Bonita Unified School District

ROBERT KAPLINSKY

@robertkaplinsky

Goals

- Engaging problem solving
  - Real world problem-based learning
  - Higher depth of knowledge problems
- Better implementation
  - Improve our ability to ask questions
  - Practice preparing to implement a lesson
  - Figure out how to deal with uncomfortable situations

DOUBLE-DOUBLE® *Double Meat & Double Cheese* 2.65

CHEESEBURGER 1.75

HAMBURGER 1.50

FRENCH FRIES 1.05

SHAKES *Chocolate Strawberry Vanilla* 1.55

SM	MED	LG	X-LG
99	1.10	1.29	1.49

COKE *Classic or Diet*
SEVEN-UP
ROOT BEER
DR PEPPER
LEMONADE
ICED TEA

MILK 70
COFFEE 70

IN-N-OUT BURGER

OPEN 10:30 a.m. to 1:00 a.m.
.....Fri. and Sat. until 1:30 a.m.

2004-10-31

8:21 PM

YOUR GUEST NUMBER IS
98

IN-N-OUT BURGER LAS VEGAS EASTERN
2004-10-31 8:21 PM

165 1 5 98

Cashier: SAM
GUEST #: 98

Counter-Eat In

Dbl Dbl	
98 Meat Pty XChz	2.65
	88.20
Counter-Eat In	90.85
TAX 7.50%	6.81
Amount Due	97.66
CASH TENDER	$97.66
Change	$.00

2004-10-31

Cashier: SAM
GUEST #: 98

Counter-Eat In

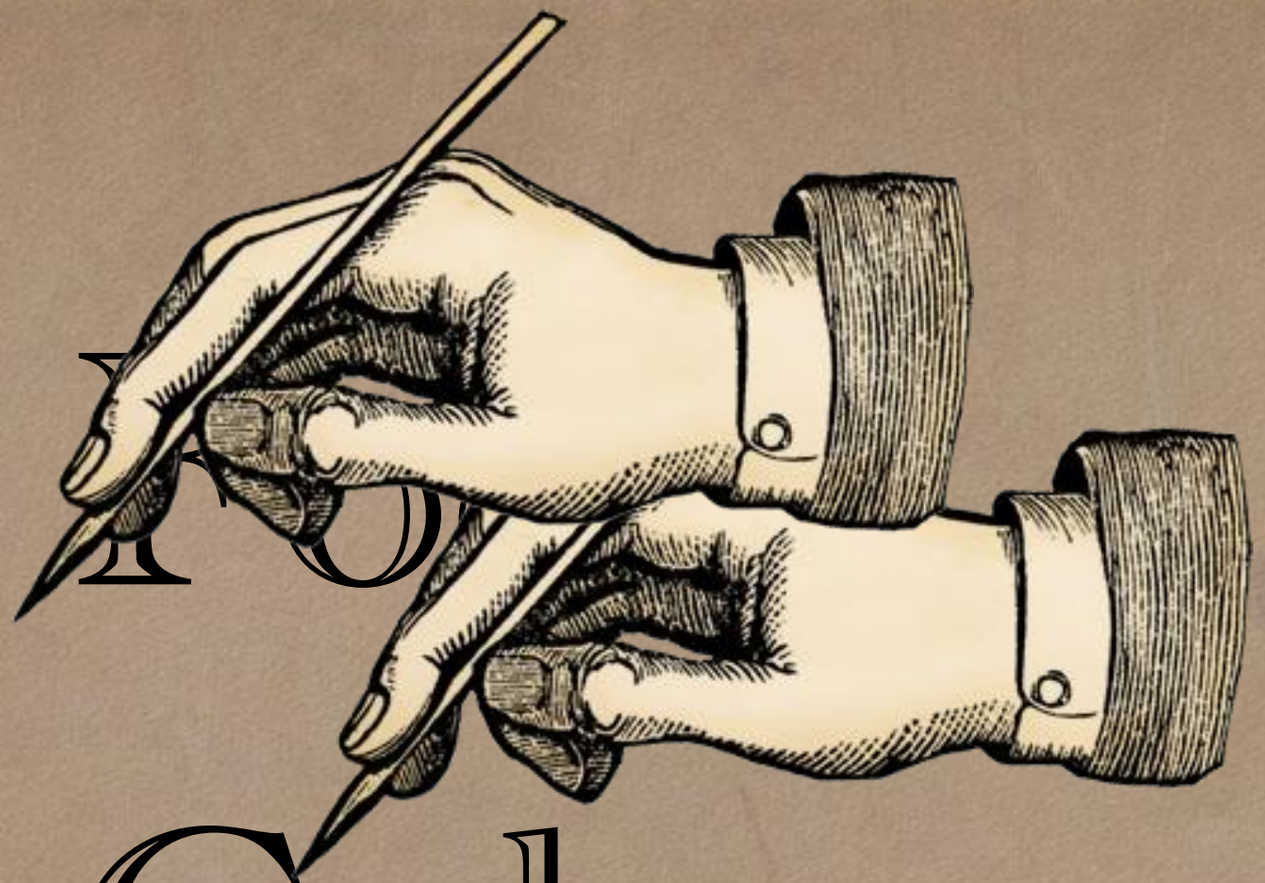
Db1Db1	
98 Meat Pty XChz	2.65
	88.20
Counter-Eat In	
TAX 7.50%	90.85
Amount Due	6.81
	97.66
CASH TENDER	
Change	$97.66
	$.00

2004-10-31

8:21 PM

	Serving Size (g)	Calories
Hamburger w/Onion	243	390
Cheeseburger w/Onion	268	480
Double-Double w/Onion	330	670

- Focus
- Coherence
- Rigor



Layers	Cost
1	$1.75
2	$2.65
3	$3.55
4	$4.45
.	.
.	.
20	$18.85
.	.
.	.
100	$90.85
.	.
.	.
N	$1.75 + (N-1)*$0.90

bun + produce + meat + cheese + meat + cheese = $2.65

bun + produce + meat + cheese = $1.75

meat + cheese = $0.90

The Reality

- Students needed guidance to figure out a layer's cost
- Not every class is ready to go straight to 100x100
- Common wrong answers included:
  - $175.00 ($1.75 x 100 cheeseburgers)
  - $132.50 ($2.65 x 50 Double-Doubles)
- Students had equations that had more than X patties
- Students were surprised to see three different equations:
  - Starting with a Double-Double
  - Starting with a cheeseburger
  - Starting with produce and bun only

STUDENT WORK

What problem are you trying to figure out?

How much does a 100x100 burger cost?

What do you already know from the problem?	What do you need to know to solve the problem?
• theres 100 beef patties	• How much does a regular cheeseburger cost.

What is your conclusion?

To get the answer, I first figured out what the price of a regular & double-double cheeseburgers are. From there I subtracted the price of the produce & buns, then multiplyed by 100. That gave me the answer, which I once again had to add the price of the buns & produce.

What is your conclusion?

The only difference between a double double and a cheeseburger is one patty and one slice of cheese. So you subtract the prices of the two to find the price of only one patty & cheese. You then use that number (.90) & subtract it from the cost of one whole cheeseburger to find the price of all the extra stuff. Multiply by 100

What is your conclusion?

A 100×100 at In-n-Out cost $90.85. To solve that, you start by subtracting the price of a cheeseburger from a double double. The answer (.90) is the price of a patty and cheese slice. You multiply (.90) by one less patty than what you want. (x-1), and you add the price of a cheeseburger (1.75). You end up with the eq. [$y = .90(x-1)+1.75$.]. For the 100×100, you plug in 100 to the (x) and you end up with $90.85.

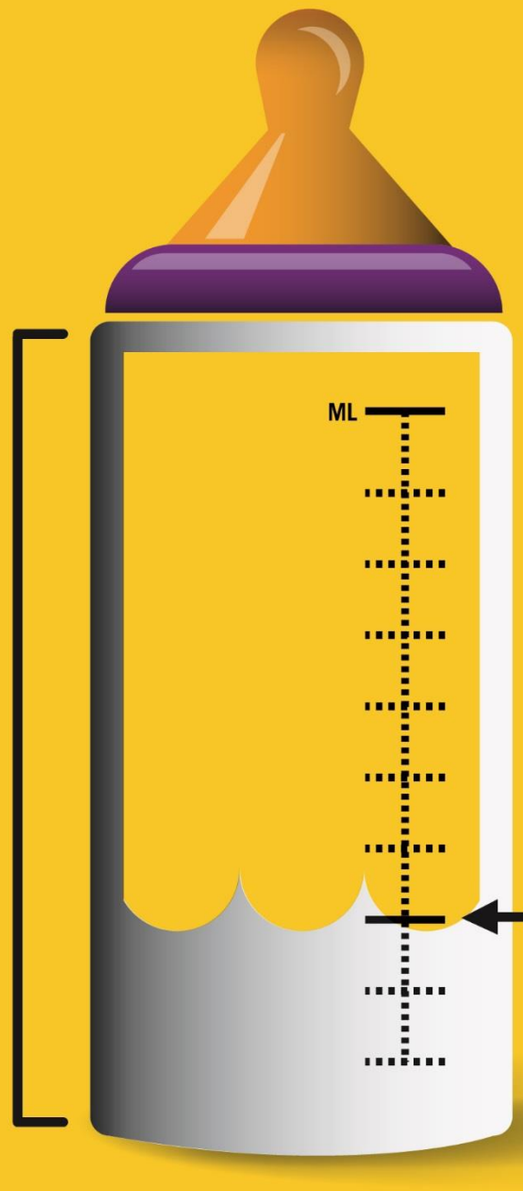
$$\begin{aligned} y &= .90(100-1)+1.75 \\ y &= 89.10+1.75 \\ y &= 90.85 \end{aligned}$$

What is your conclusion?

Figure the price difference from the Double-Double with a cheeseburger. Then find out the prize for the produce and cheese-beef. get total into $90.85

CHOOSE CAR SEAT:
BY AGE & SIZE

THE NUMBER OF PEOPLE **WHO THINK** THEY HAVE THEIR CHILD IN THE RIGHT SEAT.



THE ONES **WHO ACTUALLY DO.**

KNOW FOR SURE

IF YOUR CHILD IS IN THE RIGHT CAR SEAT.

VISIT SAFERCAR.GOV/THERIGHTSEAT

Ad Council

NHTSA www.nhtsa.gov

Child Car Safety

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BY AGE & SIZE

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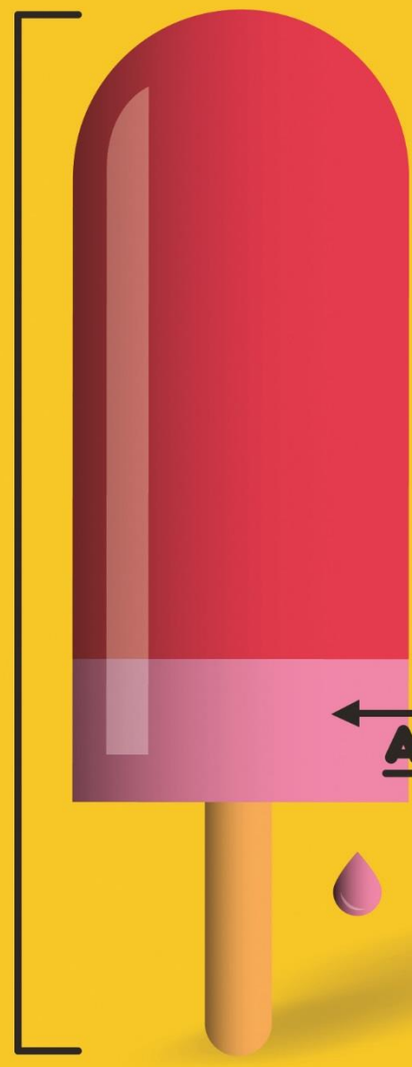

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NHTSA www.nhtsa.gov

Child Car Safety

There are 125 sheep and 5 dogs in a flock. How old is the shepherd?

Of the 32 students I interviewed…

- 75% of them gave me numerical responses
- 2 students calculated the answer to be 130 (125 + 5)
- 2 students calculated the answer to be 120 (125 – 5)
- 12 students calculated the answer to be 25 (125 ÷ 5)
- 0 students calculated the answer to be 625 (125 x 5)
- 4 students stated that they guessed their answer (90, 5, 42, and 50)
- 4 students tried to divide 125 by 5 but could not correctly implement the procedure

Takeaways

- Making sense of mathematics
- Intellectual autonomy
  - Intellectual autonomy is about being able to think for yourself and not being dependent on others for the direction and control of one's thinking.

What Does the NHTSA Say?

