** Languages for algorithms include natural language, pseudocode, and visual and textual programming languages.
		4.1.2B Natural language and pseudocode describe algorithms so that humans can understand them.
		4.1.2C Algorithms described in programming languages can be executed on a computer.
	4.1.1 Develop an algorithm for implementation in a program. [P2]	**4.1.1A** Sequencing, selection, and iteration are building blocks of algorithms.
		4.1.1B Sequencing is the application of each step of an algorithm in the order in which the statements are given.
		4.1.1D Iteration is the repetition of part of an algorithm until a condition is met or for a specified number of times.
		4.1.1H Different algorithms can be developed to solve the same problem.
2.3 Models and simulations use abstraction to generate new understanding and knowledge.	**2.3.1** Use models and simulations to represent phenomena. [P3]	**2.3.1A** Models and simulations are simplified representations of more complex objects or phenomena.
		2.3.1B Models may use different abstractions or levels of abstraction depending on the objects or phenomena being posed.
5.2 People write programs to execute algorithms.	**5.2.1** Explain how programs implement algorithms. [P3]	**5.2.1B** Program instructions are executed sequentially.
		5.2.1C Program instructions may involve variables that are initialized and updated, read, and written.
5.5 Programming uses mathematical and logical concepts.	**5.5.1** Employ appropriate mathematical and logical concepts in programming. [P1]	**5.5.1A** Numbers and numerical concepts are fundamental to programming.
		5.5.1D Mathematical expressions using arithmetic operators are part of most programming languages.

8. The question below uses a simple programming language with the following instructions.

Instruction	Explanation
`a + b`	Evaluates to the sum of the numbers `a` and `b`.
`a ← b`	Assigns the value of `b` to the variable `a`.
`isPositive(n)`	Evaluates to `true` if `n` is greater than 0; otherwise evaluates to `false`.
`FOR EACH n IN list { }`	The variable `n` is assigned the value of each list element sequentially. The block of instructions between the braces `{ }` is executed once for each assignment of `n`.
`IF (condition) instruction`	The `instruction` is executed once if `condition` is `true`; no action is taken if `condition` is `false`.
`display(expression)`	Displays the value of `expression`.

Consider the goal of counting the number of positive-valued integers in a list called numbers. Which of the following code segments can be used to accomplish the goal?

(A)
```
count ← 0
FOR EACH value IN numbers
{
     IF (isPositive (value)) count ← count + 1
}
display(count)
```

(B)
```
FOR EACH value IN numbers
{
     count ← 0
     IF (isPositive (value)) count ← count + 1
}
display(count)
```

(C)
```
count ← 0
FOR EACH value IN numbers
{
     IF (isPositive (count)) increment(value)
}
display(count)
```

(D)
```
FOR EACH value IN numbers
{
     count ← 0
     IF (isPositive (count)) increment(value)
}
display(count)
```

Answer: A

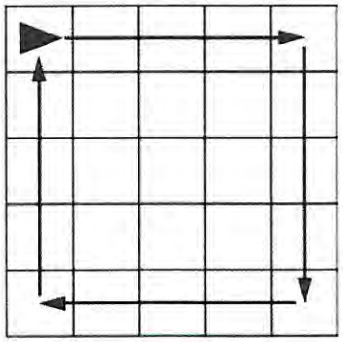
Enduring Understandings	Learning Objectives	Essential Knowledge
5.5 Programming uses mathematical and logical concepts.	**5.5.1** Employ appropriate mathematical and logical concepts in programming. [P1]	**5.5.1I** Lists and other collections can be treated as abstract data types (ADTs) in developing programs.
		5.5.1J Basic operations on collections include adding elements, removing elements, iterating over all elements, and determining whether an element is in a collection.
4.1 Algorithms are precise sequences of instructions for processes that can be executed by a computer and are implemented using programming languages.	**4.1.1** Develop an algorithm for implementation in a program. [P2]	**4.1.1A** Sequencing, selection, and iteration are building blocks of algorithms.
5.3 Programming is facilitated by appropriate abstractions.	**5.3.1** Use abstraction to manage complexity in programs. [P3]	**5.3.1A** Procedures are reusable programming abstractions.
		5.3.1B A procedure is a named grouping of programming instructions.
		5.3.1G Parameters provide different values as input to procedures when they are called in a program.

9. The question below uses a robot in a grid of squares. The robot is represented as a triangle, which is initially facing toward the right side of the grid. The robot is moved according to the following instructions.

Instruction	Explanation
`Move Forward`	The robot moves one square forward in the direction it is facing.
`Rotate Right`	The robot rotates in place 90 degrees clockwise (i.e., makes an in-place right turn).
`Rotate Left`	The robot rotates in place 90 degrees counterclockwise (i.e., makes an in-place left turn).
`REPEAT n TIMES`	The block of instructions contained between the braces `{ }` is repeated `n` times.

Consider the following incorrect program, which is intended to move the robot around the perimeter of the grid below, as indicated by the arrows.

```
Line 1: REPEAT 4 TIMES
        {
Line 2:     Move Forward
Line 3:     Rotate Right
Line 4:     REPEAT 4 TIMES
            {
Line 5:         Move Forward
            }
Line 6:     Rotate Right
        }
```



Which lines of code should be removed so that the program will work as intended?
Select <u>two</u> answers.

(A) Line 2

(B) Line 3

(C) Line 4

(D) Line 5

Answer: A, B

Enduring Understandings	Learning Objectives	Essential Knowledge
5.4 Programs are developed, maintained, and used by people for different purposes.	**5.4.1** Evaluate the correctness of a program. [P4]	**5.4.1E** Locating and correcting errors in a program is called debugging the program.
		5.4.1F Knowledge of what a program is supposed to do is required in order to find most program errors.
		5.4.1G Examples of intended behavior on specific inputs help people understand what a program is supposed to do.
		5.4.1K Correctness of a program depends on correctness of program components, including code blocks and procedures.

10. Which of the following statements correctly explain how the Internet is able to facilitate communication at a large scale?

I. A central monitoring computer is used to track and maintain the connections of the Internet.

II. Data is routed between points in multiple ways so that if a connection fails, the data can be rerouted around the inoperative connections.

III. Protocols for packets and routing are used so that computers from different manufacturers can communicate in a standard way.

(A) I and II only

(B) I and III only

(C) II and III only

(D) I, II, and III

Answer: C

Enduring Understandings	Learning Objectives	Essential Knowledge
6.2 Characteristics of the Internet influence the systems built on it.	**6.2.2** Explain how the characteristics of the Internet influence the systems built on it. [P4]	**6.2.2A** Hierarchy and redundancy help systems scale.
		6.2.2B The redundancy of routing (i.e., more than one way to route data) between two points on the Internet increases the reliability of the Internet and helps it scale to more devices and more people.
		6.2.2D Interfaces and protocols enable widespread use of the Internet.

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Code.org Computer Science Principles

Syllabus and Overview

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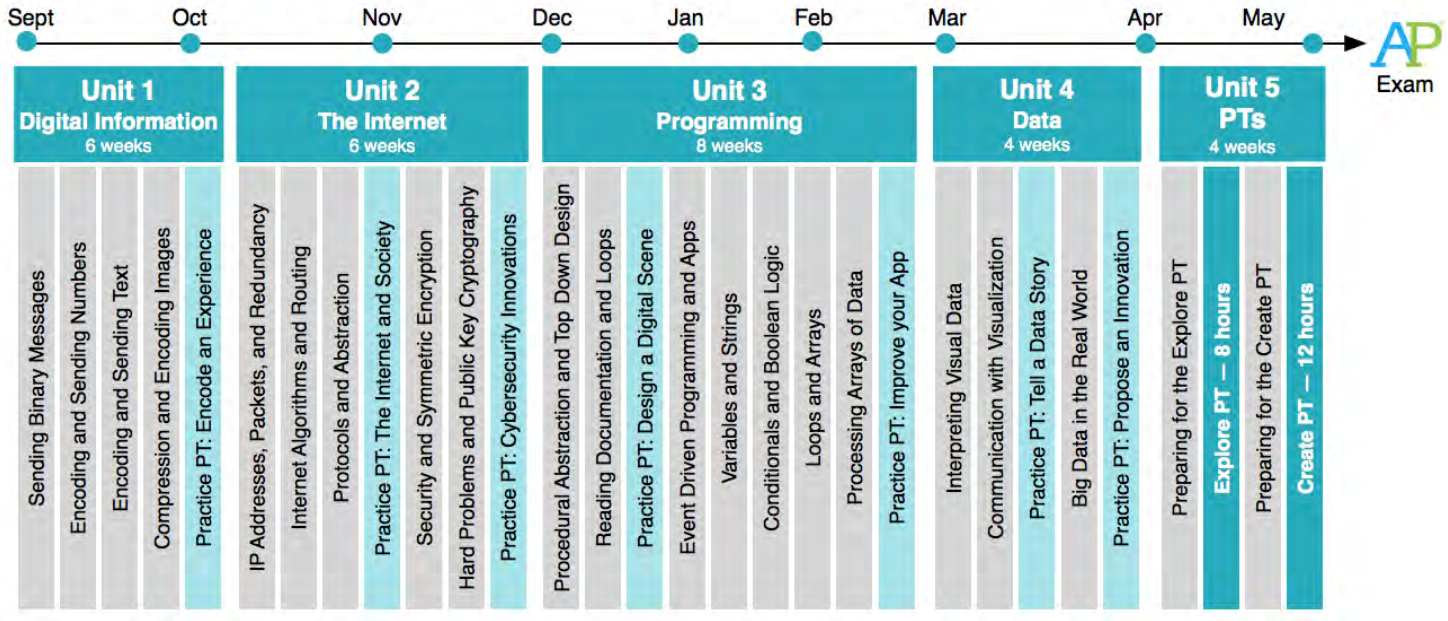
AP Computer Science Principles

Code.org's Computer Science Principles (CSP) curriculum is a **full-year, rigorous, entry-level course** that introduces high school students to the foundations of modern computing. The course covers a broad range of topics that make up computing such as programming, algorithms, the Internet, big data, digital privacy and security, and the societal impacts of computing.

