BPS K-12
Math Program Overview

May 17, 2016

Focal Points

District-Wide Strategic Objectives

Coherent, Higher Order Thinking and Student-Centered Learning

Equity and Diversity: Teaching all Students

Collaborative Professional Culture

K-5 Mathematics

Aligned to 2011
Massachusetts Math Standards
Common Core

K-5 Coherent, Higher-Order Thinking, Student-Centered

DAVIS K-2

Bridges in Mathematics, 2nd Edition

Comprehensive : Two components: Number Corner and Units (lessons and workplaces)

Whole group and small group work instruction

Approximately one hour per day

Transition to Lane School

LANE SCHOOL 3-5

EnVision 2012 - Common Core Edition
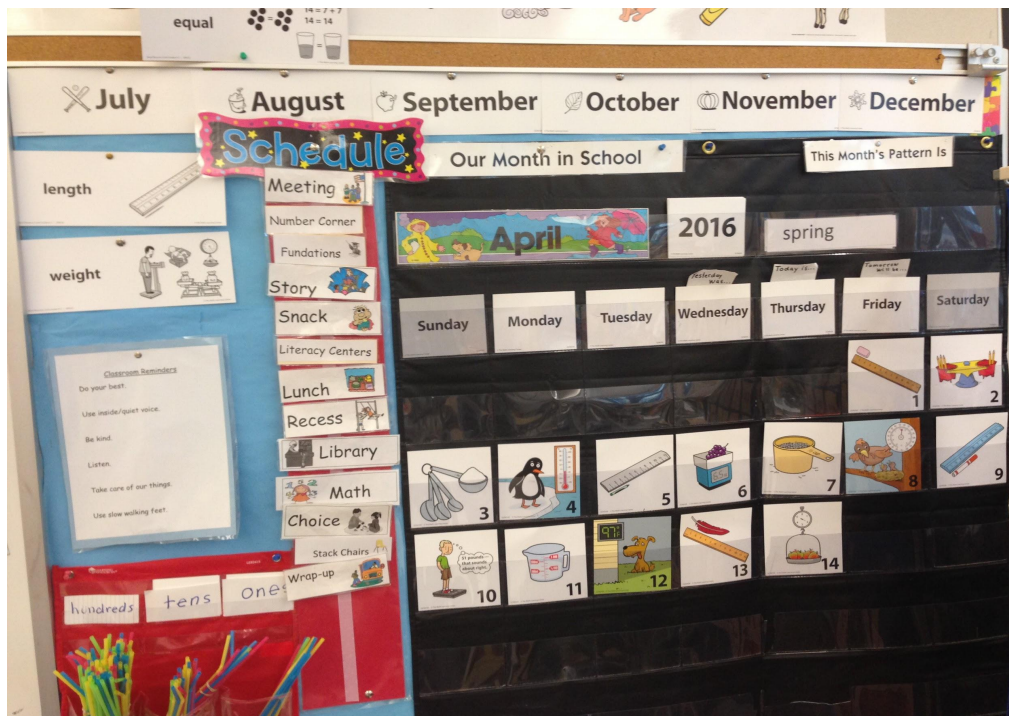
Comprehensive: 16 Topics + Performance Tasks