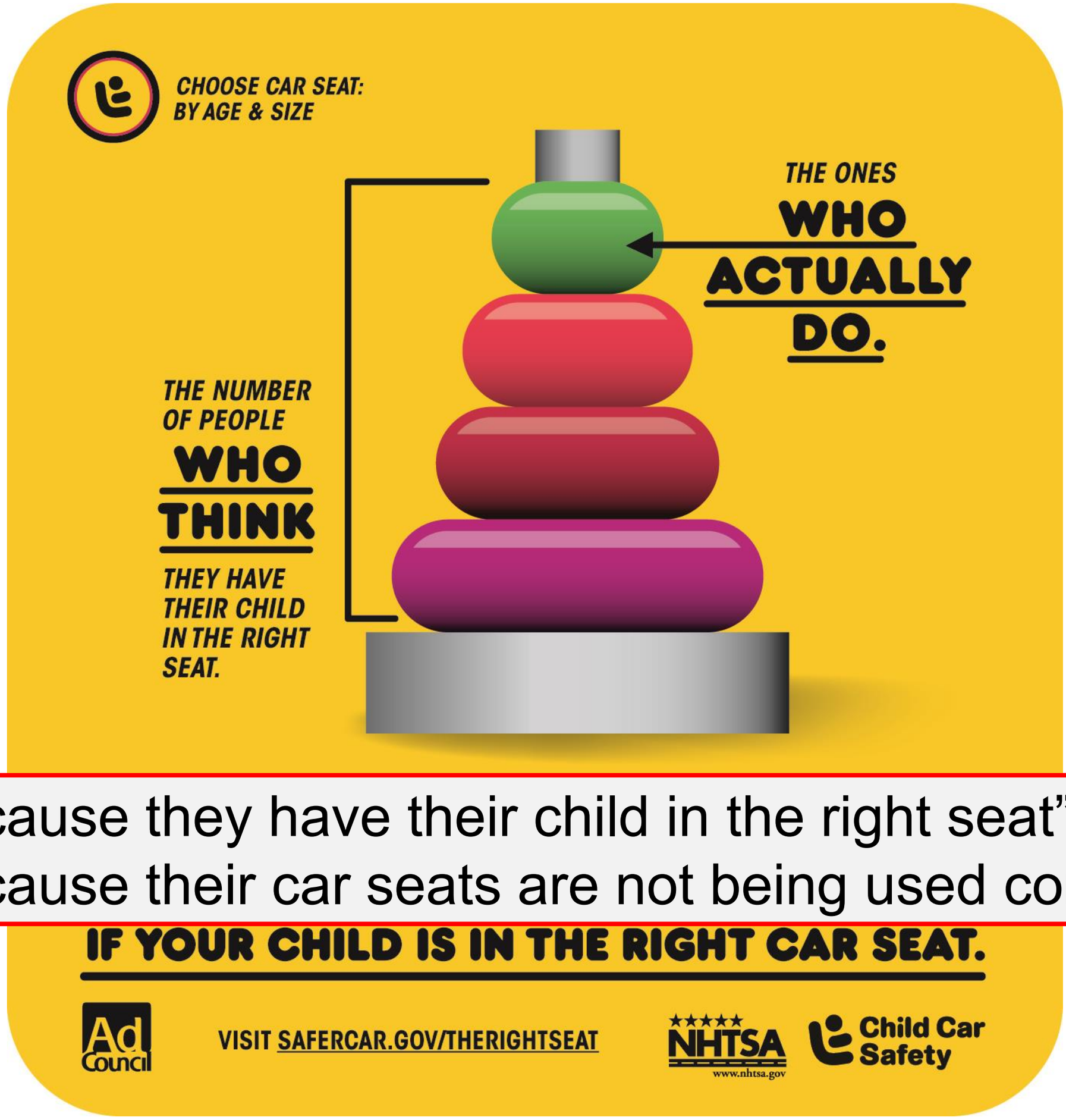
Key Statistics and Consumer Insights:

- Motor vehicle crashes are the leading cause of death for children age 1 through 12 years old.[1]

According to a NHTSA study, 3 out of 4 kids are not as secure in the car as they should be because their car seats are not being used correctly.

be reduced by about half if the correct child safety seats were always used.

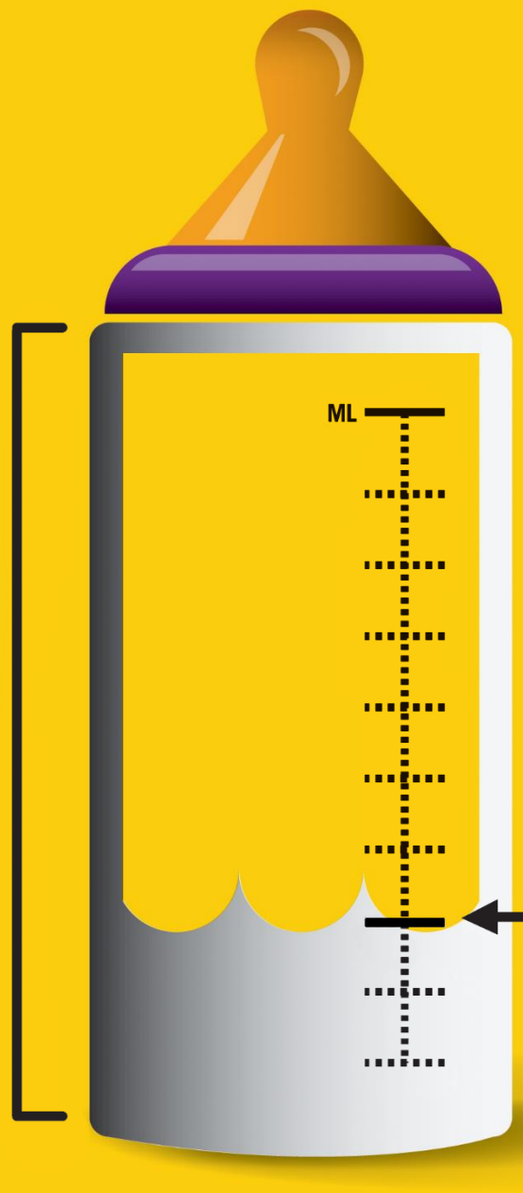
[1] Source: Based on the latest mortality data currently available from the CDC's National Center for Health Statistics.



- “because they have their child in the right seat”
- “because their car seats are not being used correctly”

CHOOSE CAR SEAT:
BY AGE & SIZE

THE NUMBER OF PEOPLE **WHO THINK** THEIR CAR SEATS ARE BEING USED CORRECTLY.



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Child Car Safety

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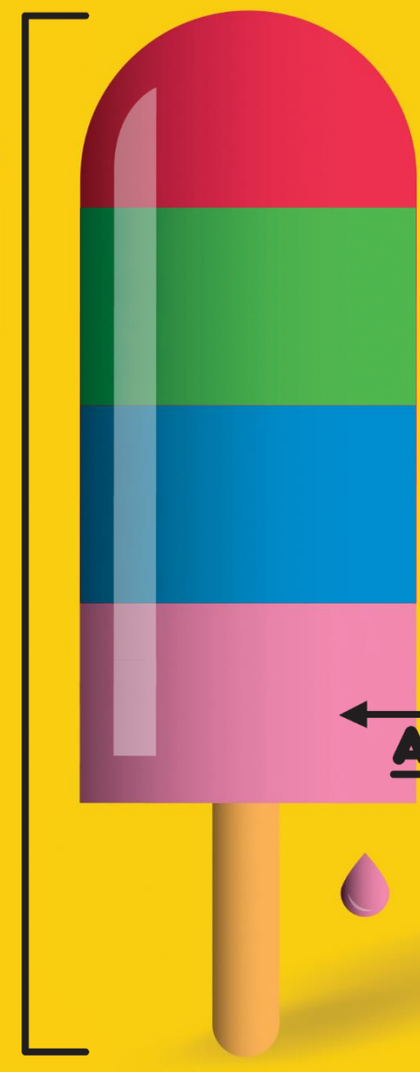

THE ONES **WHO ACTUALLY DO.**

KNOW FOR SURE

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Ad Council

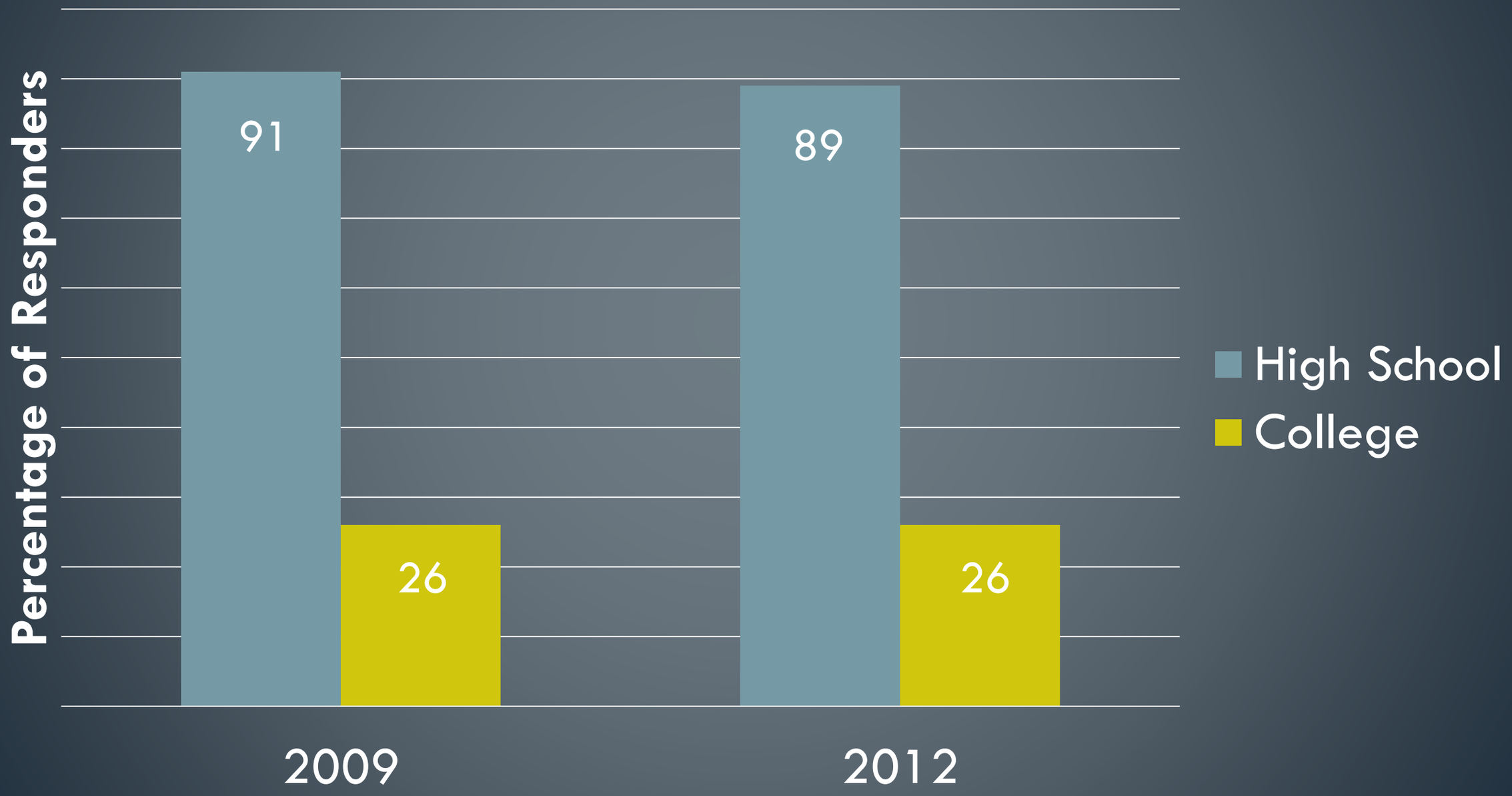
NHTSA www.nhtsa.gov

Child Car Safety

WHAT IS THE PURPOSE OF A K-12 EDUCATION?