The course is designed around the AP Computer Science Principles Framework and **prepares students to take the AP exam and to complete the AP Performance Tasks**. For context, it is useful to be familiar with the CSP Framework before reading this document.

Course Snapshot

Below is a snapshot of the course. The course contains **four core units of study,** with a fifth unit devoted almost exclusively to students working on their *AP Performance Task* (PT) projects. Each gray box in the diagram represents a group of 2-5 lessons which each take from one to two class periods to complete, assuming 50-minute class periods. A timeline showing a typical school year is shown to give a rough estimate of pacing. **Note: the AP Exam and submission deadline is typically the first week of May.**



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Curriculum Overview and Goals

Computing affects almost all aspects of modern life and *all* students deserve a computing education that prepares them to pursue the wide array of intellectual and career opportunities that computing has made possible.

This course is not a tour of current events and technologies. Rather, this course seeks to provide students with a "future proof" foundation in computing principles so that they are adequately prepared with both the knowledge and skills to live and meaningfully participate in our increasingly digital society, economy, and culture.

The Internet and Innovation provide a narrative arc for the course, a thread connecting all of the units. The course starts with learning about what is involved in sending a single bit of information from one place to another and ends with students considering the implications of a computing innovation of their own design. Along the way students learn:

- How the Internet works and its impacts on society.
- How to program and rapidly prototype small JavaScript applications both to solve problems and to satisfy personal curiosity.
- How to collect, analyze and visualize data to gain insight and knowledge.
- How to evaluate the beneficial and harmful effects to people and society brought on by computing innovations.

Addressing Diversity, Equity, and Broadening Participation in the Curriculum

A central goal of Code.org's CSP curriculum is for it to be accessible to all students, especially those in groups typically underrepresented in computing. To this end, we have worked to provide examples and activities that are relevant and topical enough for students to connect back to their own interests and lives. Wherever possible, but especially in the videos that accompany the curriculum, we seek to **highlight a diverse and impressive array of role models** in terms of gender, race, and profession from which students can draw inspiration and "see themselves" participating in computing.

The curriculum assumes no prior knowledge of computing and is written to support *both* students and teachers who are new to the discipline. Activities are designed and structured in such a way that students with diverse learning needs have space to find their voice and to express their thoughts and opinions. The activities, videos, and computing tools in the curriculum are strive to have a broad appeal and to be accessible to a student body diverse in background, gender, race, prior knowledge of computing, and personal interests.

Broadening student participation in computer science is a national goal, and effectively an issue of social justice. Fancy tools and motivational marketing messages only get you so far. We believe that the real key to attracting students to computer science and then sustaining that growth has as much to do with the teacher in the classroom as it does with anything else. The real "access" students need to computing is an **opportunity to *legitimately and meaningfully participate* in every lesson** regardless of the student's background or prior experience in computing coming into the course. For example, the course begins with material that is

challenging but typically unfamiliar even to students who have some prior experience or knowledge of computer science. Students should not feel intimidated that others in the class are starting with a leg up on the material.

Who Should Take This Course?

There are no formal prerequisites for this course, though the College Board recommends that students have taken at least Algebra 1. The course requires a significant amount of expository writing (as well as writing computer code, of course). For students wishing to complete the requirements of the AP Exam and Performance Tasks, we recommend they be in 10th grade or above due the expectations of student responsibility and maturity for an AP course.

The curriculum itself does not assume any prior knowledge of computing concepts before entering the course. It is intended to be suitable as a **first course in computing** though students with a variety of backgrounds and prior experiences will also find the course engaging and with plenty of challenges. While it is increasingly likely that students entering this AP course in high school will have had *some* prior experience with programming, that experience is equally likely to be highly varied both in quantity and quality. It is for this reason that the course *does not* start with programming, but instead with material that is much more likely to put all students on a level playing field for the first few weeks of class. Read more about this in the description of Unit 1.

Teaching the course

The work of providing an accessible classroom doesn't stop with curriculum-- the classroom environment and teaching practice must also be structured such that all learners can access and engage with the material at a level that doesn't advantage a few at the expense of others.

Equitable teaching practices are inextricably linked and woven into the design and structure of our lessons, and in some cases the reason for their existence.

The curriculum provides a number of resources for the teacher, such as assessment support, computing tools that are designed for learning specific concepts, and the programming environment, App Lab. These resources have been specifically curated *for each each step of each lesson*, which allows the teacher to act in the role of facilitator and coach when addressing unfamiliar material, rather than having to worry about presenting or lecturing.

Who Should Teach This Course?

The curriculum is designed so that a teacher who is new to teaching this material has adequate support and preparation - especially for those who go through Code.org's professional development program. A teacher who is motivated to teach a course like this, but who has limited technical or formal computer science experience should be able to be successful. At a minimum, we strongly recommend that the teacher have a reasonable level of comfort using computers (using the web, email, downloading and saving files, basic troubleshooting, etc.) and at least some experience with computer programming obtained through self-instruction, an online course, or other formal computer science training or coursework.

Unit Structure: Units, Chapters, Lessons

While the layout of units appears to be modular, the units of study are loosely scaffolded, **and sequenced build students' skills and knowledge toward the Enduring Understandings of the CSP Course Framework.** The lessons for each unit assume that students have the knowledge and skills obtained in the previous units. There are also many thematic connections that can be made between and among lessons and units.

Each **unit** attempts to "tell a story" about a particular topic in computing from a more primitive beginning to a more complex end. The lessons in each unit are grouped into **chapters** of a few lessons each whose content is related or connected in some way. The course snapshot on the previous page shows the chapters for each unit. Each **lesson** is intended to be a complete thought that takes the student from some motivational question or premise to an activity that builds skills and knowledge toward some learning objective(s).

Each unit contains at least one summative assessment, project, or Practice PT that asks students to complete tasks similar to the official PTs. Sometimes these come mid-unit, and sometimes they come closer to the end.

Lesson Structure and Philosophy

Lessons are designed to be student-centered and to engage students with inquiry-based and concept-discovery activities. The course does not require the new-to-computing teacher to lecture or present on computer science topics if they do not want to. Direct instruction, where necessary, is built into our tools and videos.

Another goal of each lesson is to provide more resources, supports, and activities than a teacher could (or should) use in one lesson. **The teacher plays a large role making choices and ensuring that the activities, inquiry, and reflection are engaging and appropriate for their students, as well as assessing student learning**.

Most lessons have the following structure:

- **A warm-up activity** to activate prior knowledge and/or present a thought-provoking problem
- **An activity** that varies but is typically one of:
  - Unplugged concept invention, and problem solving scenarios
  - Creating computational artifacts (including programming)
  - Research / reflection / presentation
- **A wrap-up** activity or reflection

Technical Requirements

The course requires and assumes a 1:1 computer lab or setup such that each student in the class has access to an internet-connected computer every day in class. Each computer must have a modern web browser installed. All of the course tools and resources (lesson plans, teacher dashboard, videos, student tools, programming environment, etc.) are online and accessible through a web browser.

While the course features many “unplugged” activities away from the computer, daily access to a computer is essential for every student. It is not required that students have access to computers at home, but because almost all of the materials are online, students with access to computers outside of class and at home will find it more convenient and easier to keep up with the pace of the lessons.

Computational Tools, Resources and Materials

The Code.org CSP curriculum includes almost all resources teachers need to teach the course including:

Lesson Plans

- Instructional guides for every lesson
- Activity Guides and handouts for students
- Formative and summative assessments
- Exemplars, rubrics, and teacher dashboard

Videos

- Student videos - including tutorials, instructional and inspirational videos

- Teacher videos - including lesson supports and pedagogical tips and tricks

Computational Tools

- Widgets and simulators for exploring individual computing concepts
- **Internet Simulator** - Code.org's tool for investigating the various "layers" of the internet
- **App Lab** - Code.org's JavaScript programming environment for making apps

A few lessons call for typical classroom supplies and manipulatives such as poster paper, markers, dixie cups, string, playing cards, a handful of Lego blocks, etc. In most cases there are alternatives to these materials if necessary. Costs should be low.