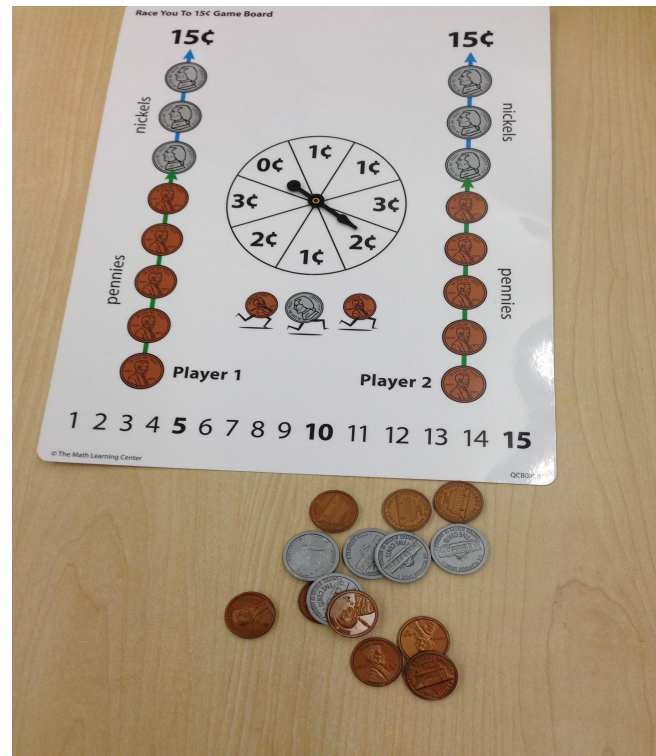Extremely well-scaffolded

Approximately one hour per day

Transition to JGMS

Davis Number Corner and Workplace Examples

April Calendar - Kindergarten Classroom

Kindergarten Money Game

Davis Higher-Order Thinking Skills

" I think one of the strengths of the program clearly includes a focus on getting children to "think" like a mathematician and to practice the set of Mathematical Practices that are outlined in the Common Core State Standards. There are many examples of how to get children to articulate their understandings and strategies."

Davis School Kindergarten Teacher

" The Bridges developers have done a beautiful job balancing the research on the best math practices while keeping in mind the developmental ages/stages of six- and seven-year old learners. The materials are truly multi-sensory: white boards, number racks, number lines, many manipulatives like pattern blocks, Unifix cubes, and counters...The games are engaging for the children. The students are having fun with frogs and flies chasing each other on the number line, performing word problems with their number racks, and practicing math facts with card and spinner games. The children work in partnerships, work by themselves and with the teacher. It's all there."

Davis School Grade One Teacher

Davis Higher-Order Thinking Skills

Solve each story problem below. Use numbers, pictures, or words to help solve the problem and show your thinking. Write your answer on the line.

a Sam has 5 apples. Ella has 9 apples. How many more apples does Ella have than Sam?
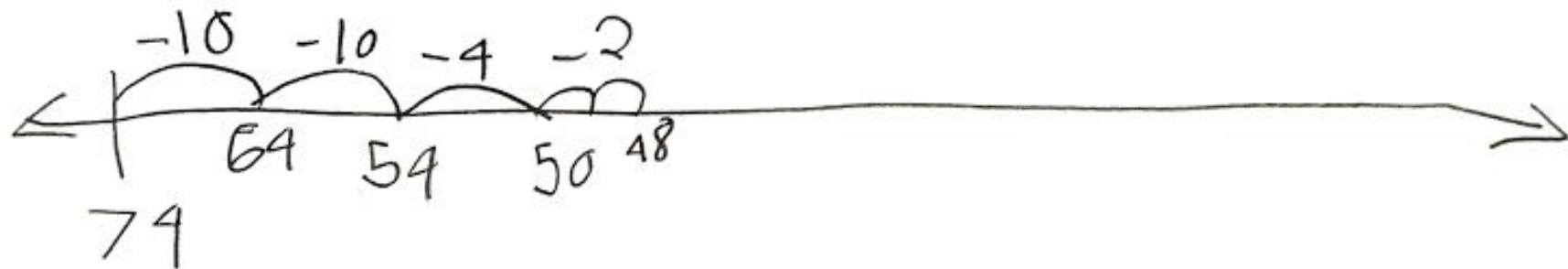
Grade one
Story problems

Ella has ___4___ more apples than Sam.

Davis Higher-Order Thinking Skills

$$74 - 26 = 48$$

Grade 2
Double-digit subtraction

Collaborative Problem-Solving

Lane School: Grade 4 Task

The perimeter of a state park shown is 42 miles.

State Park

8 miles

A ranger estimates that there are 9 deer in each square mile of the park.