- *College readiness*
  - *ACT National Curriculum Survey*
  - *Surveyed 9,937 educators*

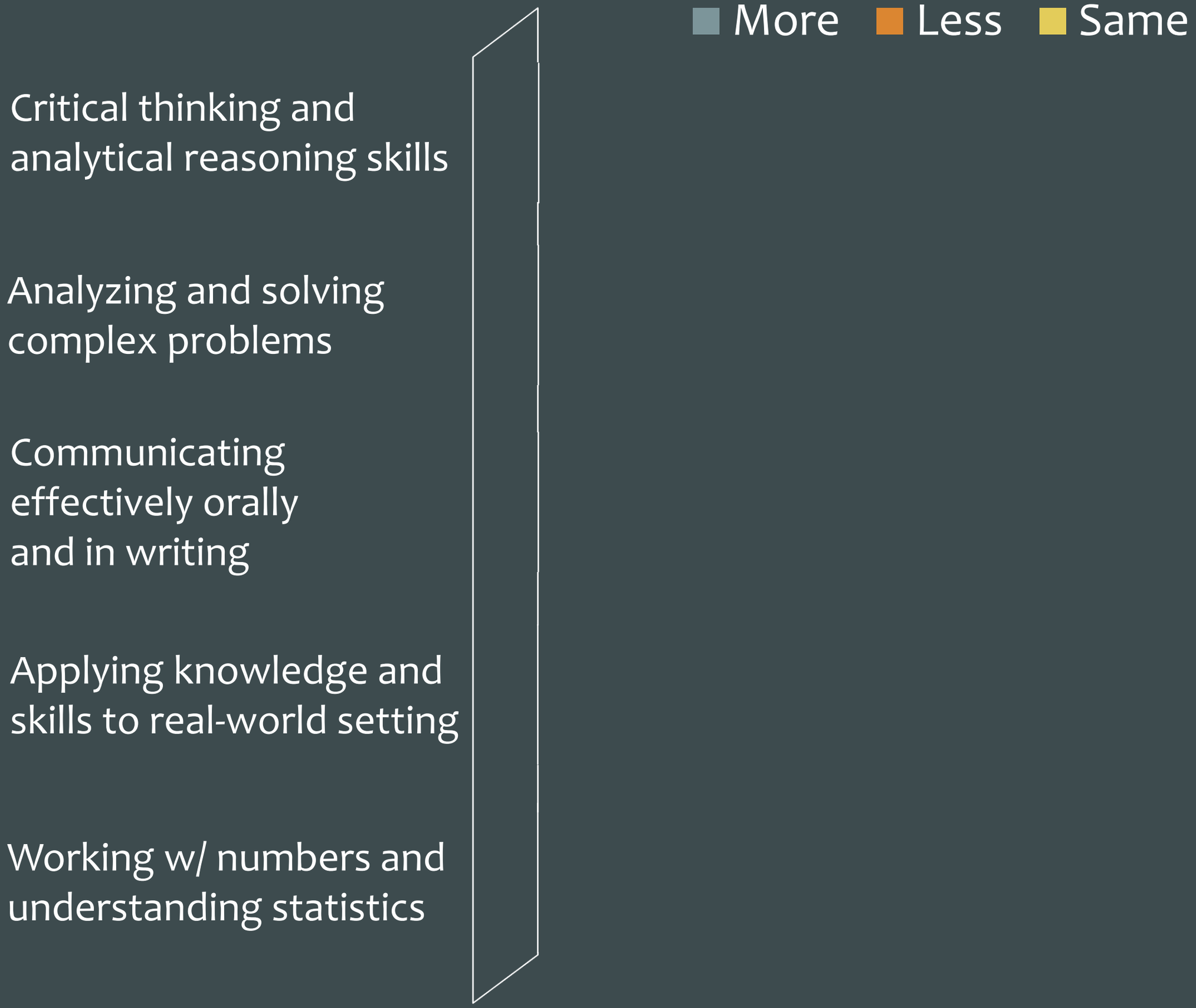
“Well” or “Very Well” Prepared for College



Source: http://www.act.org/research/policymakers/pdf/NCS-PolicySummary2012.pdf

WHAT IS THE PURPOSE OF A K-12 EDUCATION?

- *College readiness*
- *Career readiness*
  - *Association of American Colleges and Universities survey*
  - *Surveyed over 300 employers with at least 25 employees and many new hires*



Source: http://www.aacu.org/leap/documents/2013_EmployerSurvey.pdf


ALTO

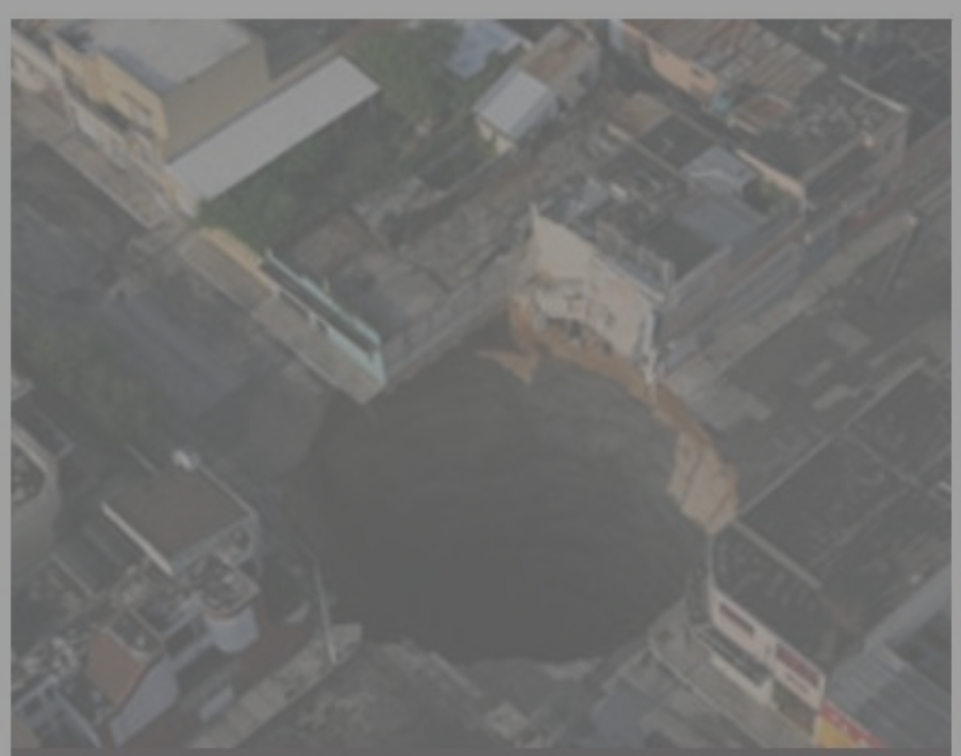
Sinkhole Dimensions

- National Geographic: “60 feet (18 meters) wide and about 30 stories deep”
- Time Magazine: “runs some 200 ft. deep”
- CNN: “The 20-meter (about 66 feet) diameter sinkhole is about 30 meters (about 100 feet) deep.”
- Slate: “A sinkhole, 65 feet across and 100 feet deep”

How To Fix a Giant Sinkhole

The cement method vs. the graded-filter technique.

By Brian Palmer



A sinkhole in Guatamala

It's not clear whether cement is the best option, however. A 6,500-cubic-foot wad of concrete may serve to concentrate water runoff in other areas, leading to more sinkholes. Many engineers prefer the **graded-filter technique**, in which the hole is filled with a layer of boulders, then a layer of smaller rocks, and, finally, a layer of gravel. This fills the hole, more or less, while permitting water to drain through the area.

2010 Guatemalan Sinkhole - Google Chrome

Reply Reply All Forward

2010 Guatemalan Sinkhole

Kaplinsky, Robert

To: [redacted]

Wednesday, February 06, 2013 1:39 PM

Hi Brian,

I am using your "How to Fix a Giant Sinkhole" article for a math lesson on volume of a cylinder. I have one question for you. You mentioned.

> "It's not clear whether cement is the best option, however. A 6,500-cubic-foot wad of concrete may serve to concentrate water runoff in other areas, leading to more sinkholes."

Can you please tell me where you got 6500 cubic feet from? Did you do 65 x 100? We get something closer to 342,000 cubic feet.

Thanks,
Robert

Re: 2010 Guatemalan Sinkhole - Google Chrome

Reply Reply All Forward

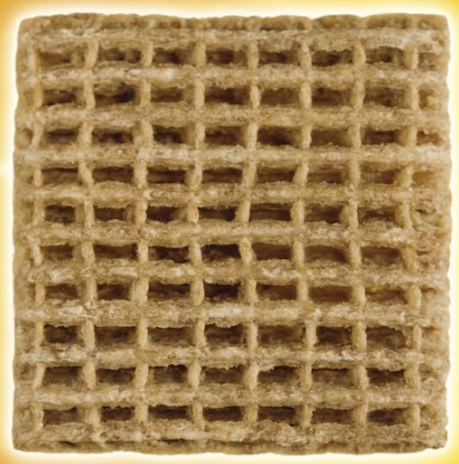
Re: 2010 Guatemalan Sinkhole

Brian Palmer

To: Kaplinsky, Robert

Wednesday, February 06, 2013 2:01 PM

Apparently you picked the wrong article for a math lesson! I apologize. It appears you are correct. I can't find anything in my notes to save myself-- I think I just screwed up. Dunce cap for me.



NEW

Diamond Shreddies

Cereal

OLD
(Boring)

NEW
(Exciting!)


Shreddies
SQUARE OR DIAMOND?
Vote for your Favourite at DiamondShreddies.com
Post
Diamond
Shreddies
Combo Pack
ENLARGED TO SHOW TEXTURE
Square
Diamond
Made with 100% Whole Grain Wheat
620 g Cereal
SERVING SUGGESTION
COR 114
Limited Edition
Sensible Solution
• Very High Source of Fibre
• Good Source of 8 Essential Nutrients
• Low in Fat

h

πr^2

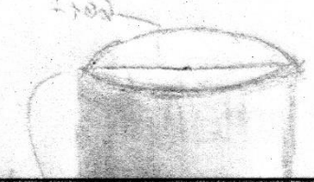
The Reality

- Some students felt anxious about not having the exact dimensions.
- Depending on how much extra information I gave them, students modeled the problem differently:
  - Cylinder
  - Semi-sphere
  - Truncated cone
- Students struggled with precision when dealing with multiple units:
  - feet vs. square feet vs. cubic feet
  - feet vs. meters vs. stories
- Many students doubted themselves when they saw that the “answer” was 6,500 cubic feet.

STUDENT WORK

What problem are you trying to figure out?

What is the volumen of the sink hole



What do you already know from the problem?

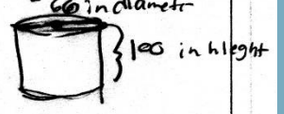
- It needs to be filled with materials such as rocks, cement and dirt.
- Circular Shape (cylinder)

What do you need to know to solve the problem?

- How deep is it?
- How wide?
- How much materials are used to fill the hole?

What is your conclusion?

First In order to gain a general idea of my question I drew an image to represent my given measurements.



Then I used the equation formula to find the volume of a cylinder. Which was $\pi r^2 . h$. I use this equation because I needed to find how much cement was need to fill the hole. My equation looks like this $\pi 33r^2 . 100$ (radius, height). Then I pluged it into my calculator and I got $342,119 ft^3$.

What is your conclusion?

In order to solve this problem, you need the width and the height of the hole. Once you have it you plug them into the equation $r^2\pi.h$ which is to find the volume. Once you find the volume you will know how much cement you will need to order so that you could fill that hole, which in this case would be 342, 119 feet of cement.

What is your conclusion?

This particular sinkhole in Guatemala City, was about 20 meters (66 feet) in diameter and about 30 meters (100 feet) deep. We are trying to find the volume of the hole to figure out how much material is needed to fill it. I used the cylinder volume formula ($V = \pi r^2 h$). When you plug in the radius and the height, you get $V = \pi (33)^2 (100)$. I did not use 66 as my radius, because that is my diameter. Radius is half of the diameter. After you solve, you are left with 342,119.44 ft^3. You don't use ft^2 or ft because the hole is 3 dimensional. From here on, you just use the material cost and amount to find the price of the job.

What is your conclusion?

In order to fill the sinkhole with cement. They will need 342,119 ft^3 of cement. How is this possible?

Diameter - 66 feet, but we are looking for radius.

66/2 = 33 Now we got our radius which is 33.

r=33

Depth = 100 feet.

So we have a radius and height. we can use the volume of a cylinder formula. which is $V = \pi r^2 h$

$V = \pi(33)^2 \cdot 100$

$V = \pi(1089) \cdot 100$

$V = 3421.20$

$V = 342119.44$

WHAT ISN'T MATHEMATICAL MODELING?