Suggested Text:

Blown to Bits http://www.bitsbook.com/

This course does not require or follow a textbook. *Blown to Bits* is a book that can be accessed online **free of cost**. Many of its chapters are excellent supplemental reading for our course, especially for material in Units 1, 2 and 4. We refer to chapters as supplemental reading in lesson plans as appropriate.

AP® Assessment

The AP Assessment consists of a 74-question multiple choice exam and two "through-course" assessments called the *AP Performance Tasks* (PTs). For context it would be useful to familiarize yourself with the College Board documents. There are two:

- Explore Performance Task
- Create Performance Task

Assessments in the Curriculum

The course provides a number of assessment types and opportunities. For students, the goal of the assessments is to prepare them for the AP exam and performance tasks. For teachers, the goal is to use assessments to help guide instruction, give feedback to students, and make choices about what to emphasize in lessons.

Summative Assessments:

The curriculum contains two types of summative assessments that teachers may elect to use. They are intended to mimic the AP assessments though in more bite-sized chunks.

Fixed Response (multiple choice) Assessments

Each "chapter" of the curriculum - typically a sequence of 2-5 lessons - has an associated short multiple choice-style assessment that addresses material in those lessons.

Practice Performance Task Assessments

Each unit contains at least one project designed in the spirit of the Advanced Placement Performance Tasks (PTs). These **Practice PTs** are smaller in scope, contextualized to the unit of study and are intended to help prepare students to engage in the official administration of the AP PTs at the end of the course.

Rubrics
The curriculum contains rubrics for assessing certain kinds of student work:

- Written and project work
- Practice PTs
- Programming projects
- Student presentations

Formative Assessments:

The curriculum provides teachers many opportunities for formative assessment (such as checks for understanding). These include, but are not limited to:

Assessments in Code Studio
All lesson materials can be accessed by students on a single platform called Code Studio. In addition to housing lesson descriptions, instructional materials, and programming exercises in App Lab, Code Studio includes features that assist the teacher in completing formative assessment including:

- Multiple choice or matching questions related to questions on the chapter summative assessment.
- Free-response text fields where students may input their answer.
- Access to student work within the App Lab programming environment and other digital tools and widgets used in the curriculum.
- The ability for students to submit final versions of App Lab projects

Worksheets and Activity Guides

- Many lessons contain worksheets or activity guides that ask students to write, answer questions, and respond to prompts (Answer keys provided).
- These can be collected as a form of formative assessment

It is up to the classroom teacher:

- to determine the appropriateness of the assessments for their classrooms
- to decide how to use, or not to use, the assessments for grading purposes. The curriculum and Code Studio does not provide teachers with a gradebook.

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Coverage of the AP CS Principles Framework and Computational Thinking Practices

The CS Principles Framework outlines seven "Big Ideas" of computing, and six "Computational Thinking Practices". Activities in the course should ensure that students are engaging in the Computational Thinking Practices while investigating the Big Ideas.

Seven Big Ideas

The [course is] organized around seven big ideas, which encompass ideas foundational to studying computer science.

Big Idea 1: Creativity
Big Idea 2: Abstraction
Big Idea 3: Data
Big Idea 4: Algorithms
Big Idea 5: Programming
Big Idea 6: The Internet
Big Idea 7: Global Impacts

Six Computational Thinking Practices

Computational thinking practices capture important aspects of the work that computer scientists engage in.

P1: Connecting Computing
P2: Creating Computational Artifacts
P3: Abstracting
P4: Analyzing Problems and Artifacts
P5: Communicating
P6: Collaborating

These *Big Ideas* and *Practices* are not intended to be taught in any particular order, nor are they units of study. The Big Ideas all overlap, intersect, and reference each other. The practices represent higher order thinking skills, behaviors, and habits of mind that need to be constantly visited, repeatedly honed, and refined over time.

For example, a learning objective listed under the Big Idea *Abstraction* also references the Practice of *Programming*.

> *LO 2.2.1 Develop an abstraction when writing a program or creating other computational artifacts. [P2]*

Even though this particular learning objective highlights practice *P2: Creating Computational Artifacts,* it clearly will also engage the practice of *Abstracting.* Therefore, this single learning objective represents an intersection of two *Big Ideas*: Abstraction and Programming, while also engaging at least two *Computational Thinking Practices*.

This curriculum takes the view that the 7 Big Ideas actually represent a body of knowledge in which topics of study: The Internet, Programming and Data intersect with more general principles computing: Creativity, Abstraction, Algorithms and Global Impacts. It is much more usefully viewed in two dimensions.

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	Internet	Programming	Data
Creativity	Invent a communication protocol	Make a digital scene. Program an app.	Visualizing Data Create a visualization
Abstraction	Internet Protocols	Writing procedures and functions	Encoding images in binary
Algorithms	Routing, Encryption	String manipulation Array processing	Searching and data mining
Global Impact	Security, Privacy, Hacking	Software can solve some but not all problems	Implications of collection and storage of big data
	Unit 2	**Unit 3**	**Unit 4**

For Units 2, 3 and 4, we treat the Big Ideas *Internet*, *Programming*, and *Data* as major topics of study. We ensure that we cover all aspects of those topics by looking at their intersections with the other 4 big ideas: *Creativity*, *Abstraction*, *Algorithms*, *Global Impact*. The chart below shows the intersections of the big ideas and examples of topics addressed in the curriculum.

What about Unit 1? **Unit 1** actually addresses items from almost all of the big ideas, but heavily emphasizes items from the big ideas **Abstraction** and **Creativity.** Students invent things, solve problems, and create many artifacts in Unit 1 related to the digital representation of information and the implications of attempting to encode information in ways that computers can process (in binary). See the full unit descriptions for more information.

The six **computational thinking practices** are addressed continuously throughout the curriculum in a number of ways. They are woven into the curriculum, engineered into activities and projects, as well as in teaching tips for lessons. The acts of **abstracting**[P3] and **creating** and **analyzing computational artifacts** [P2 and P4] are part and parcel of many of the lessons, activities, and projects, themselves. The teacher plays a large role in ensuring that students are **connecting computing** [P1], **collaborating** [P6] effectively, and **communicating** [P5] both in writing and speaking. You can find explicit reference to the computational practices used in lessons in the unit overviews below.

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Unit Overviews

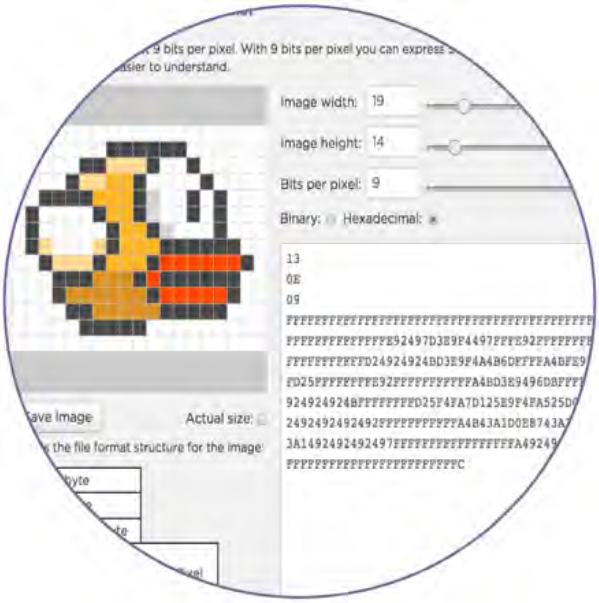
What follows are more in-depth descriptions of each unit of study which explain the topics covered and what students will be doing. Each unit also highlights a particular lesson, project or assignment of interest, explaining what students do and showing which **learning objectives** and **computational thinking practices** that particular assignment addresses.

Unit 1: The Digital Representation of Information

This unit sets the foundation for thinking about the digital (binary) representation of information and how that affects the world we live in. This unit explores the technical challenges and questions that arise from the need to represent digital information in computers and transfer it between people and computational devices. Topics include: the digital representation of information - numbers, text, images, and communication protocols.

The unit begins with a consideration of what is involved in sending a single bit of information from one place to another. In the *Sending Binary Messages* lesson students work with a partner to devise and build their own bit-sending “machines.” Complexity increases as students adapt their machines to handle multi-bit messages and increasingly complex information. For encoding information that can be sent between devices we use an Internet Simulator that allows students to develop and test binary encodings and communication protocols of their own invention.

The first unit of this course purposefully addresses material that is fundamental to computing but with which many students, even those with computers at home or who have some prior experience with programming, are unfamiliar. This levels the playing field for participation and engagement right from the beginning of the course.