If this estimate is correct, how many total deer are in the park? Explain your answer using numbers, symbols and words.
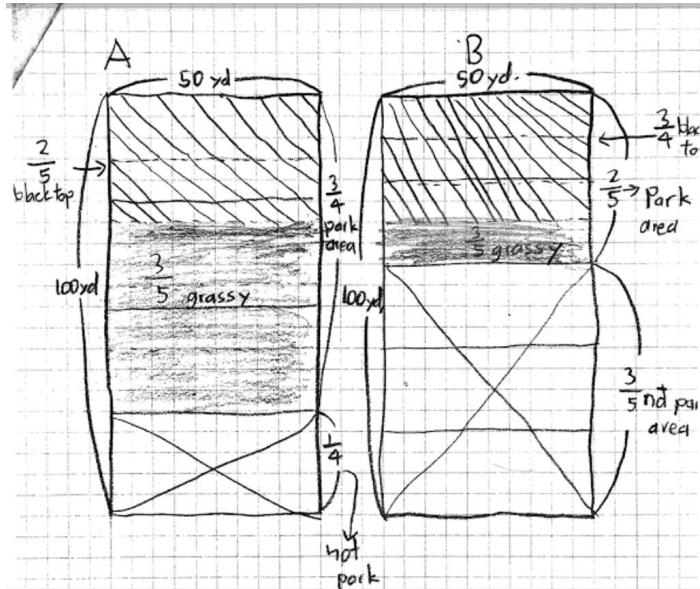
Student solution (verbatim): (Just typed for ease of reading)

If the ranger's estimate was correct, there would be 936 deer in the state park. We know this because since 42 is the perimeter, and the shape of the park is a rectangle and one side is 8 miles, then the two short sides measure 8 x 2 = 16. Then we know that 42 – 16 = 26, so 26 is the perimeter of the two long sides. 26 ÷ 2 = 13 so 13 miles is the length of one of the two other sides. Then, to find the area, we did 13 x 8 = 104 sq. miles (A = l x w). The ranger from the park estimated there were 9 deer per square miles, so we multiplied 9 x 104 = 936. 936 is the amount of deer in the state park if the ranger is correct.

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Two communities, A and B, have parcels of land that measure 50 yards by 100 yards. In community A, they have been asked to convert $\frac{3}{4}$ of their lot to a playground, and 2/5 of that playground should be covered with blacktop. In community B, they are building their playground on 2/5 of the lot, and $\frac{3}{4}$ of the playground should be blacktop.

In which park is the grassy playground bigger? In which lot is the blacktop bigger? Illustrate and explain your answers.

Lane School: Grade 5 Task

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K-5 Equity and Diversity: Teaching All Students

All (but a few) students receive the core curriculum and common assessments at grade level.

Heterogenous classes until Fifth grade: Flexible Grouping model in 5th

Remedial support: In class or pull-out with Special Educators and/or TA support

Enrichment: Provided upon teacher request for entire class, small group or individual students.

   Weekly pull-out math class Grades 3, 4 and 5

After school programs at Lane: METCO Math and Homework Club Academic

K-5 Professional Collaborative Culture

Grade Level Cluster Teams or Pods - Discuss student progress and lesson planning

Grade Level Teams - Teacher Days with Math Discussions (around the new editions or curricula)

Curriculum Coordinator - Consult with individual teachers and grade level teams, analyze data of student performance, meet weekly Davis Math Support TA and Lane Title I teacher, provide pacing guides and assessments

Teacher Days and Summer Work

JGMS Student Centered Learning and Higher Order Thinking

Box Enlargement Project

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4) Discuss the surface area to volume ratio of different spheres and how it changes based on the radius. At what radius do the surface area and the volume of a sphere equal each other. Show this with calculations, algebraically and graphically.