- *It is not modeling in the sense of, "I do; now you do."*
- *It is not modeling in the sense of using manipulatives to represent mathematical concepts.*
- *It is not modeling in the sense of a "model" being just a graph, equation, or function.*
- *It is not just starting with a real world situation and solving a math problem.*
- *It is not beginning with the mathematics and then moving to the real world.*

Source: http://www.cde.ca.gov/ci/ma/cf/documents/aug2013apxdmathmodel.pdf

Content and Language Objectives using

Content Objective Example:

SWBAT apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. (MP4)

Language Objective Example:

SWBAT understand and use stated assumptions, definitions, and previously established results in constructing arguments. (MP3)

example:

- In early grades, this might be as simple as writing an addition equation to describe a situation. (MP4)
- In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. (MP4)
- By high school, a student might use geometry to solve a design problem or use a function to describe how one

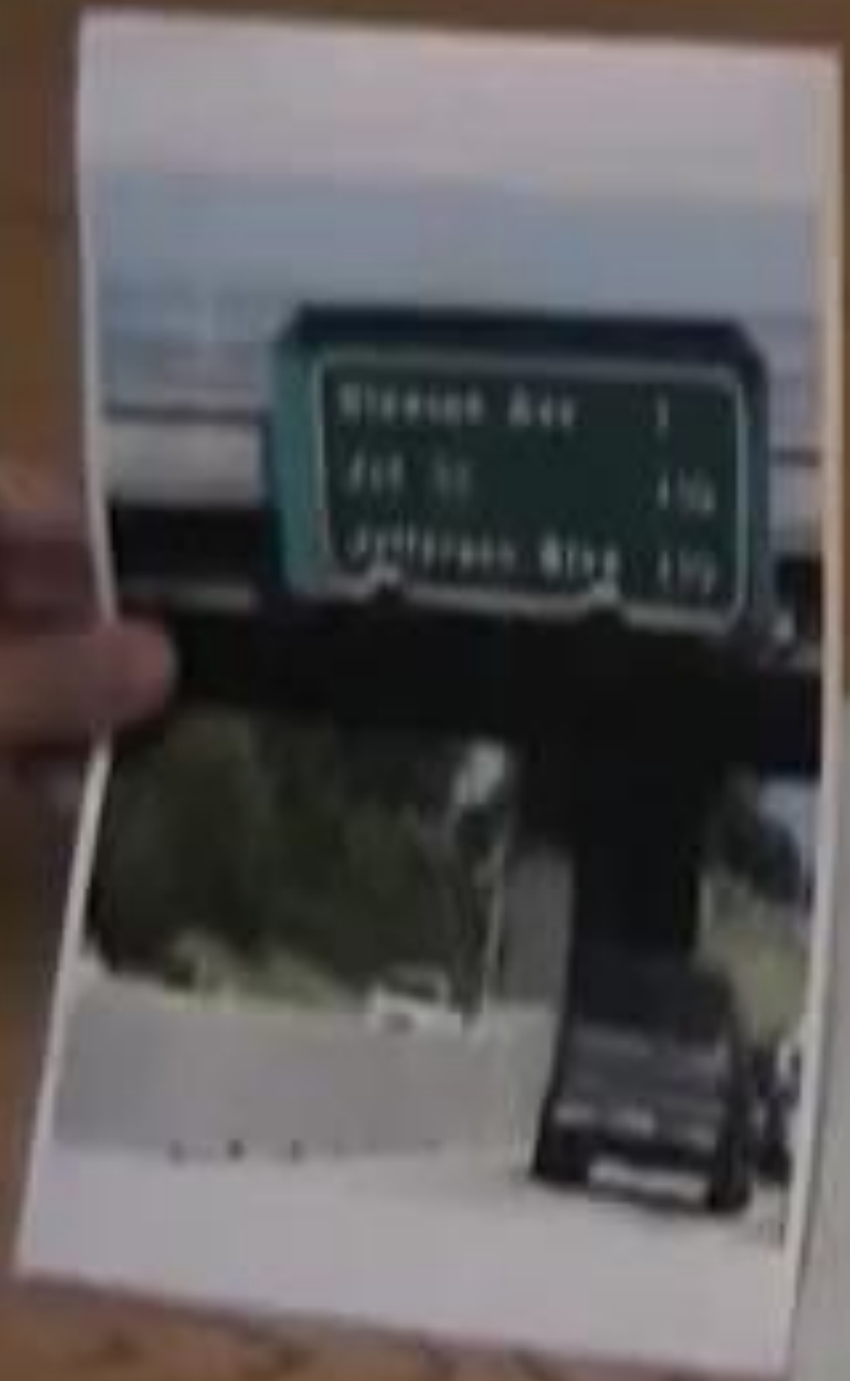
WHAT DOES IT LOOK LIKE…

- when students have procedural skill but not conceptual understanding or the ability to apply mathematics?
- when students **can** work with numbers but **cannot**:
  - critically think
  - applying knowledge and skills to real-world settings
  - analyze and solve complex problems

How far apart are the exits on this freeway: Jct 90 and Jefferson Blvd?

$$1\frac{1}{2} - 1\frac{1}{4}$$

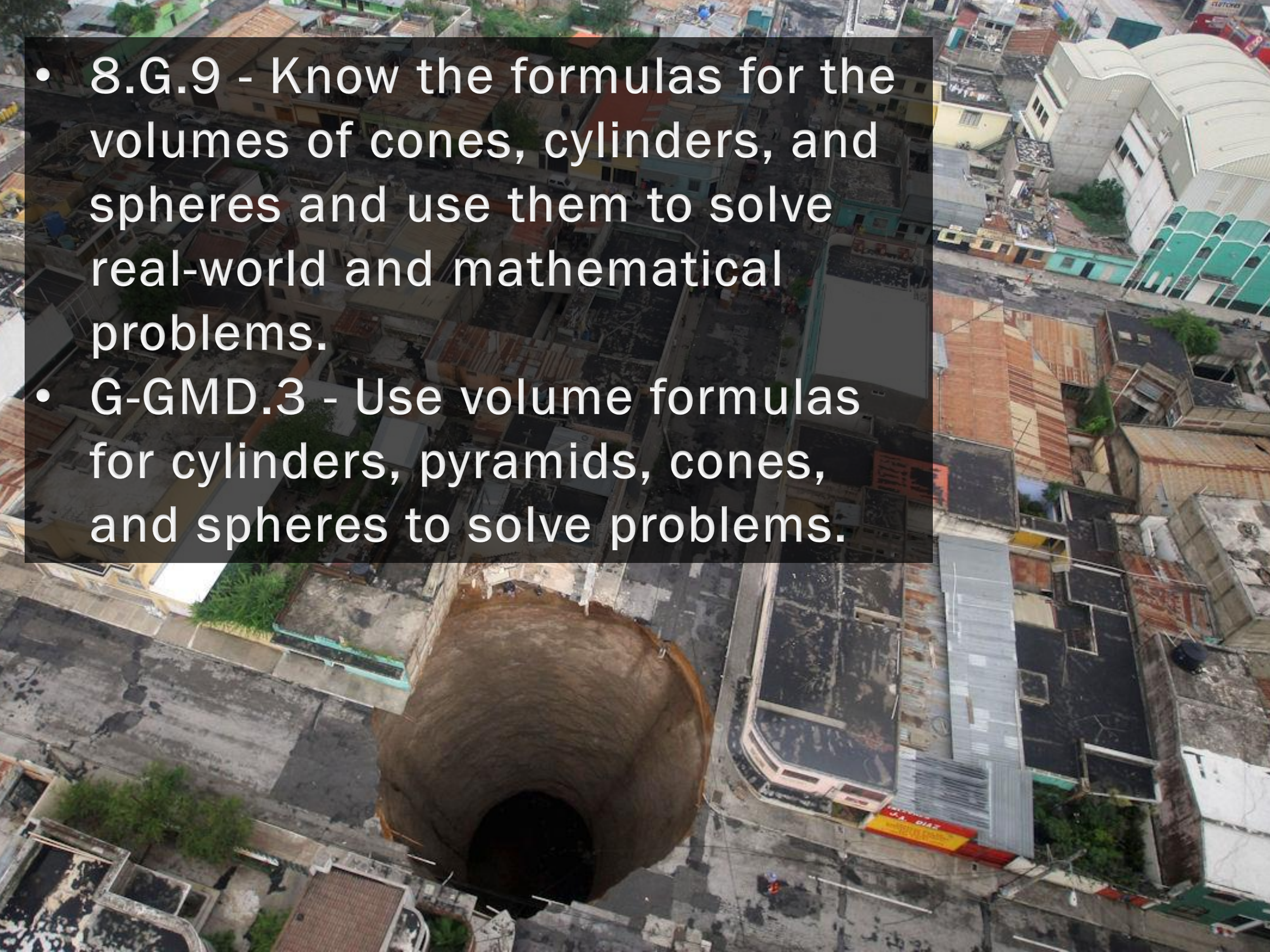
$$1\frac{1}{2} - 1\frac{1}{4}$$



The Four C's

- Communication
- Curiosity

- 6.G.4 - Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures.
- 7.G.6 - Solve real-world and mathematical problems involving area, volume and surface area.



- 8.G.9 - Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
- G-GMD.3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

- 8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- G-CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.

- A-CED.1 - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- F-IF.7a - Graph linear and quadratic functions and show intercepts, maxima, and minima.

- 6.RP.2 - Understand the concept of a unit rate

The Four C's

- Communication
- Curiosity
- Critical Thinking

Problem Solving Framework

- Inspired by Geoff Krall's resources at emergentmath.com

Name: _____ Period: _____ Date: _____

What problem are you trying to figure out?	What guesses do you have?
What do you already know from the problem?	**What do you need to know to solve the problem?**
What should we title this lesson?	
What is your conclusion? How did you reach that conclusion?	

The Four C's

- Communication
- Curiosity
- Critical Thinking
- Content Knowledge

Goals

- Engaging problem solving
  - Real world problem-based learning
  - Higher depth of knowledge problems
- Better implementation
  - Improve our ability to ask questions
  - Practice preparing to implement a lesson
  - Figure out how to deal with uncomfortable situations

Questioning Scenarios

- The activity begins with teachers in groups of three taking the roles of teacher, student, or observer.
- The individuals playing the role of teacher and student each receive a slip of paper describing their scenario.
- The individual playing the role of observer waits to record all of the teacher's questions to the student.
- Once the activity begins, the teacher will talk to the student in the context of the scenario they read about on the slips of paper.

What did you get for the area of the circle with a radius of 2 units?

4 pi

Great. Do you have any questions?

No

What did you get for the area of the circle with a radius of 2 units?

4 pi

Great. How did you get your answer?

The radius is 2 so I plugged it into 2 pi r and got 4 pi.

WHY?

How do you know?

Convince me.

Explain that please.

Draw a picture.

1	24
2	28
3	32
4	36
5	40

$y = 20 + 4x$

EXPONENTIAL

Source: Steve Leinwand

Goals

- Engaging problem solving
  - Real world problem-based learning
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- Better implementation
  - Improve our ability to ask questions
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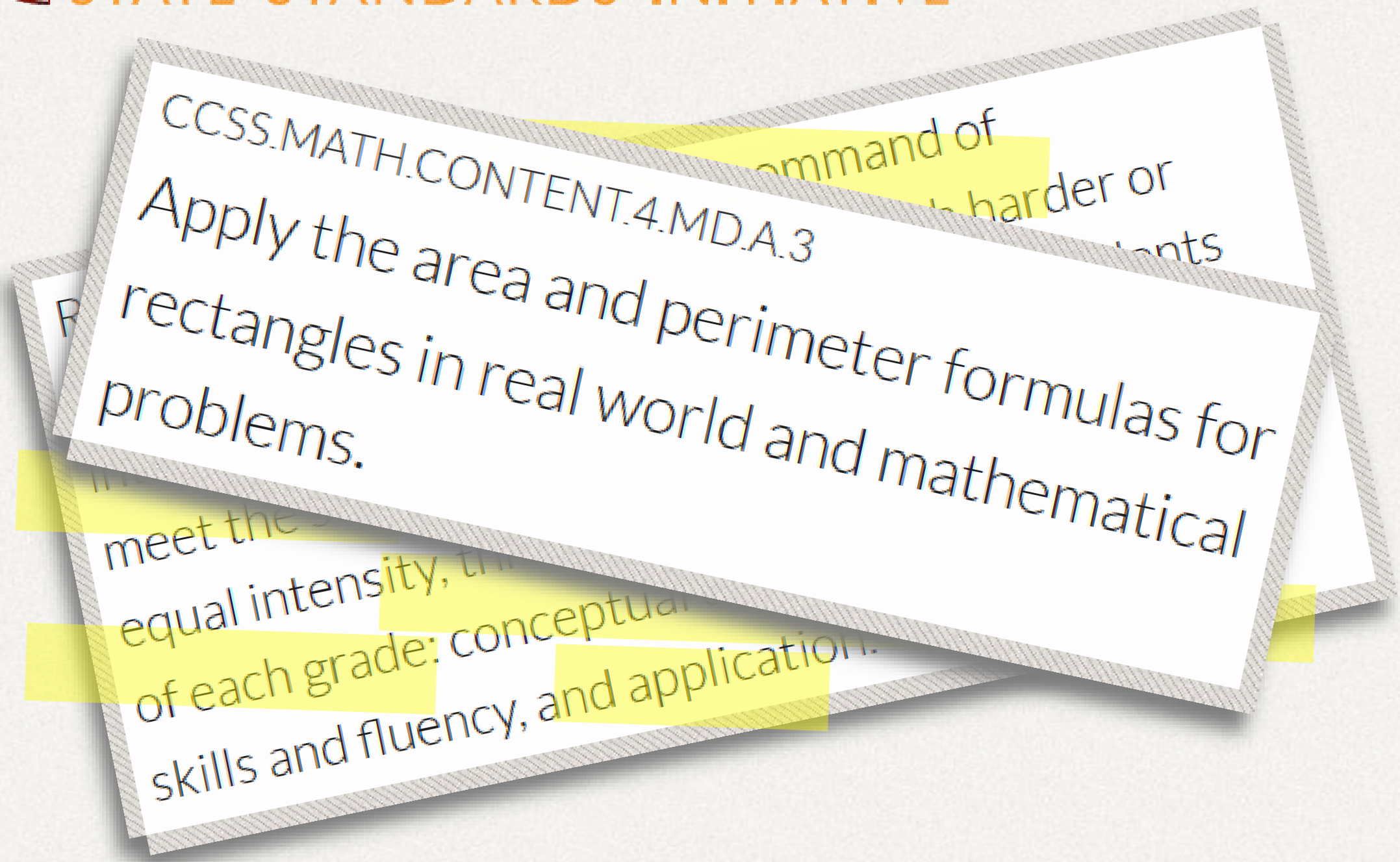
  - Figure out how to deal with uncomfortable situations