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Unit 1 Lessons

Chapters	LO [P] (Ek)	Lessons / Topics
Getting Started	7.1.1 [P4] (A-O) 7.2.1 [P1] (A-C,G) 7.3.1 [P4] (A-O) 7.4.1 [P1] (A-D)	Personal Innovations
Sending Binary Messages	2.1.1 [P3] (A-C,E) 2.1.2 [P5] (D-F) 2.3.1 [P3] (A-D) 2.3.2 [P3] (A) 3.3.1 [P4] (A-B) 6.1.1 [P3] (A-D) 6.2.1 [P5] (A,D) 6.2.2 [P4] (A-K)	Sending Binary Messages Sending Complex Messages Sending Binary Messages with the Internet Simulator Sending Bits in the Real World
Encoding and Sending Numbers	2.1.1 [P3] (A-G) 2.1.2 [P5] (A-F) 2.3.1 [P3] (A-D) 2.3.2 [P3] (A-E) 3.1.1 [P4] (A,B,D,E) 3.3.1 [P4] (A,B) 6.2.2 [P4] (D,G,H)	Number Systems - Circles, Triangles, Squares Binary Numbers Sending Numbers Encoding Numbers in the Real World
Encoding and Sending Text	2.1.1 [P3] (A-E) 2.1.2 [P5] (B-F) 2.2.1 [P2] (A,B) 2.3.1 [P3] (A-D) 2.3.2 [P3] (A-E) 3.1.1 [P4] (A,D,E) 3.1.2 [P6] (A-D) 3.1.3 [P5] (A,E) 3.3.1 [P4] (A,B,G) 4.2.1 [P1] (A-D) 4.2.3 [P1] (A-C) 4.2.4 [P4] (A,C,D) 6.1.1 [P3] (A-D) 6.2.2 [P4] (D,F-H)	Encoding and Sending Text Sending Formatted Text Bytes and File Sizes
Compression and Encoding Images	1.1.1 [P2] (A,B) 1.2.1 [P2] (A) 1.3.1 [P2] (C) 2.1.1 [P3] (A-C) 2.1.2 [P5] (D-F) 2.2.1 [P2] (A,B) 2.3.1 [P3] (A-D) 3.1.1 [P4] (A,D,E) 3.1.2 [P6] (A-D) 3.1.3 [P5] (A,E) 3.2.1 [P1] (G-I) 3.3.1 [P4] (A-E,G)	Text Compression Encoding B&W Images Encoding Color Images Lossy Compression and File Formats
Practice PT	2.1.1 [P3] (A-E) 2.1.2 [P5] (A,B,D,F) 2.2.1 [P2] (A,B)	**Practice PT - Encode an Experience**

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Unit 1: Practice PT Highlight

Practice PT: Encode an Experience
Students invent a binary encoding (file format) for a real life experience. Students must figure out a way to encode or represent with data, the elements of some kind of human experience. How might you encode a birthday party? or a soccer game? or the brush strokes of a real painting? Students come up with their own creation and present their work in a format similar to that of a Performance Task. While the project is done individually the lesson helps students through an iterative feedback process with a partner. This assignment emphasizes the writing process, and giving and incorporating feedback from peers.

Learning Objectives Addressed:
Creativity: 1.1.1 [P2], 1.2.4 [P6]
Abstraction: 2.1.1 [P3], 2.1.2 [P5], 2.2.1 [P2]
Data: 3.2.1 [P1], 3.3.1 [P4]

Computational Thinking Practices Emphasized:
P1: Connecting Computing
P3: Abstracting
P5: Communicating
P6: Collaborating

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Unit 2: The Internet

This unit explores the structure and design of the Internet and the implications of those design decisions including the reliability of network communication, the security of data, and personal privacy.

The unit has two logical parts Topics include the Internet Protocol (IP), DNS, TCP/IP, cryptography and other security and hacking concerns. Students are introduced to algorithms formally in this unit by considering shortest path problems for routing. The unit also makes the link between the existence of computationally hard problems and encryption schemes that are “hard” for computers to crack.

The unit starts with students being presented with a more robust Internet Simulator that students will use to solve some of the classic problems of network communication such as addressing devices, routing traffic, and developing packet switching. Students work together to invent solutions and protocols to many of the problems that arise. The second half of the unit asks students to consider how information might be encrypted to ensure privacy and some of the tradeoffs involved.

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Unit 2 Lessons

Chapters	LO [P] (Ek)	Lessons
Getting Started	6.1.1 [P3] (B,C,E) 6.2.2 [P4] (B) 7.3.1 [P4] (A,D,E,G,L) 7.4.1 [P1] (C-E)	The Internet is for Everyone
Internet Addresses, Packets, and Redundancy	2.1.1 [P3] (A-C,E) 2.1.2 [P5] (D-F) 3.3.1 [P4] (A-F) 6.1.1 [P3] (B-E) 6.2.1 [P5] (D) 6.2.2 [P4] (B,D,G) 6.3.1 [P1] (A)	The Need for Addressing Invent an Addressing Protocol Routers and Redundancy Packets and Making a Reliable Internet
Algorithms of the Internet: Routing	4.1.1 [P2] (B,H,I) 4.1.2 [P5] (A-C,F,I) 4.2.1 [P1] (A,B) 4.2.4 [P4] (A-D,G)	Minimum Spanning Tree Shortest Path Problem How Routers Learn
Protocols and Abstraction	6.1.1 [P3] (A-I) 6.2.1 [P5] (B,C) 6.2.2 [P4] (C-E,H) 6.3.1 [P1] (B)	The Need for DNS DNS in the Real World HTTP and Abstraction
Practice PT	6.3.1 [P1] (A,B) 7.1.1 [P4] (A-D,H-K,M,0) 7.3.1 [P4] (A-Q) 7.4.1 [P1] (A,B,D,E) 7.5.1 [P1] (A,B) 7.5.2 [P5] (A,B)	**Practice PT: The Internet and Society**
Security and Symmetric Encryption	2.3.2 [P3] (A) 3.1.1 [P4] (A) 3.1.2 [P6] (A,C) 3.3.1 [P4] (B,E,F) 4.2.1 [P1] (A,C,D) 6.3.1 [P1] (C, H-K) 7.3.1 [P4] (G)	Tell Me a Secret - Encrypting Text Cracking the Code Keys and Passwords
Hard problems and Asymmetric Encryption	2.3.1 [P3] (A,B) 4.2.1 [P1] (A-D) 4.2.2 [P1] (A-D) 4.2.3 [P1] (A,D) 4.2.4 [P4] (A-C) 6.3.1 [P1] (H-L)	Hard Problems - The Traveling Salesperson Problem One Way Functions - The WiFi Hotspot Problem Asymmetric Keys - Cups and Beans Public Key Crypto
Practice PT	1.1.1 [P2] (A,B) 1.2.1 [P2] (A-C,E) 1.2.2 [P2] (A) 1.2.5 [P4] (B) 6.3.1 [P1] (A-M) 7.3.1 [P4] (A,D,G,H,L) 7.4.1 [P1] (A,B,E) 7.5.1 [P1] (A,B) 7.5.2 [P5] (A,B)	**Practice PT- Cybersecurity Innovations**

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Unit 2: Practice PT highlights

Practice PT: The Internet and Society Students will research and prepare a flash talk about a social issue related to the Internet. Students pick one of: Net Neutrality, Internet Censorship, or Computer/Network Surveillance. This lesson is good practice for certain elements of the Explore Performance Task, which students will complete later in the school year. Students will do a bit of research about impacts of the Internet, explain some technical details related to ideas in computer science, and connecting these ideas to global and social impacts. Students will practice synthesizing information, and presenting their learning in a flash talk.	**Learning Objectives Addressed:** **Internet:** 6.3.1 [P1] **Global Impacts:** 7.1.1 [P4], 7.3.1 [P4], 7.4.1 [P1], 7.5.2 [P5] **Computational Thinking Practices Emphasized:** **P1:** Connecting Computing **P5:** Communicating

Practice PT: Cybersecurity Innovations Students will complete a research project on an innovation of their choosing. Students will need to identify appropriate online resources to learn about the functionality, context, and impact of their cybersecurity innovation. After completing their research, students will present their findings both in a written summary and with an audio / visual artifact they found online. The written components and audio / visual artifact students will identify are similar to those students will see in the AP Performance Tasks.	**Learning Objectives Addressed:** **Data:** 3.3.1 [P4] **Internet:** 6.1.1 [P3], 6.2.1 [P5], 6.2.2 [P4], 6.3.1 [P1] **Computational Thinking Practices Emphasized:** **P1:** Connecting Computing **P5:** Communicating

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Unit 3: Programming

This unit introduces students to programming in the JavaScript language and creating small applications (apps) that live on the web. This introduction places a heavy emphasis on understanding general principles of computer programming and revealing those things that are universally applicable to any programming language.

Students will program in an online programming environment created by Code.org called *App Lab* that has many features, chief among them the ability to write JavaScript programs with click-and-drag blocks as well as typing text - allowing the user to switch back and forth at will. This should greatly ease the transition to typing text-based programming languages.

The unit begins with students solving problems with classic turtle-style programming, focusing on the power of procedural abstraction and personal expression with code. After learning some basics of programming with the turtle, students transition to more event-driven apps, gradually blending in common user interface objects like buttons and text inputs, images and so on.