What a terrific graph! Outstanding

4) The surface area to volume ratio is 3:r.

$$\frac{4\pi r^2}{\frac{4}{3}\pi r^3} = \frac{4\pi \times \pi}{\frac{4}{3}\pi r \pi} = \frac{4}{\frac{4}{3}r} = \frac{4\times 3}{\frac{4}{3}\times 3r} = \frac{12}{4r} = \frac{3}{r}$$

This ratio changes based on what the radius is because r is a variable so it can be any number. The surface area equals the volume when the radius is 3 because the ratio is 3:3.

$$SA = Volume$$
$$4\pi r^2 = \frac{4}{3}\pi r^3$$
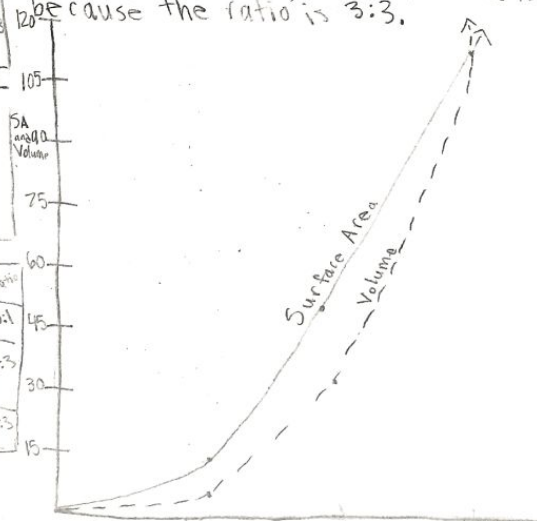$$\frac{4\pi r r}{\pi r^2} = \frac{\frac{4}{3}\pi r r r}{\pi r^2}$$
$$3 \times 4 = \frac{4}{3}r \times 3$$
$$12 = 4r$$
$$\frac{12}{4} = \frac{4r}{4}$$
$$3 = r$$

$\pi = 3.14$

r	SA	V	ratio
1	4π / 12.56	$\frac{4}{3}\pi$ / 4.186	3:1
2	16π or 50.24	10.6π / 33.49	3:3
3	30π / 113.04	36π / ?.?4	3:3

Equity and Diversity: Teaching all students

JGMS Tenacity Challenge

MathCounts

8th Grade Enrollment Data

	2012-2013 **# of students**	**2013-2014**	**2014-2015**	**2015-2016**
Pre-Algebra	56 (28%)	63 (32%)	49 (29%)	**26 (15%)**
Algebra	144 (72%)	134 (68%)	119 (71%)	90 (53%)
Algebra IA	0	0	0	54 (32%)
Total	200 students	197 students	168 students	170 students

JGMS Professional Collaboration

7th grade **8th grade** **9th grade**

7th Grade Math → 8th Grade Pre Algebra → Algebra College Prep

8th Grade Pre Algebra → Algebra Honors

7th Grade PreAlgebra → 8th Grade Algebra 1A → Algebra Honors

8th Grade Algebra 1A → Continuing Alg/Geo Honors

8th Grade Algebra 1A → Geometry Honors

7th Grade PreAlgebra → 8th Grade Algebra → Geometry Honors

8th Grade Algebra → Geometry High Honors

8th Pre Algebra

8th Pre Algebra → STEM Applications → Algebra CP → Geometry CP → Algebra II CP / Business Math CP

8th Pre Algebra → Algebra CP → Geometry CP → Algebra II CP → Business Math CP

8th Pre Algebra → Algebra Honors → Geometry Honors → Algebra II Honors → Pre-Calc, Statistics, Business Math CP/H

8th Algebra (1 or 1A)

8th Algebra (1 or 1A) → Cont. Alg/Geo H → Cont. Geo/Alg II H → Cont. Alg II/Pre-Calc Honors → **Calculus H**, Statistics, or Business Math

8th Algebra (1 or 1A) → Geometry Honors → Algebra II Honors → PreCalc Honors → **Calculus Honors**

8th Algebra (1 or 1A) → Geometry High Honors → Algebra II High Honors → PreCalc High Honors → **Calculus AP AB and BC**