COMMON CORE
STATE STANDARDS INITIATIVE



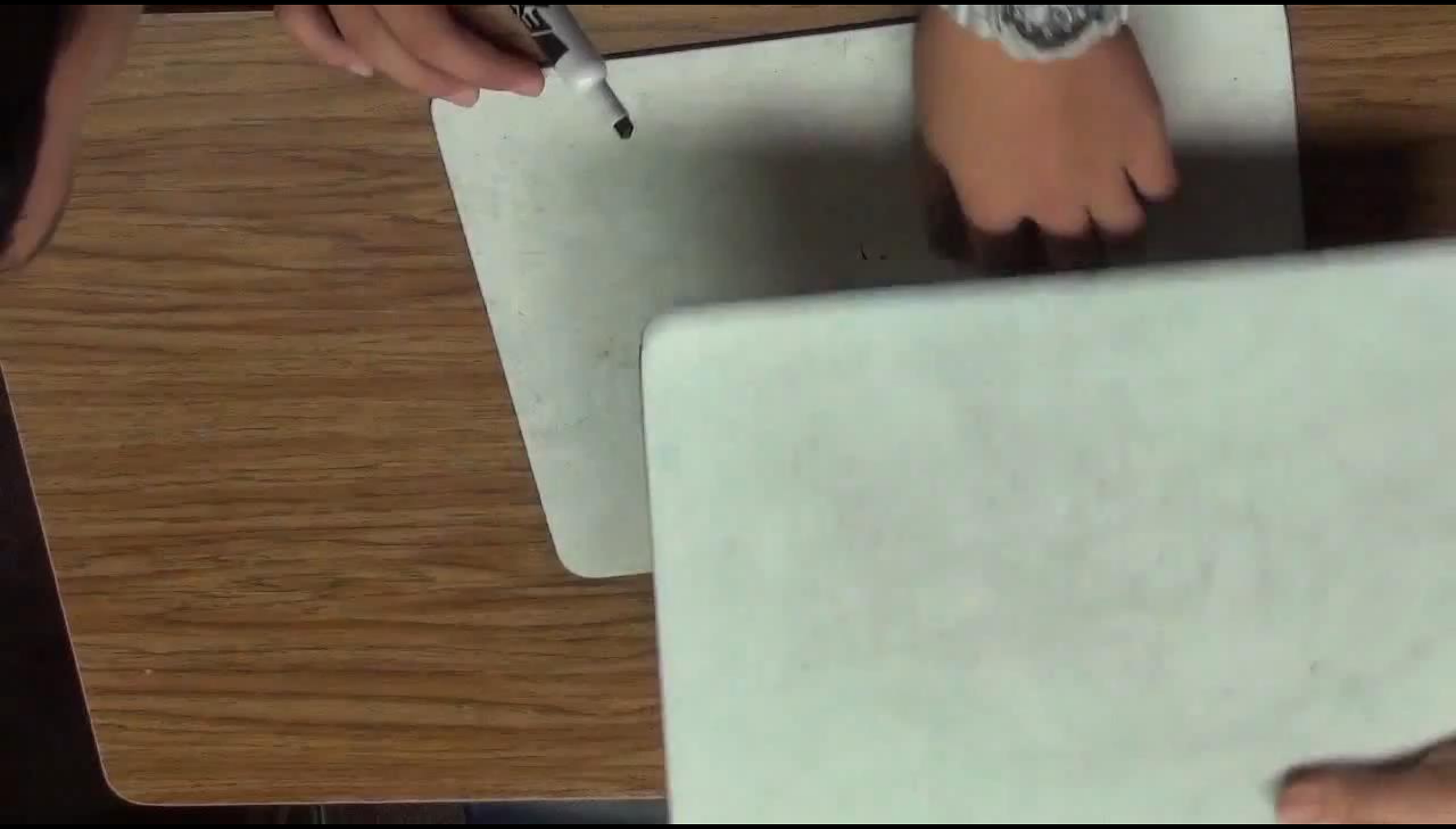
Source: http://www.corestandards.org/other-resources/key-shifts-in-mathematics/

What is the perimeter of a rectangle that measures 8 units by 4 units?

Components of Rigor

- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding

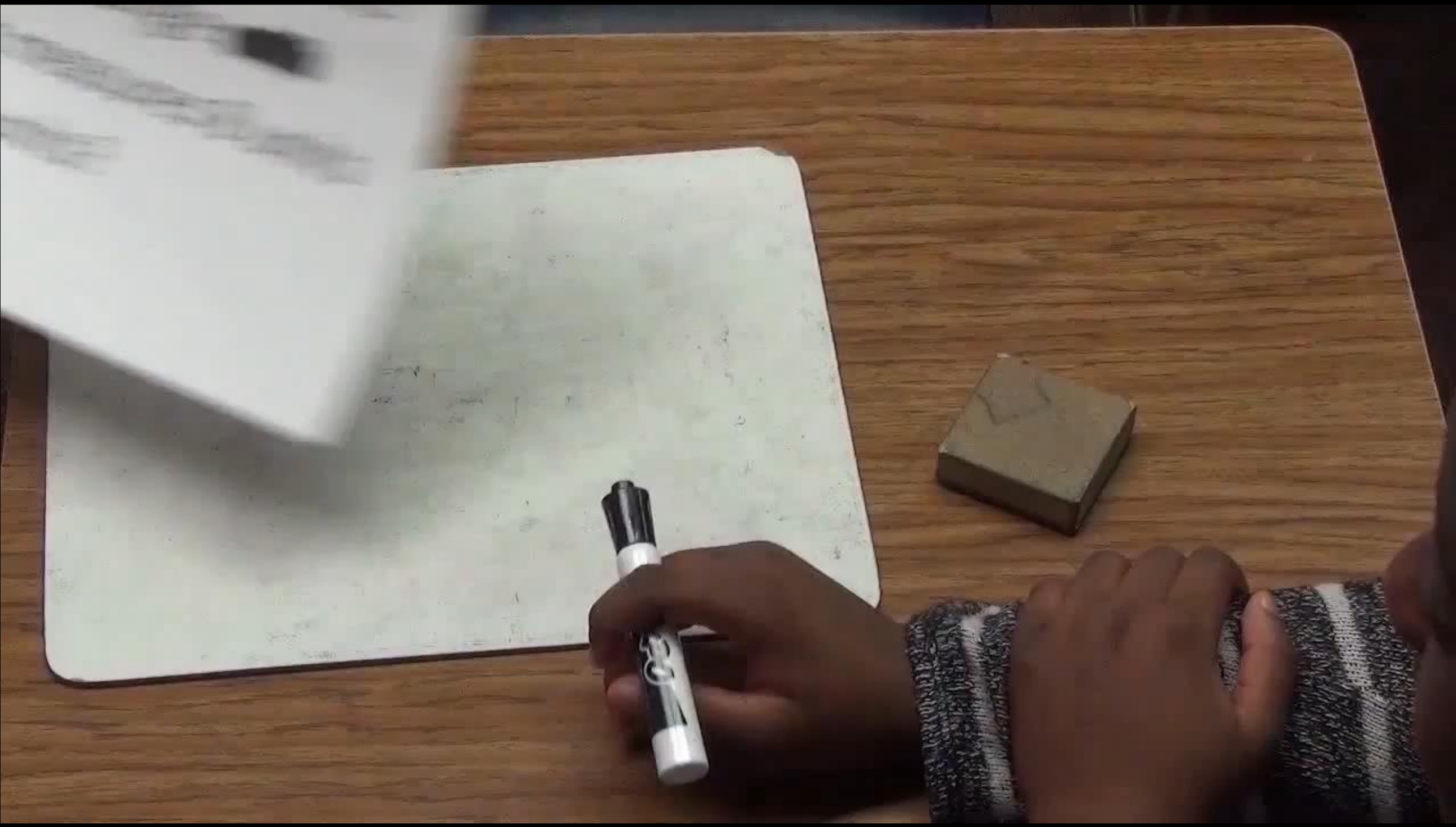
List the dimensions of a rectangle with a perimeter of 24 units.



Components of Rigor

- ☒ Procedural Skill and Fluency
- ☒ Conceptual Understanding

WHY?



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List the

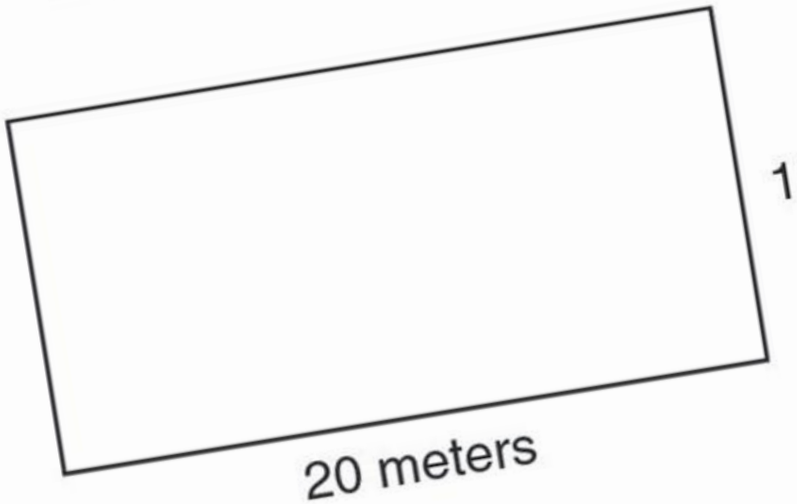
of a rectangle with a perimeter of 24 units.

Components of Rigor

- ☒ Procedural Skill and Fluency
- ☒ Conceptual Understanding

STAR

71 **A basketball court is shaped like a rectangle 20 meters long and 10 meters wide.**



What is the perimeter in meters of the court?