Students create a number of small exemplar apps during the unit each emphasizing a different aspect of programming:

- a digital scene created with turtle graphics
- a simple clicker game
- an “intelligent” digital assistant
- a coin-flipping simulation
- a drawing effects app

The unit also features two practice performance tasks. The first: *Design a Digital Scene* asks students to collaborate and share code with their team to create a small scene. The second: *Improve Your App* asks students to look back at the exemplar apps they’ve created during the unit and use one as a point of inspiration for creating their own app.

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Unit 3 Lessons

Chapters	LO [P] (Ek)	Lessons
Getting Started	4.1.2 [P5] (A-C, F, I) 5.2.1 [P3] (E)	The Need For Programming Languages
Procedural Abstraction and Top-Down Design	2.2.1 [P2] (A, B) 2.2.2 [P3] (A, B) 2.2.3 [P3] (A) 5.1.2 [P2] (A-C, I) 5.1.3 [P6] (A-F) 5.2.1 [P3] (A, B) 5.3.1 [P3] (A-D, L) 5.4.1 [P4] (A-E, I)	Using Simple Commands Creating Functions Functions and Top-Down Design
Documentation and Simple Loops	2.2.1 [P2] (C) 2.2.2 [P3] (A, B) 2.2.3 [P3] (A, B) 4.1.1 [P2] (D) 5.1.2 [P2] (B-F) 5.3.1 [P3] (A, C-G, L-O) 5.4.1 [P4] (C-K)	APIs and Function Parameters Creating functions with Parameters Looping and Random Numbers
Practice PT	2.2.1 [P2] (C) 2.2.2 [P3] (A, B) 2.2.3 [P3] (A, B) 4.1.1 [P2] (D) 5.1.2 [P2] (B, C) 5.1.3 [P6] (A-F) 5.3.1 [P3] (A, C, D, F, G, L) 5.4.1 [P4] (C-K)	**Design a Digital Scene**
Event Driven Programming and Apps	1.1.1 [P2] (A, B) 1.2.1 [P2] (A-E) 2.2.1 [P2] (B, C) 5.1.1 [P2] (A-C) 5.1.2 [P2] (J) 5.2.1 [P3] (D, G, H) 5.4.1 [P4] (C, E, F, M)	Events Unplugged Event-Driven Programming and Debugging Beyond Buttons Toward Apps Introducing Design Mode Multi-screen Apps
Variables and Strings	4.1.1 [P2] (A, C) 5.1.1 [P2] (B) 5.2.1 [P3] (C, F) 5.3.1 [P3] (I)	Controlling Memory with Variables Using Variables in Apps User Input and Strings
Conditionals and Boolean Logic	1.2.3 [P2] (A-C) 1.2.4 [P6] (A-D) 1.3.1 [P2] (E) 2.2.3 [P3] (F) 4.1.1 [P2] (A-C, I) 5.1.2 [P2] (A-C) 5.1.3 [P6] (A-F) 5.3.1 [P3] (I) 5.5.1 [P1] (E-G) 7.1.1 [P4] (L-N)	Introduction to Digital Assistants Understanding Program Flow and Logic Introduction to Conditional Logic Compound Conditional Logic Digital Assistant Project
Loops and Arrays	2.3.1 [P3] (A, C, D) 2.3.2 [P3] (A-F) 3.1.1 [P4] (A) 4.1.1 [P2] (A-D, H) 4.1.2 [P5] (A-G) 5.1.1 [P2] (A, B)	While Loops Loops and Simulations Introduction to Arrays

	5.1.3 [P6] (A-F) 5.2.1 [P3] (A-F, I-K) 5.3.1 [P3] (A-D, G, K, L) 5.4.1 [P4] (B, C, E-H, K-M) 5.5.1 [P1] (D-J)	Image Scroller with Key Events
Processing Arrays of Data	1.1.1 [P2] (B) 1.2.1 [P2] (A-D) 1.2.3 [P2] (A-C) 1.3.1 [P2] (C-E) 2.2.1 [P2] (A-C) 2.2.2 [P3] (A, B) 4.1.1 [P2] (A-I) 4.1.2 [P5] (A-C, G, I) 4.2.4 [P4] (D-F, H) 5.1.1 [P2] (A-E) 5.1.2 [P2] (A-C, J) 5.2.1 [P3] (A-F, I, J) 5.3.1 [P3] (A-G, J-L) 5.4.1 [P4] (A-H, L-N) 5.5.1 [P1] (D-J)	Processing Arrays Functions with Return Values Canvas and Arrays in Apps
Practice PT	1.1.1 [P2] (A, B) 1.2.1 [P2] (A-E) 1.2.2 [P2] (A, B) 1.2.3 [P2] (A-C) 1.2.4 [P6] (A-F) 1.2.5 [P4] (A-D) 2.2.1 [P2] (A-C) 2.2.2 [P3] (A, B) 4.1.1 [P2] (A-I) 4.1.2 [P5] (A-I) 5.1.1 [P2] (A-E) 5.1.2 [P2] (A-J) 5.1.3 [P6] (A-F) 5.2.1 [P3] (A-F, I-K) 5.3.1 [P3] (A-O) 5.4.1 [P4] (C, E-H, J, L-N) 5.5.1 [P1] (A-J)	**Improve Your App**

Unit 3 Practice PT Highlights

Practice PT: Digital Scene Design
In this project students work with a small team to create a digital scene with turtle graphics. They plan the scene together, code the parts separately and bring them together to make a whole. An important focus of this project is on how teams of programmers work together, and some insight is given into how real engineering teams do this. Students are asked to reflect on their experience in a way that is similar to the *Create* performance task. In terms of programming, a heavy emphasis is on writing functions (procedures) that can be easily incorporated into others' code.

Learning Objectives Addressed:
Creativity: 1.1.1 [P2], 1.2.1 [P2], 1.2.4 [P6], 1.3.1 [P2]
Abstraction: 2.2.1 [P2], 2.2.2 [P3]
Algorithms: 4.1.1 [P2]
Programming: 5.1.1 [P2], 5.1.3 [P6], 5.3.1 [P3]

Computational Practices Emphasized:
P2: Creating Computational Artifacts
P3: Abstracting
P6: Collaborating

rev. January 2016

Practice PT: Improve Your App
To conclude their introduction to programming, students will design an app based off of one they have previously worked on in the programming unit. Students will choose the kinds of improvements they wish to make to a past project in order to show their ability to add new abstractions (procedures and functions) and algorithms to an existing program. The project concludes with reflection questions similar to those students will see on the AP Create Performance Task. Students can either complete the project individually or with a partner. Every student will need a collaborative partner with whom they will give and receive feedback.

Learning Objectives Addressed:
Creativity: 1.1.1 [P2], 1.2.1 [P2], 1.2.2 [P2], 1.2.3 [P2], 1.2.4 [P6], 1.3.1 [P2]
Abstraction: 2.2.1 [P2], 2.2.2 [P3]
Algorithms: 4.1.1 [P2], 4.1.2 [P5]
Programming: 5.1.1 [P2], 5.1.2 [P2], 5.1.3 [P6], 5.2.1 [P3], 5.3.1 [P3], 5.4.1 [P4], 5.5.1 [P1]

Computational Practices Emphasized:
P2: Creating Computational Artifacts
P3: Abstracting
P5: Communicating
P6: Collaborating

rev. January 2016

Unit 4: Data

Being able to digitally manipulate data, visualize it, identify patterns, trends and possible meanings are important practical skills that computer scientists do every day. The data rich world we live in also introduces many complex questions related to public policy, law, ethics and societal impact. Understanding where data comes from, having intuitions about what could be learned or extracted from it, and being able to use computational tools to manipulate data and communicate about it are the primary skills addressed in the unit.

Chapters	LO [P] (Ek)	Lessons / Topics
Getting Started	3.2.1 [P1] (A,B,C) 5.1.1 [P2] (F) 7.1.1 [P4] (C) 7.2.1 [P1] (A,B,G)	Introduction to Data - The Tracker Project
Interpreting Visual Data	1.1.1 [P2] (A,B) 1.2.1 [P2] (A,B,E) 1.2.5 [P4] (A-D) 3.1.1 [P4] (A,B,D,E) 3.1.2 [P6] (A-F) 3.1.3 [P5] (A-E) 3.2.1 [P1] (A-E) 7.1.1 [P4] (E-G) 7.4.1 [P1] (A,C,D)	Telling Stories with Visualizations - Google Trends Good v. Bad Visualization Digital Divides
Communicating with Visualization	1.1.1 [P2] (A,B) 1.2.1 [P2] (A-C) 1.2.4 [P6] (A,B,F) 3.1.1 [P4] (A-E) 3.1.2 [P6] (A-F) 3.1.3 [P5] (A-C) 3.2.1 [P1] (A-G,I) 3.2.2 [P3] (C,G) 3.3.1 [P4] (F) 7.3.1 [P4] (G)	What's the story? Chart it - using Visualization for Discovery Cleaning and Manipulating your data Summarizing Data in Tables
Practice PT	1.2.1 [P2] (A-C,E) 1.2.2 [P2] (A,B) 1.2.5 [P4] (A-D) 3.1.3 [P5] (A-D) 7.3.1 [P4] (J) 7.5.2 [P5] (A,B)	Tell a Data Story
Data in the Real World	1.2.5 [P4] (A-D) 3.1.1 [P4] (C-E) 3.1.2 [P6] (F) 3.2.1 [P1] (A-D,G) 3.2.2 [P3] (A-D,G,H) 3.3.1 [P4] (A,B,F) 7.1.1 [P4] (F) 7.2.1 [P1] (A) 7.3.1 [P4] (A,D-M) 7.5.2 [P5] (A,B)	Big data - Where does it come from? Big Public Data - datasets and APIs Security and Privacy in the world of data Public policy and privacy policies
Practice PT	1.2.5 [P4] (A-D) 3.1.3 [P5] (A-E) 3.3.1 [P4] (A,B,F) 7.1.2 [P4] (D,E,F,G) 7.3.1 [P4] (G,H)	Propose an Innovation

Unit 4 Practice PT Highlights

Tell a Data Story - Communicate Data Visually
This small project culminates a series of lessons in which students, provided a set of raw data, must use digital tools to collaboratively investigate the data to discover possible connections and trends. In the end students must produce a visual explanation of their findings in the data and write a small about about what the data shows. The emphasis is on producing the visual communication. The reflection questions mimic those on the Explore PT.