BHS Coherent, Standards-based Curriculum

Strong Professional Collaboration

Student Centered Learning that makes kids think...
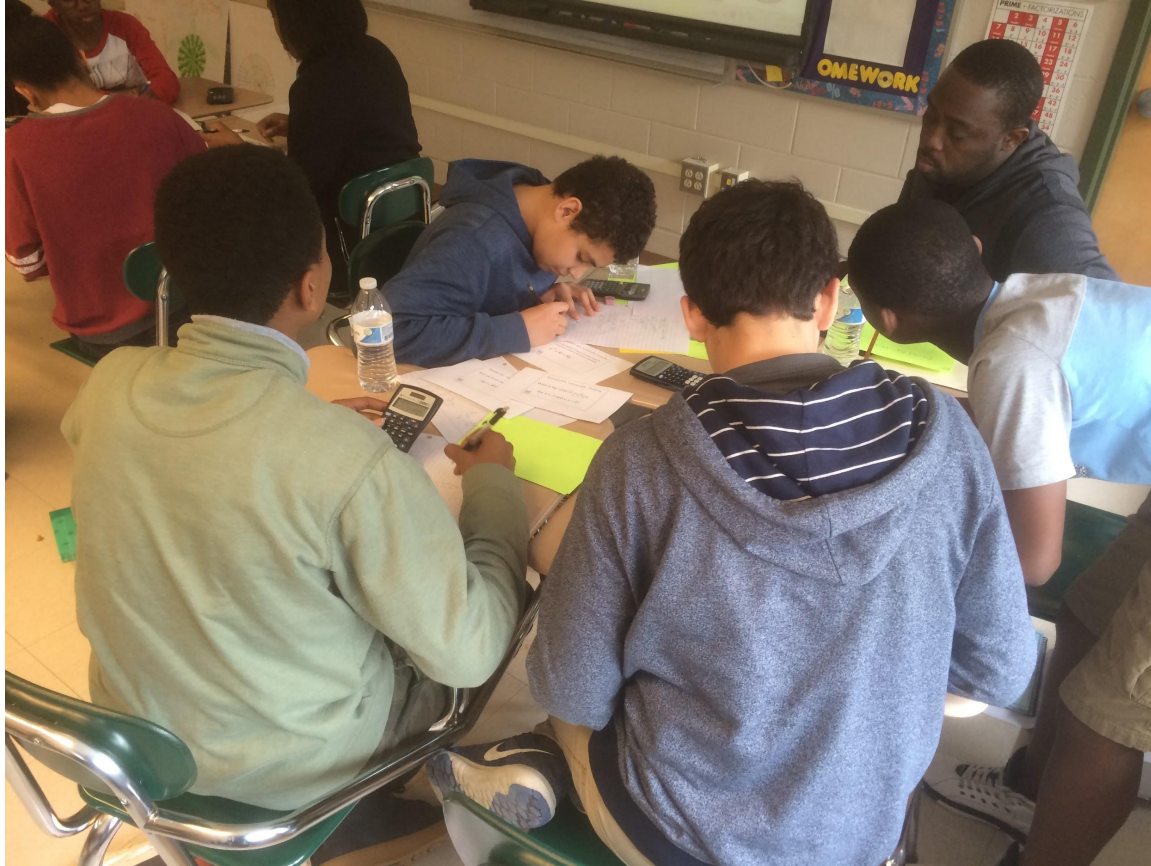
Challenging Tasks

Student Centered Learning

Stock Market Simulation

Equity and Diversity: Teaching <u>all</u> students

Challenges

- BHS Department Reputation
- MCAS Scores
- Support for co-teaching classes at JGMS and BHS
- Lack of Common Planning time at BHS
- Sharing classrooms at BHS, need for laptops for all
- "Continuing" Sequence of courses

10th Grade MCAS

	2011	2012	2013	2014	2015
Advanced	76%	73%	80%	76%	72%
Proficient	17%	20%	14%	19%	19%
Needs Improvement	6%	7%	3%	4%	8%
Warning	0%	0%	2%	1%	2%

Some columns don't add to 100% due to rounding errors.

BHS: Looking Ahead

- Analyzing student work in PLCs and between buildings
- Co-Teaching support
- Shared collaborative workroom
- Drop in Help Center
- Adding AP Stats
- Focused MCAS support with identified populations