A 30 meters

B 50 meters

C 60 meters

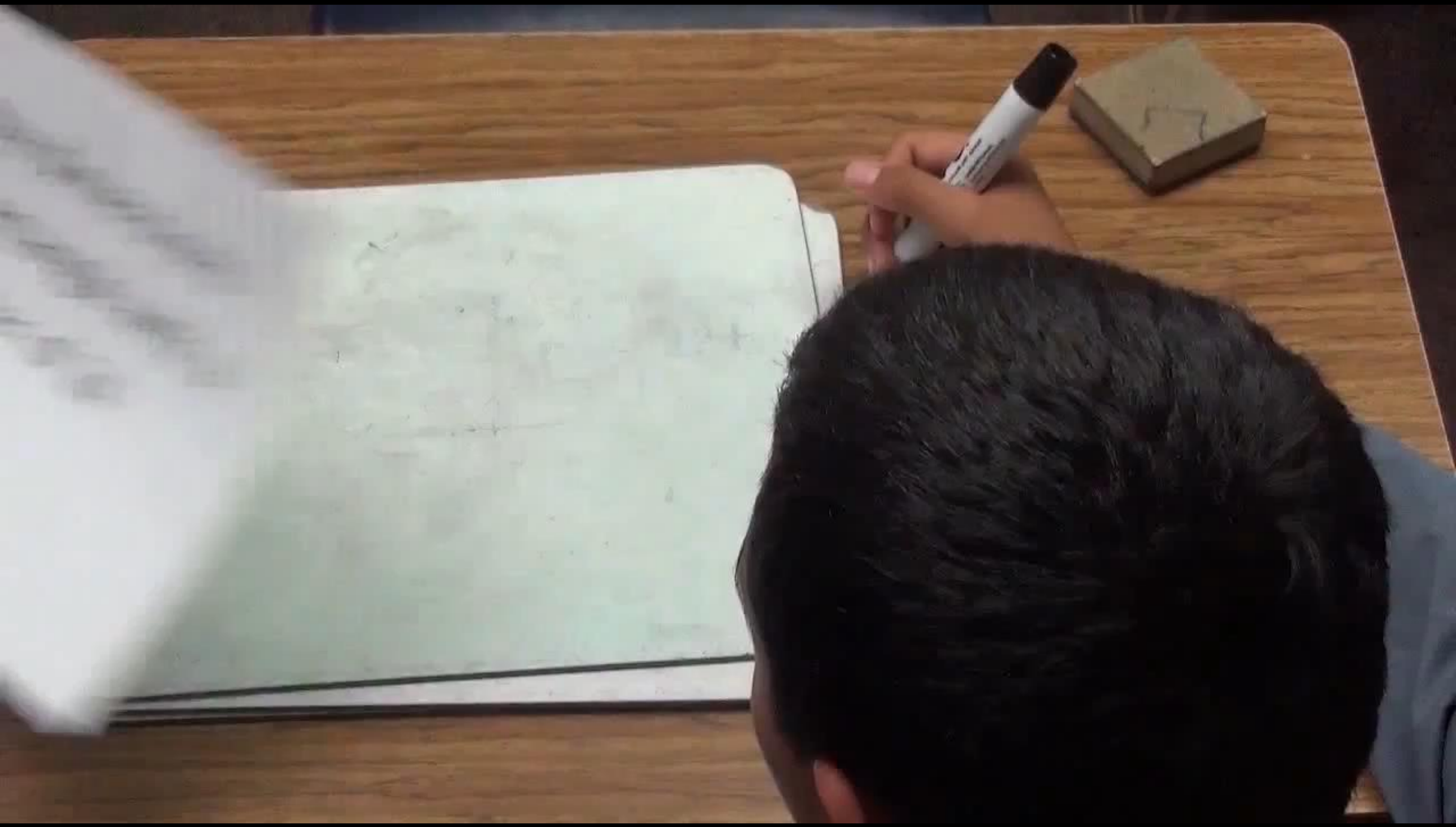
D 200 meters

Source: http://www.cde.ca.gov/ta/tg/sr/documents/cstrtqmath3.pdf

What is the perimeter of a rectangle [redacted] that measures 8 units by 4 units?

Components of Rigor

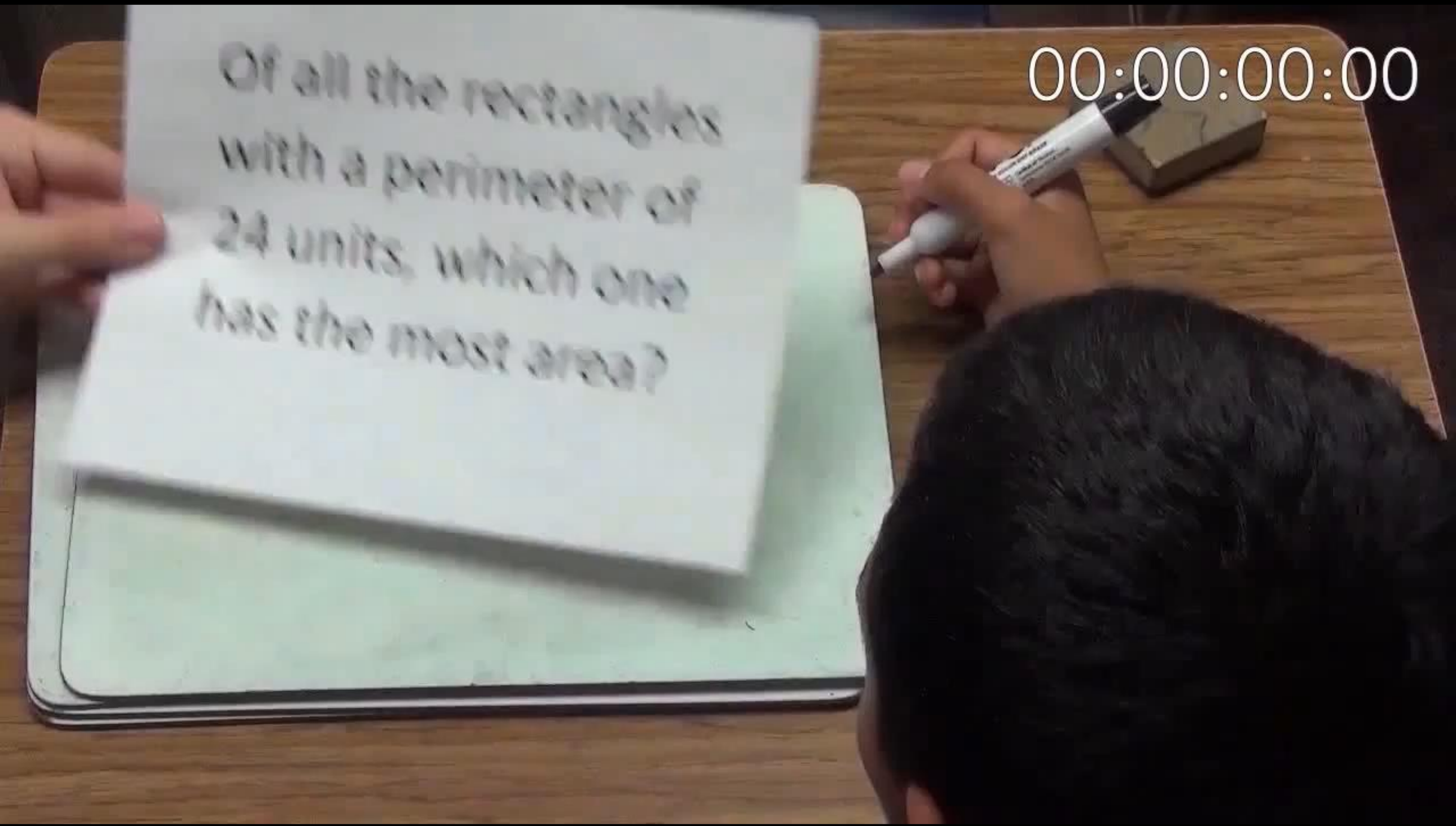
- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding



Components of Rigor

- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding

Of all the rectangles with a perimeter of 24 units, which one has the most area?


Of all the rectangles with a perimeter of 24 units, which one has the most area?
00:00:00:00

Components of Rigor

- ☒ Procedural Skill and Fluency
- ☒ Conceptual Understanding

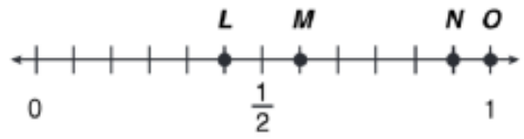
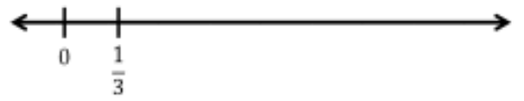
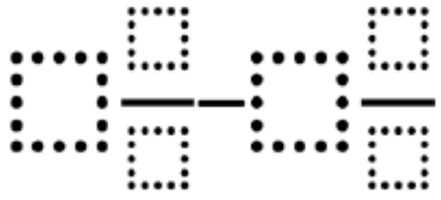
Defining the Problem

- Students appear to demonstrate "deep, authentic command of mathematical concepts" when given commonly used problems.
- However with more challenging problems, the same students seem to no longer demonstrate that command.

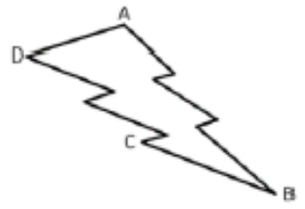
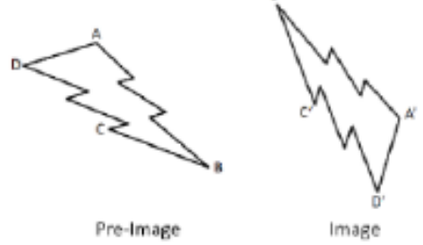
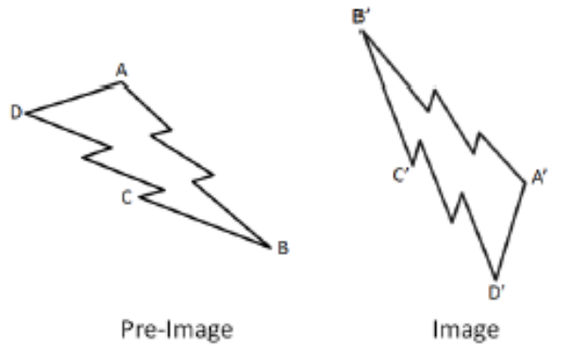
Addressing the Problem

- First, we must have a clear understanding about why these problems are different from one another.
- Next, we need to practice using these problems so that we understand how students may react to them.
- Last, we need a source that can provide us with a variety of free problems.

DOK | Distinguishing Between Depth of Knowledge Levels in Mathematics

Topic	Adding Whole Numbers	Money	Fractions on a Number Line	Area and Perimeter	Subtracting Mixed Numbers
CCSS Standard(s)	• 1.NBT.4 • 2.NBT.5	• 2.MD.8	• 3.NF.2	• 3.MD.8 • 4.MD.3	• 5.NF.1
DOK 1 Example	Find the sum. $44 + 27 =$	If you have 2 dimes and 3 pennies, how many cents do you have	Which point is located at $\frac{7}{12}$ below? 	Find the perimeter of a rectangle that measures 4 units by 8 units.	Find the difference. $5\frac{1}{2} - 4\frac{2}{3} =$
DOK 2 Example	Fill in the boxes below using the whole numbers 1 through 9, no more than one time each, so that you make a true equation. $\square\square + 53 = \square\square$	Make 47¢ in three different ways with either quarters, dimes, nickels, or pennies.	Label the point where $\frac{3}{4}$ belongs on the number line below. Be as precise as possible. 	List the measurements of three different rectangles that each has a perimeter of 20 units.	Create three different mixed numbers that will make the equation true by using the whole numbers 1 through 9, no more than one time each,. You may reuse the same whole numbers for each of the three mixed numbers. $5\frac{4}{5} - \square\frac{\square}{\square} = 3\frac{1}{20}$
DOK 3 Example	Make the largest sum by filling in the boxes below using the whole numbers 1 through 9, no more than one time each. $\square\square + \square\square =$	Make 47¢ using exactly 6 coins with either quarters, dimes, nickels, or pennies.	Create 5 fractions using the whole numbers 0 through 9, no more than one time each, as numerators and denominators and correctly place them all on a number line.	What is the greatest area you can make with a rectangle that has a perimeter of 24 units?	Make the smallest difference by filling in the boxes below using the whole numbers 1 through 9, no more than one time each. 

DOK | Distinguishing Between Depth of Knowledge Levels in Mathematics

Topic	Surface Area and Volume	Probability	Transformations	Factoring Quadratics	Quadratics in Vertex Form
CCSS Standard(s)	• 6.G.4 • 7.G.6	• 7.SP.5 • 7.SP.7	• 8.G.1 • G-CO.5	• A-SSE.3a	• F-IF.7a
DOK 1 Example	Find the surface area of a rectangular prism that measures 3 units by 4 units by 5 units.	What is the probability of rolling a sum of 5 using two 6-sided dice?	Rotate the image below 90° counterclockwise and reflect it across a horizontal line. 	Find the factors: $2x^2 + 7x + 3$	Find the roots and maximum of the quadratic equation below. $y = -3(x-4)^2 - 3$
DOK 2 Example	List the measurements of three different rectangular prisms that each has a surface area of 20 square units.	What value(s) have a 1/12 probability of being rolled as the sum of two 6-sided dice?	List three sequences of transformations that take pre-image ABCD to image A′B′C′D′.  Pre-Image Image	Fill in the blank with integers so that the quadratic expression is factorable. $x^2 + \_\_x + 4$	Create three equations for quadratics in vertex form that have roots at 3 and 5 but have different maximum and/or minimum values.
DOK 3 Example	What is the greatest volume you can make with a rectangular prism that has a surface area of 20 square units?	Fill in the blanks to complete this sentence using the whole numbers 1 through 9, no more than one time each. Rolling a sum of ___ on two ___-sided dice is the same probability as rolling a sum of ___ on two ___-sided dice.	What is the fewest number of transformations needed to take pre-image ABCD to image A′B′C′D′?  Pre-Image Image	Fill the blank by finding the largest and smallest integers that will make the quadratic expression factorable. $2x^2 + 3x + \_\_$	Create a quadratic equation with the largest maximum value using the whole numbers 1 through 9, no more than one time each. $y = -\square(x-\square)^2 + \square$

Version 1.10

Complicated or Complex?