Learning Objectives Addressed:
Creativity: 1.1.1 [P2], 1.2.1 [P2], 1.2.4 [P6], 1.2.5 [P4]
Data: 3.1.1 [P4], 3.1.2 [P6], 3.1.3 [P5], 3.2.1 [P1]
Gbal Impacts: 7.1.1 [P4], 7.4.1 [P1]

Computational Practices Emphasized:
P1: Connecting Computing
P2: Creating Computational Artifacts
P5: Communicating
P6: Collaborating

Practice PT - Propose an Innovation
Connecting back to the very beginning of the course, students here collaboratively *propose* a computing innovation of their own imagining that would positively affect or impact some community, group, or individual. As part of the proposal students must explain how the innovation would collect or use data, develop a privacy policy around its use, anticipate the possible negative effects the innovation might have and explain tradeoffs that need to be considered. This project prepares students for various aspects of the Explore Performance Task, particularly in considering how a computing innovation produces and consumes data and the beneficial and harmful effects that might result.

Learning Objectives Addressed:
Creativity: 1.3.1 [P2]
Data: 3.1.3 [P5], 3.3.1 [P4]
Gbal Impacts: 7.1.1 [P4], 7.3.1 [P4], 7.4.1 [P1]

Computational Practices Emphasized:
P1: Connecting Computing
P4: Analyzing Problems and Artifacts
P5: Communicating
P6: Collaborating

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Unit 5 - Performance Tasks

In Units 1-4 students engaged in projects to learn and practice the skills and content they needed to know in order to succeed on the AP CSP Performance Tasks. Still, a certain level of guidance during the PT development process is not only recommended, but vital. For example, coaching students early on helps them clarify their ideas and/or approaches to the PTs. This unit is primarily set aside to ensure that students have enough time in class to work on and complete their performance tasks for submission to the College Board. There are a few guided activities for teachers to run that will help students get organized and ensure they have reasonable project plans that can be achieved in the time allotted. In the official submission to the College Board, teachers will attest that all student work is original and that the appropriate amount of class time - 8 hours for *Explore*, 12 hours for *Create* - was provided.

Chapters	LO [P] (Ek)	Lessons / Topics
Explore PT Overview	7.5.1 [P1] (A,B) 7.5.2 [P5] (A,B)	Planning to do the Explore PT Research Tips and Tricks Requirements and managing time.
Explore PT		**Administration of** ***Explore* Performance Tasks** **8 hours**
Create PT Overview	5.1.1 [P2] (A, B, C) 5.1.2 [P2](A, B, C) 5.1.3 [P6] (B,C)	Planning to do the Create PT Requirements and managing time.
Create PT		**Administration of** ***Create* Performance Tasks** **12 hours**

Kenosha Unified School District
Kenosha, Wisconsin

April 12, 2016
Curriculum/Program Standing Committee Meeting

NEW CURRICULUM/RESOURCES: MATH APPLICATIONS

Background

In 2008-09 Kenosha Unified School District began offering Math Applications as an optional third course in the high school mathematics sequence. The course, as it was originally developed, is no longer aligned to the Wisconsin High School Mathematics Standards; nor does it provide access to rigorous mathematics necessary to prepare students to succeed on the ACT which is now required of all Wisconsin eleventh grade students.

While Algebra 2 provides students with the best preparation for both the ACT and postsecondary mathematics, it is recognized that a traditional Algebra 2 course does not meet the needs of all students. In addition to offering students the opportunity to learn rigorous mathematics embedded in contexts that are interesting and relevant, the proposed curriculum and resource updates provide an opportunity to increase the financial literacy of Kenosha Unified School District students.

Several other Wisconsin school districts have also implemented this curriculum and resources, including: Madison Metropolitan School District, Merrill, D C Everest, Wisconsin Rapids, Mosinee, Sun Prairie, Amherst, Black River Falls, Fond du Lac, Jefferson, New Berlin, Rosendale and Wilmot.

Course Change Proposal

In order to implement this course in the 2016-17 school year, the Office of Teaching and Learning is providing, for board of education approval, the course change proposal form (Appendix A). The form explains the rationale for the new curriculum and resources. Additional appendices provide the following information:

- Appendix B: Kenosha Unified School District Algebra 1 Priority Standards
- Appendix C: Kenosha Unified School District Algebra 2 Priority Standards
- Appendix D: Updated Scope and Sequence for Math Applications

Recommendation

Administration recommends that the Curriculum/Program Standing Committee forward the new curriculum and resources for the Math Applications course to the school board on for consideration.

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Ms. Julie Housaman
Assistant Superintendent of Teaching and Learning

Mrs. Jennifer Lawler
Coordinator of Mathematics

APPENDIX A

COURSE/PROGRAM CHANGE PROPOSAL: SENIOR HIGH SCHOOL

Return this form to your department chair by no later than May 15 for building & committee signatures. Completed forms must be returned to the Director of Instruction by June 15. Type responses on additional sheets when appropriate and attach to this form.

Date Initiated 12/8/2015 Name Jennifer Lawler

Department & School Teaching & Learning

Proposed or Removed Course Math Applications

___ New Course ___ New Name Length: ___Quarter Credits: ___½ Credit

__X__ New Curriculum & Resources ___Semester __X__1 Credit

Recommended Prerequisites (if any) Geometry

Rationale for Course: Explain why this course is needed – It fills a curricular gap, extends course sequence, addresses needs of a particular learner. How does this course support the district focus on achievement for all students? *Does this course fit the District's approved curriculum cycle?* (If this is a course removal, only fill out this section.)

Since 2008, KUSD has offered Math Applications as an alternative to Algebra 2. This course as it was originally developed, as well as the associated Board of Education approved text, is no longer aligned to the Wisconsin High School Mathematics Standards and does not prepare students for success on the ACT. The curriculum and resources being proposed for Math Applications will align to the Wisconsin High School Mathematics Standards as well as preparing students for the ACT.

The recommended curriculum and resources are algebra-based, applications-oriented, and technology-dependent. The course addresses college preparatory mathematics topics from algebra, statistics, probability, and advanced mathematics concepts under seven financial umbrellas: Banking, Investing, Credit, Employment and Income Taxes, Automobile Ownership, Independent Living, and Retirement Planning and Household Budgeting. The course allows students to experience the interrelatedness of mathematical topics, find patterns, make conjectures, and extrapolate from known situations to unknown situations. The mathematics topics contained in this course are introduced, developed, and applied in an as-needed format in the financial settings covered. Students are encouraged to use a variety of problem-solving skills and strategies in real-world contexts, and to question outcomes using mathematical analysis and data to support their findings. The course offers students multiple opportunities to use, construct, question, model, and interpret financial situations through symbolic algebraic representations, graphical representations, geometric representations, and verbal representations. It provides students a motivating, young-adult centered financial context for understanding and applying the mathematics they are guaranteed to use in the future.

Proposed Course Description: In three or four sentences, write a course overview appropriate for the Course Description Booklet.

Mathematical Applications is a college-preparatory course that will use sophisticated mathematics to give you the tools to become a financially responsible young adult. The course employs algebra, probability and statistics, geometry and advanced mathematical concepts to solve financial problems that occur in everyday life. Real-world problems in investing, credit, banking, auto insurance, mortgages, employment, income taxes, budgeting and planning for retirement are solved by applying the relevant mathematics. Field projects, computer spreadsheets, and graphing calculators are key components of the course.

Content Standards and Benchmarks: List the primary content standards and benchmarks students will be expected to understand and be able to apply as a result of taking this course.

This course supports the KUSD Priority Standards for Algebra 1 and Algebra 2. See Appendices B and C.

Pacing Guide/Scope and Sequence: Outline the planned structure for the course, including a tentative timeline for instruction.

See Appendix C

Cost Associated with the Course: Estimate the costs involved in offering this course. List desired texts and materials on a separate sheet. Also list and explain other needs.

a. Teaching Staff $ 0

b. Textbooks/kits $82.50 (T&L Budget)

c. Supplementary $ 0

d. Facilities/Space $ 0

Approvals:	Name(s)	Date
Department head & Principal	_____/_____	_____
Building Review Committee	_____	_____
District Review Committee	_____	_____
Central Office	_____	_____

Revised 2/14/14

Kenosha Unified School District
Algebra 1 Priority Standards

Priority Standard	Essential Knowledge & Skills
N.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.	● Understand and apply the properties of exponents ● Convert from radical representation to using rational exponents and vice versa
*** CROSS-CUTTING*** N.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	● Interpret units in the context of the problem ● When solving a multi-step problem, use units to evaluate the appropriateness of the solution. ● Choose the appropriate units for a specific formula and interpret the meaning of the unit in that context. ● Choose and interpret both the scale and the origin in graphs and data displays
*** CROSS-CUTTING*** A.SSE.A.1 Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity.	● Identify the different parts of the expression and explain their meaning within the context of a problem (ex. interpret the slope and y-intercept). ● Decompose expressions and make sense of the multiple factors and terms by explaining the meaning of the individual parts (ex. interpret $1 + r)^n$as the product of factors independent meanings)
A.SSE.B.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.* a. Factor a quadratic expression to reveal the zeros of the function it defines.	● Write expressions in equivalent forms by factoring to find the zeros of a quadratic function and explain the meaning of the zeros. ● Given a quadratic function explain the meaning of the zeros of the function. That is if f(x) = (x – c) (x – a) then f(a) = 0 and f(c) = 0. ● Given a quadratic expression, explain the meaning of the zeros graphically. That is for an expression (x – a) (x – c), a and c correspond to the x-intercepts (if a and c are real).
*** CROSS-CUTTING*** A.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales	● Create equations in two or more variables to represent relationships between quantities. ● Graph equations in two variables on a coordinate plane and label the axes and scales.
*** CROSS-CUTTING*** A.CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context	● Write and use a system of equations and/or inequalities to solve a real world problem. ● Recognize that the equations and inequalities represent the constraints of the problem. ● Interpret the solution in the context of the problem.

A.REI.B.4 Solve quadratic equations in one variable. b. Solve quadratic equations by inspection, taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as a+/- bi for real numbers a and b.	● Solve quadratic equations in one variable by simple inspection (by looking at a graph or factored form), taking the square root, factoring, and quadratic formula. ● Understand why taking the square root of both sides of an equation yields two solutions.
A.REI.C.6 Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.	● Solve systems of equations using graphs, substitution, and elimination.
A.REI.D.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	● Understand that all solutions to an equation in two variables are contained on the graph of that equation. ● Be able to identify solutions from a graph.
A.REI.D.11 Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equation f(x)=g(x); find one solutions approximately, e.g. using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear~~, polynomials, rational, absolute value, exponential, and logarithmic functions~~.	● Explain why the intersection of y = f(x) and y = g(x) is the solution of f(x) = g(x) for any combination of linear, ~~polynomial, rational, absolute value, exponential, and logarithmic functions~~. Find the solution(s) by: ○ Using technology to graph the equations and determine their point of intersection, ○ Using tables of values, or ○ Using successive approximations that become closer and closer to the actual value
F.IF.B.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities and sketch graphs showing key features given a verbal description of the relationship.	● Graph a function in two variables in any given form (standard, slope-intercept, exponential, etc.) on a coordinate plane and label the axes. ● Given a function, identify key features in graphs and tables including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; and symmetries. ● Given the key features of a function, sketch the graph.
F.IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	● Compare the key features of two functions represented in different ways. (ex. given an equation of one quadratic and the graph of another, identify key features such as which has maximum or minimum)

F.BF.A.1 Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	● Write a function that describes the linear/exponential relationship between two quantities.
F.LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another. c. Recognize situations in which a quantity grows or decays by a constant percent or rate per unit interval relative to another.	● Given a contextual situation, describe whether the situation in question has a linear pattern of change or an exponential pattern of change. ● Show that linear functions change at the same rate over time and that exponential functions change by equal factors over time. ● Describe situations where one quantity changes at a constant rate per unit interval as compared to another. ● Describe situations where a quantity grows or decays at a constant percent rate per unit interval as compared to another.
S.ID.B.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. b. Informally assess the fit of a function by plotting and analyzing residuals. c. Fit a linear function for a scatter plot that suggests a linear association	● Describe the form, strength and direction of the relationship. ● Categorize data as linear or not. Use algebraic methods and technology to fit a linear function to the data. Use the function to predict values. ● Explain the meaning of the slope and y-intercept in context. ● Categorize data as exponential. Use algebraic methods and technology to fit an exponential function to the data. Use the function to predict values. ● Explain the meaning of the growth rate and y-intercept in context. ● Categorize data as quadratic. Use algebraic methods and technology to fit a quadratic function to the data. Use the function to predict values. ● Explain the meaning of the constant and coefficients in context. ● Calculate a residual. Create and analyze a residual plot.

Kenosha Unified School District
Algebra 2 Priority Standards

Priority Standard	Essential Knowledge & Skills
N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions	● Solve quadratic equations with real coefficients that have solutions of the form a + bi and a – bi.
CROSS-CUTTING A.SSE.A.1: Interpret expressions that represent a quantity in terms of its context. a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity.	● Identify the different parts of the expression and explain their meaning within the context of a problem. ● Decompose expressions and make sense of the multiple factors and terms by explaining the meaning of the individual parts.
A.APR.B.3: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomials.	● Find the zeros of a polynomial when the polynomial is factored. ● Use the zeros of a function to sketch a graph of the function.
CROSS-CUTTING A.CED.A.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales	● Create equations in two or more variables to represent relationships between quantities. ● Graph equations in two variables on a coordinate plane and label the axes and scales.
CROSS-CUTTING A.CED.A.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context	● Write and use a system of equations and/or inequalities to solve a real world problem. ● Recognize that the equations and inequalities represent the constraints of the problem. ● Interpret the solution in the context of the problem.
A.REI.D.11: Explain why the x-coordinates of the points where the graphs of the equations y=f(x) and y=g(x) intersect are the solutions of the equation f(x)=g(x); find one solutions approximately, e.g. using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomials, rational, absolute value, exponential, and logarithmic functions.	● Explain why the intersection of y = f(x) and y = g(x) is the solution of f(x) = g(x) for any combination of linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ● Find the solution(s) by: ○ Using technology to graph the equations and determine their point of intersection, ○ Using tables of values, or ○ Using successive approximations that become closer and closer to the actual value

F.IF.B.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	● Given a function, identify key features in graphs and tables including: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ● Given the key features of a function, sketch the graph.
F.IF.C.8: Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions.	● Write a function in equivalent forms to show different properties of the function. ● Explain the different properties of a function that are revealed by writing a function in equivalent forms. ● Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. ● Use the properties of exponents to interpret expressions for percent rate of change, and classify them as growth or decay.
F.IF.C.9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)	● Compare the key features of two functions represented in different ways. For example, compare the end behavior of two functions, one of which is represented graphically and the other is represented symbolically.
F.BF.A.1: Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context. b. Combine standard function types by using arithmetic operations.	● From context, either write an explicit expression, define a recursive process, or describe the calculations needed to model a function between two quantities. ● Combine standard function types, such as linear and exponential, using arithmetic operations.
F.BF.B.3: Identify the effect on the graph of replacing f(x) by f(x)+k, kf(x), f(kx), f(x+k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions from them.	● Identify, through experimenting with technology, the effect on the graph of a function by replacing f(x) with f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative). ● Given the graphs of the original function and a transformation, determine the value of (k). ● Recognize even and odd functions from their graphs and equations.
F.LE.A.2: Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table)	● Create linear and exponential functions given the following situations: - arithmetic and geometric sequences - a graph - a description of a relationship - two points, which can be read from a table

F.TF.A.2 : Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	● Explain how radian measures of angles rotated counterclockwise in a unit circle are in a one-to-one correspondence with the nonnegative real numbers, and that angles rotated clockwise in a unit circle are in a one-to-one correspondence with the non-positive real numbers.
S.IC.B.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	● Use sample means and sample proportions to estimate population values. ● Conduct simulations of random sampling to gather sample means and sample proportions. Explain what the results mean about variability in a population and use results to calculate margins of error for these estimates.
S.CP.B.5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations	● Recognize and explain the concepts of independence and conditional probability in everyday situations.