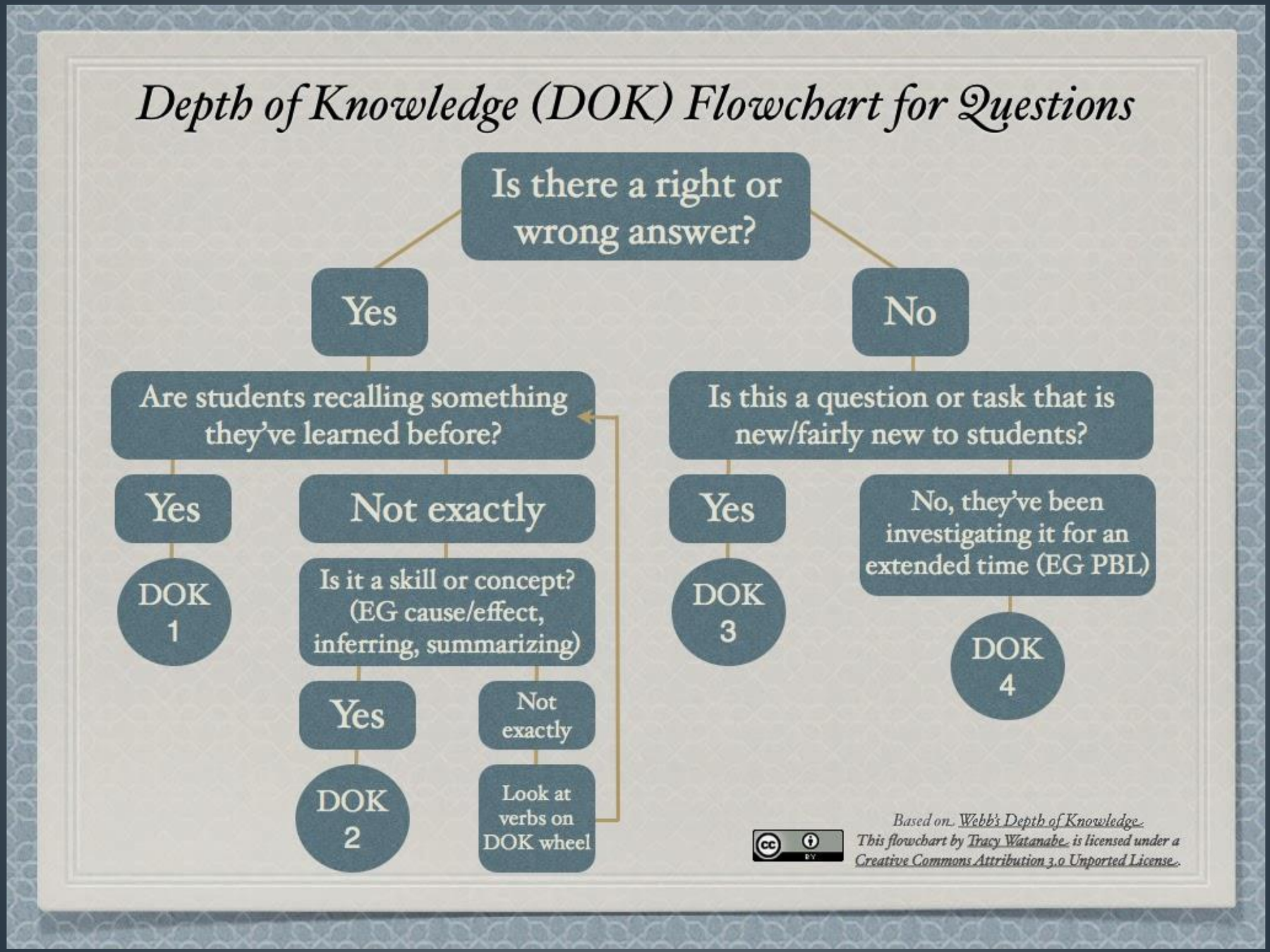

Cookie Monster Cupcakes


Nailed it

DOK Verb Wheel

Source: Unknown

DOK Flowchart for Questions



Source: Tracy Watanabe - @tracywatanabe

DOK Posters

DOK 1

Routine Thinking

- Can you recall ____?
- Can you identify ____?
- How would you describe ____?
- What might you include on a list about____?
- Can you select____?
- How can you find the meaning of____?

arrange	calculate	memorize
measure	name	recognize
recall	repeat	identify
illustrate	match	label
state	list	state

DOK 2

Conceptual Thinking

- Can you explain how _____ affected____?
- How would you apply what you learned to develop____?
- How would you summarize____?
- What do you notice about____?
- How would you estimate____?
- How could you organize____?

compare	classify	categorize
measure	graph	distinguish
predict	modify	construct
organize	infer	summarize
interpret	make observations	

DOK 3

Strategic Reasoning

- How is____related to____?
- What conclusions can be drawn?
- Can you elaborate on____?
- How would you test____?
- What evidence supports____?
- What would happen if____?
- Why is that the best answer?

assess	compare	construct
apprise	revise	hypothesize
critique	investigate	
draw conclusions		
develop a logical argument		

DOK 4

Extended Reasoning

- Write a research paper.
- What information can you gather to support your idea about____?
- Write a thesis, drawing conclusions from multiple sources.
- Apply information from one text to another to develop an persuasive argument.

design	connect	prove
analyze	critique	synthesize
create	apply concepts	

Created by Penny Lund 2013

Source: Penny Lund
http://isntitelementary.blogspot.com/

DOK Level Differences

- **Level 1: Recall & Reproduction**
  - Often a trivial application of facts.
  - Generally requires little to no cognitive effort beyond remembering the right formula.
  - Usually only one answer.
- **Level 2: Skills & Concepts**
  - Usually requires more than one step to solve.
  - Often multiple answers.
- **Level 3: Strategic Thinking**
  - Usually requires critical thinking about the best way to approach a problem.
  - May be multiple answers or a single optimal answer.
  - Often challenging enough to make your head hurt.
- **Level 4: Extended Thinking**
  - In mathematics these are generally represented by performance tasks or problem-based lessons.

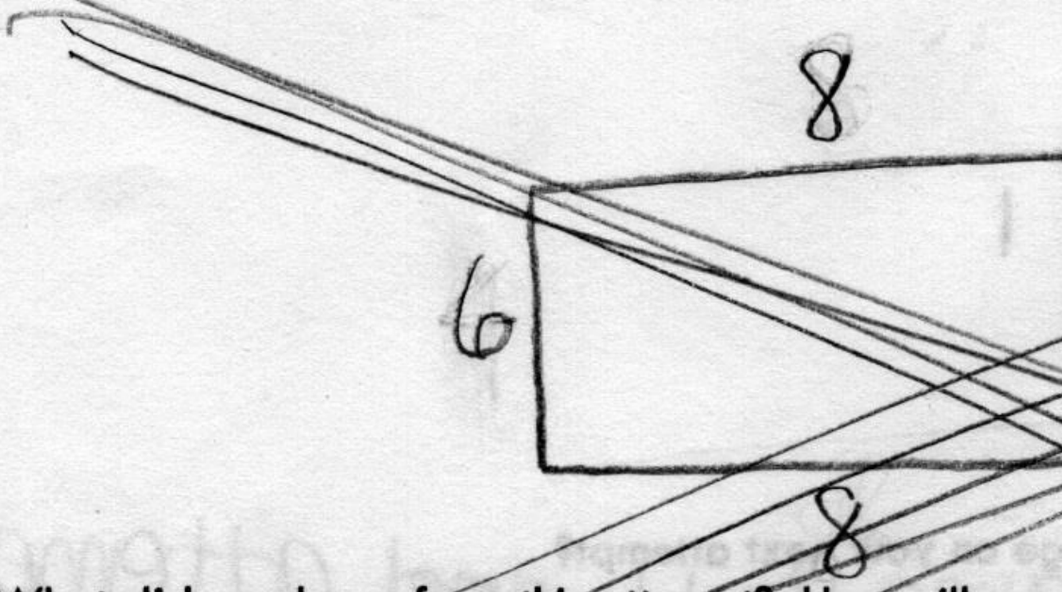
Adding Decimals

Use the numbers 1 through 9, exactly one time each, to fill in the boxes and make three decimals whose sum is as close to 1 as possible.

$$\begin{array}{r} 0.\square\square\square \\ +\,0.\square\square\square \\ \hline \end{array}$$

First attempt:

Points: ____/2 attempt ____/2 explanation



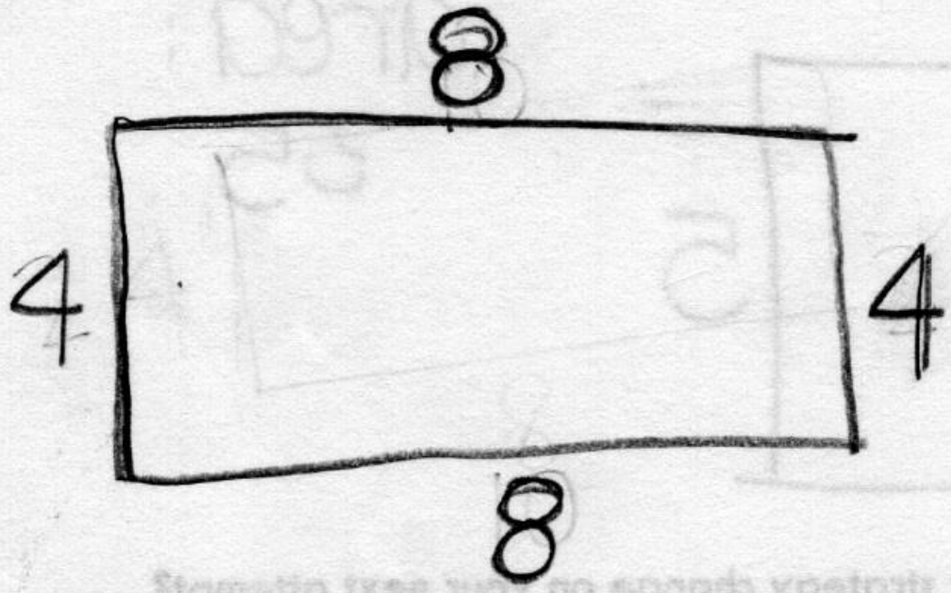
area:
48

What did you learn from this attempt? How will your strategy change on your next attempt?

This attempt doesn't equal 24.

Second attempt:

Points: ____/2 attempt ____/2 explanation



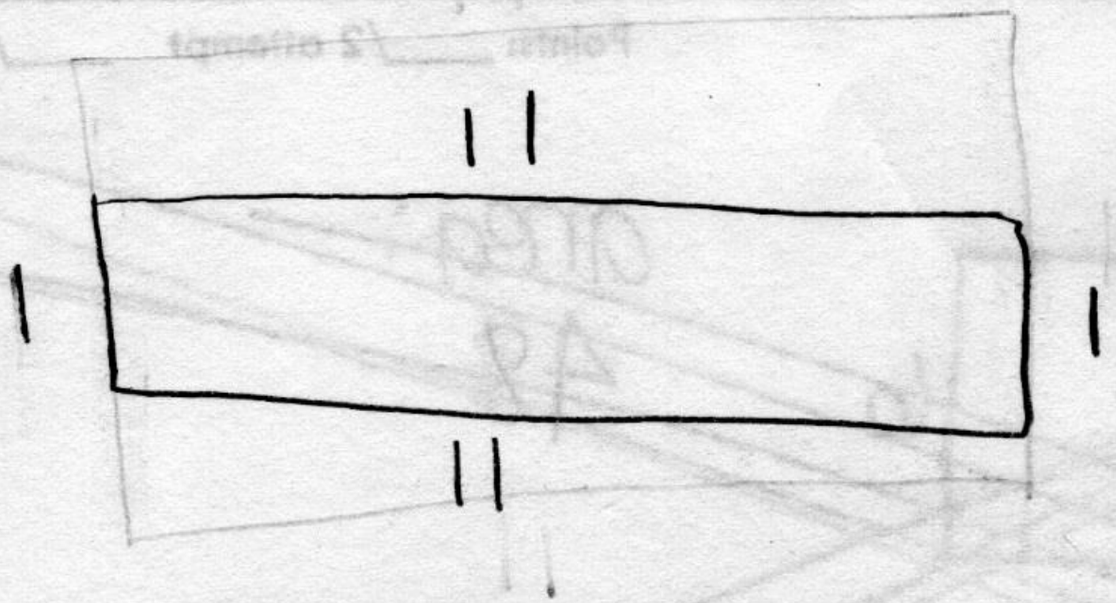
area:
32

What did you learn from this attempt? How will your strategy change on your next attempt?