Kenosha Unified School District

Math Applications

Scope and Sequence
Year at a Glance

Semester 1			Semester 2			
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Banking Services	Investing	Consumer Credit	Automobile Ownership	Employment and Income Taxes	Independent Living	Retirement Planning and Budgeting
20 days	40 days	15 days	20 days	30 days	15 days	20 days
N-RN.1 ***N-RN.2*** *A-CED.4* ***A-SSE.1a*** ***A-SSE.1b*** ***A-SSE.3*** ***F-IF.4*** ***F-IF.8b*** ***F-BF.1a***	***N-Q.1*** *N-Q.2* *N-Q.3* *A-CED.1* ***A-CED.2*** ***A-CED.3*** *A-CED.4* *A-REI.2* *A-REI.3* ***A-REI.4b*** ***A-REI.6*** *A-REI.7* ***A-REI.10*** ***A-REI.11*** *A-REI.12* *A-SSE.1* *F-IF.1* ***F-IF.4*** *F-IF.5* *F-IF.7a* ***F-IF.8*** F-LE.4 **S-ID.6** S-ID.8 S-ID.9	***N-Q.1*** *N-Q.2* ***A-CED.3*** ***A-SSE.1*** *A-SSE.2* ***A-SSE.3*** ***F-IF.8b*** ***F-BF.1a*** F-LE.5 **S-ID.6a**	***A-CED.2*** ***A-CED.3*** *A-CED.4* *A-REI.2* ***A-SSE.1b*** ***A-SSE.3*** *F-IF.1* *F-IF.2* ***F-IF.4*** *F-IF.6* *F-IF.7a* *F-IF.7b* *F-IF.7e* ***F-IF.8b*** ***F-IF.9*** ***F-LE.1b*** ***F-LE.1c*** F-LE.5 G-C.5 S-ID.1 *S-ID.2* S-ID.3 S-ID.4 **S-ID.6** *S-ID.7*	*A-CED.1* ***A-CED.2*** ***A-CED.3*** *A-CED.4* *A-REI.3* ***A-SSE.1*** ***F-BF.1*** *F-IF.1* *F-IF.2* ***F-IF.4*** *F-IF.7b* ***F-IF.8*** ***F-LE.1***	*A-APR.6* ***A-CED.2*** ***A-CED.3*** ***A-REI.6*** ***A-SSE.1*** ***F-BF.1*** ***F-LE.1*** G-C.5 G-MG.3 **S-ID.6a** **S-ID.6c** S-ID.8	***N-Q.1*** *N-Q.2* N-VM.6 ***A-CED.3*** ***A-REI.10*** ***A-SSE.1*** ***F-BF.1*** ***F-IF.4*** *F-IF.5* *F-IF.7a* *F-IF.7b* ***F-IF.8b*** S-MD.1 S-MD.2 S-MD.4 S-MD.5

BOLD Standards indicate KUSD Priority Standards
Italicized Standards indicate "Widely Applicable Prerequisites" - Source: *High School Publishers Criteria for the Common Core State Standards for Mathematics.*

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Kenosha Unified School District
Kenosha, Wisconsin

April 12, 2016
Curriculum/Program Standing Committee

TALENT DEVELOPMENT PROGRAM UPDATE

Background

The Talent Development Advisory Committee was formed in October 2014 with the charge to review the 2006 Kenosha Unified School District Talent Development Long-Range Plan (Appendix A). Over 40 parents, teachers, administrators, and community members (Appendices B and C) worked collaboratively to:

- Complete a gap analysis chart to prioritize the greatest areas of need in the existing Talent Development Long-Range Plan.
- Research best practices in the field of gifted education.
- Review gifted education plans of comparable school districts—both in the state of Wisconsin and across the nation.
- Develop a gifted and talented education plan to provide services to gifted and talented students.

Findings

The Wisconsin Department of Public Instruction recommended the gap analysis process to determine compliance with state statutes, alignment with Wisconsin Department of Public Instruction recommendations, and best practices in the field of gifted education. The committee identified gaps in the following areas as priorities:

GAP Analysis Findings
November 2014

COMPONENTS OF EFFECTIVE GIFTED AND TALENTED EDUCATION PLAN	IDENTIFIED GAP AREAS
Opportunities for students must be continuous.	• There are limited opportunities for students in kindergarten through second grades and sixth through tenth grades.

COMPONENTS OF EFFECTIVE GIFTED AND TALENTED EDUCATION PLAN	IDENTIFIED GAP AREAS
	• There are limited enrichment opportunities for students in kindergarten through fifth grades not participating in the magnet enrichment program at Roosevelt Elementary School. • There are limited enrichment opportunities beyond the core academic areas (e.g., world language and poetry). • Universal identification is only at grade 1.
Opportunities must be systematic.	• The existing magnet program is limited to a small number of students able to attend Roosevelt Elementary School. • There is no continuation of the magnet program beyond grade 5. • Limited opportunity is provided for students to participate in consistent enrichment opportunities (periods) for kindergarten through twelfth grade.
Appropriate learning opportunities match identified student needs.	• The existing universal identification process at grade 1 may not capture all students. • There is no formal screening process for students who enter the district after grade 1. • There are no additional enrichment opportunities in the areas of art and music. • There are limited opportunities for parent education. • There is a lack of support for classroom teachers to provide enrichment for identified students.
School boards shall establish a plan for gifted and talented pupils.	• The existing plan was not fully implemented. • There is a need to increase professional learning for all teachers around gifted students and best instructional practices. • The needs of gifted students not in the magnet program are not being met.

Updated Gifted and Talented Education Plan

Developing a strong and sustainable gifted program will take time; and it will require continuous modification of programs to respond to educational trends, district initiatives, state policies, shifting student demographics, and staffing. Based on the research findings of exemplar gifted and talented programs and best practices in gifted education, the committee recommended that the Wisconsin Response to Intervention (RTI) framework be the service model for Kenosha's Gifted and Talented Education (GaTE) Plan (Appendix D).

RTI provides a framework to embed gifted services into what is occurring throughout the school or district, and it requires administration and teachers to consider the needs of gifted students when planning. Using standardized screeners that are free from cultural and linguistic bias, students are identified for gifted services in the following areas: general intellectual, specific academic, visual arts, performing arts, leadership, and creative thinking. District-level screening will continue for students in first grade, and a second district-level screening will be added at the fifth grade level. Additionally, a process for a teacher or parent to identify a student at any time is defined in the plan.

Schools will identify services for each identified student that are designed to develop the potential and talents of each student. The needs of gifted students will vary similarly to the needs of students who qualify for special education services. The proposed Teacher Advocate support position will assist classroom teachers in designing services that meet the needs of identified students.

The GaTE plan outlines a multilevel system of support. The needs of most students are addressed by the classroom teacher through curriculum extensions and curriculum compacting. Select intervention services will be available for students identified for more specialized services. Most often these opportunities will be provided during a designated intervention/enrichment period. When testing indicates that a student should receive intense enrichment services, a differentiated education plan is written; and this plan will recommend either subject acceleration, grade level acceleration, or a GaTE program. Appendix E outlines how the GaTE plan addresses each component of the Wisconsin Department of Public Instruction-recommended gap analysis process.

Building and sustaining a strong gifted education program throughout the district requires the integration of gifted services throughout the district. In addition to the Talent Development Advisory Committee, input has been sought from elementary, middle, and high school principals as well as Special Education and Student Support and Teaching and Learning coordinators. These discussions will continue and expand to include teachers and students as the plan is refined. The success of the plan hinges on the connections and ties between gifted education and other district departments, especially Language Acquisition, Special Education and Student Support, Teaching and Learning, Information and Accountability, and Organizational Training and Development. These intentional connections lead to collaboration and training and improved access to resources and funds so that the needs of this population are met.

Next Steps

The coordinator of gifted and talented education and summer school will continue to collaborate with district administration, teachers, and committee members to complete the following tasks:

- Update Policy 6423—Talent Development Program—and Policy 5118.3—Retention/Acceleration—to align with the GaTE Plan.

- Identify and/or develop an assessment tool and criteria for identification in the following areas of gifted and talented education:

  - Visual arts,
  - Performing arts,
  - Leadership, and
  - Creative thinking.

- Request that the board reverse a resolution adopted on November 11, 1997, to identify the top 10 percent of the student population by gender and ethnic group for the kindergarten through fifth grade magnet program. Following is the November 11, 1997, board motion that defined the current identification process for the kindergarten through fifth grade magnet program:

  - ". . . in addition to the current talent development program, consistent with existing policies and fiscal responsibility, the district shall create classrooms through the eighth grade level which meet the needs of the top 10 percent of the student population by gender and ethnic groups as identified by widely recognized intelligence measures . . ." (Appendix F). This motion was seconded and passed.

- Identify an instructional model for the kindergarten through eighth grade magnet program.

- Develop a position description for the teacher advocate position.

- Develop a comprehensive professional learning plan for all teachers, counselors, and social workers to identify gifted and talented students and to provide appropriate services to gifted students.

- Continue to add activities and strategies to the curriculum documents that provide deeper learning opportunities for students who have mastered the grade level standard.

- Identify a gifted and talented advisory committee comprised of community members and educators to provide support for gifted and talented education services.

- Develop a gifted and talented program evaluation process.

The anticipated completion date for the GaTE is December 2016 with implementation of the plan expected for the 2017-18 school year, pending school board approval of the plan and the necessary funding to implement all components.

This is an information only item.

Link to complete appendices below
http://www.kusd.edu/docs/Talent-Development-Long-Range-Plan-Complete-Appendices.pdf

Dr. Sue Savaglio-Jarvis
Superintendent of Schools

Ms. Julie Housaman
Assistant Superintendent of Teaching and Learning

Ms. Patricia Clements
Coordinator of Gifted and Talented Education and Summer School

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