The perimeter was 24, and the area was 32 but I think there's a bigger #

Fourth attempt:

Points: ____/2 attempt ____/2 explanation

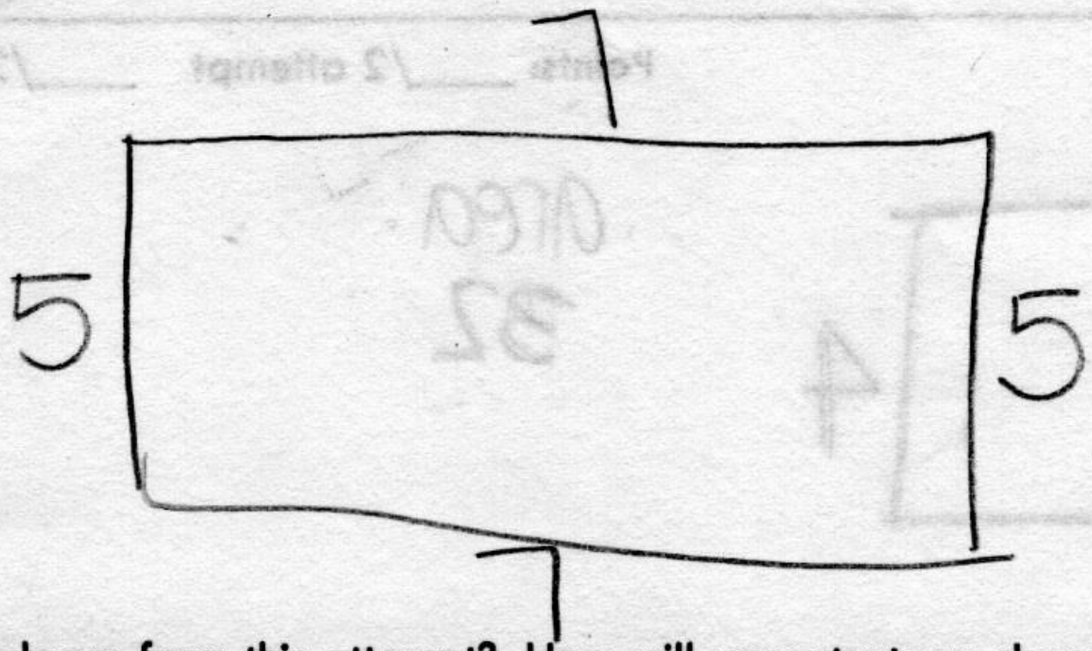


What did you learn from this attempt? How will your strategy change on your next attempt?

The perimeter is 24, but the area is 11 and attempt #2 the area is 32
Strategy: Use #'s with more than one raw.

Fifth attempt:

Points: ____/2 attempt ____/2 explanation



area:
35

What did you learn from this attempt? How will your strategy change on your next attempt?

DOK FAQ

- *When will students ever use this?*
- *What DOK level should I start students off with?*
- *How do teachers fit these problems into their pacing?*
- *How do I help prevent students from giving up after trying the problem once or twice?*
- *Where can I find other DOK 2 and DOK 3 problems or submit ones I've made?*

Goals

- [x] Engaging problem solving
  - [x] Real world problem-based learning
  - [x] Higher depth of knowledge problems
- [ ] Better implementation
  - [x] Improve our ability to ask questions
  - [ ] Practice preparing to implement a lesson
  - [ ] Figure out how to deal with uncomfortable situations

Open Middle

Challenging math problems worth solving

NEW OPEN M

Exponents a f Operations

February 10, 2015 Leave

Directions: Find 3 positive i t add up to 10. Place each number into one of the blanks to find the largest possible result. Source: Zack iller (@zmill415) **Read More »**

Create Squares

February 10, 2015 2 Comments

Directions: Create a square with one of the vertices at (2,3). Fill in the blanks with whole numbers 0 through 9, using each number at most once, to show the rest of the vertices of the square. Bonus: Find more than one set of vertices. Source: John Mahlstedt (@jdmahlstedt) **Read More »**

Solution of Two Linear Equations

February 10, 2015 Leave a comment

Directions: Using the Integers 0-9 (without duplication), provide four sets of points that represent two distinct lines. These lines can be written as two linear equations. Then provide a fifth point that represents the intersection (or solution) of those equations. Line 1: (__, __) and (__, __) Line 2: (__, __) and (__, __) Solution (__, __) Source: Bryan Anderson **Read More »**

Bingo card

February 5, 2015 1 Comment

Directions: In a standard game of BINGO, the cards are labeled with numbers 1 through 75. If it was possible, which card would you choose: a card with all of the same number or a standard bingo card? Source: Nanette

OPEN MIDDLE WORKSHEET

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Version 1.1

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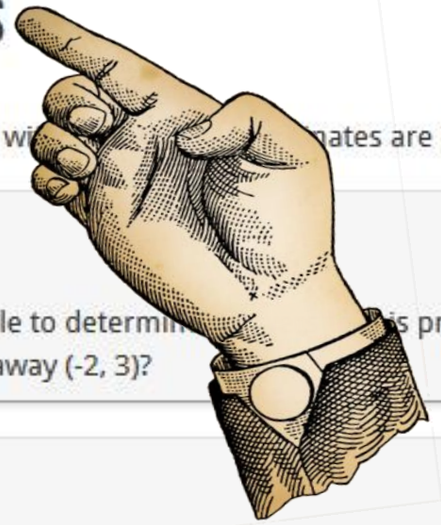
COMMON CORE STATE STANDARDS

- Grade 1 (6)
  - Number & Operations in Base Ten (3)
  - Operations & Algebraic Thinking (3)
- Grade 2 (6)
  - Measurement & Data (2)
  - Number & Operations in Base Ten (4)
- Grade 3 (11)
  - Measurement & Data (6)
  - Number & Operations in Base Ten (3)
  - Number & Operations—Fractions (2)

Open Middle

Challenging math problems worth solving

EQUIDISTANT POINTS



Directions: How many points wi nates are 5 units away from (-2, 3)?

Hint

Which methods are available to determi is problem? What shape is defined by *all* of the points that are 5 units away (-2, 3)?

Answer

12 points: (-5, 7), (-7, 3), (-5, -1), (-2, -2), (3, 3), (1, -1), (-2, 8), (1, 7), (2,6), (-6, -6), (-6, 0), and (2, 0)

Source: Dylan Kane

Print

Tagged with: 8.G.8 | DOK 2: SKILL / CONCEPT | DYLAN KANE | G-GPE.1

« Previous: Cone and Cylinder Volumes

Next: Pythagorean Shell »

LEAVE A REPLY

COMMON CORE STATE STANDARDS

- Grade 1 (6)
  - Number & Operations in Base Ten (3)
  - Operations & Algebraic Thinking (3)
- Grade 2 (6)
  - Measurement & Data (2)
  - Number & Operations in Base Ten (4)
- Grade 3 (11)
  - Measurement & Data (6)
  - Number & Operations in Base Ten (3)
  - Number & Operations—Fractions (2)

Problem-Based Lesson Resources

- Problem-based lesson search engine:

  http://robertkaplinsky.com/prbl-search-engine/

- My lessons: http://www.robertkaplinsky.com/lessons
- Dan Meyer: http://threeacts.mrmeyer.com
- Andrew Stadel: http://tinyurl.com/mrstadel
- Graham Fletcher: http://gfletchy.com/3-act-lessons/
- Geoff Krall: http://tinyurl.com/PrBLmaps
- Dan Meyer's TED talk: http://tinyurl.com/meyer-TED

Why Choose Us?

1 Math content expert

Robert graduated from University of California, Los Angeles (UCLA) with a Bachelors of Science in Mathematics. He has taught mathematics to students at the elementary, middle, and high school levels. As

Lessons

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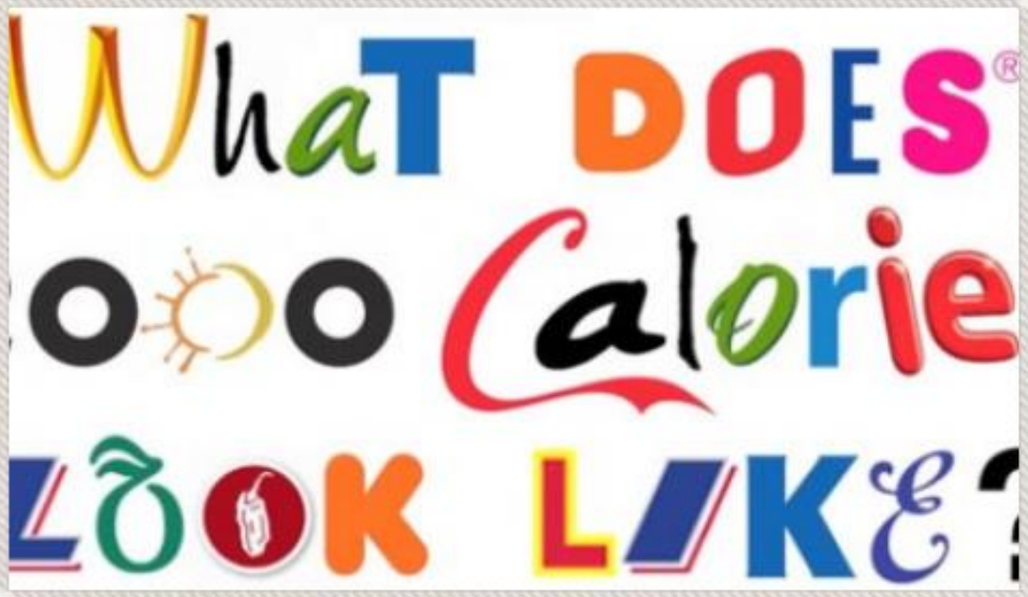
All Kinder 1st 2nd 3rd 4th 5th 6th 7th 8th Alg Func Geo Modeling Numb & Quant Stats & Prob

How Many Hot Dogs And Buns Should He Buy?



What Does 2000 Calories Look Like?

Robert Kaplinsky's Problem-Based Lessons

File Edit View Insert Format Data Tools Help All changes saved in Drive

	A	B	C	D	E	F
1	Task Name	Concept / Skill	Standard 1	Standard 2	Standard 3	Standard 4
2	How Can We Water All Of The Grass?	Circles, Pythagorean Theorem, trigonometric ratios	7.G.4	8.G.7	G-SRT.8	G-MG.1
3	How Much Money IS That?!	Volume of rectangular prism	5.MD.3	5.MD.4	5.MD.5	5.MD.5b
4	How Much Money Should Dr. Evil Demand?	Exponential Growth	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4
5	How Tall Is Mini-Me?	Scale and Dividing Decimals	5.NF.5	5.NF.5a	5.NF.5b	6.NS.3
6	How Did They Make Ms. Pac-Man?	Transformations (Rotations, Reflections, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4
7	Which Ticket Option Is The Best Deal?	Unit Rates and Ratios	6.RP.2	6.RP.3	6.RP.3a	6.RP.3b
8	How Far Apart Are The Freeway Exits?	Fractions on a Number Line and Subtracting Fractions	3.NF.2	3.NF.2b	4.NF.2	4.NF.3a
9	Do We Have Enough Paint?	Area	3.MD.5	3.MD.6	3.MD.7	
10	How Many Stars Are There In The Universe?	Scientific Notation	8.EE.3	8.EE.4		
11	What Rides Can You Go On?	Inequalities and Measurement	2.MD.1	6.NS.7a	6.NS.7b	
12	Do You Have Enough Money?	Money	2.MD.8			
13	Which Bed Bath & Beyond Coupon Should You Use?	Percent Discount	7.RP.3			
14	Is Gas Cheaper With Cash Or Credit Card?	Percent Discount	7.RP.3			
15	Where's The Nearest Toys R Us?	Pythagorean Theorem (Distance in coordinate system)	8.G.8	G-SRT.8	G-GPE.7	
16	How Sharp Is The iPhone 5's Retina Display?	Pythagorean Theorem (Length of a side)	8.G.7	G-SRT.8	G-GPE.7	
17	When Should She Take Her Medicine?	Operations with Time Intervals	4.MD.2			
18	How Big Are Sunspots?	Converting Units, Proportions, and Scientific Notation	5.MD.1	7.RP.2	7.G.4	8.EE.4
19	What Michael's Coupon Should I Use?	Percent Discount	7.RP.3	A-CED.3		
20	Is It Cheaper To Pay Monthly or Annually?	Decimal Operations and/or Systems of Equations	5.NBT.7	8.EE.8c	A-CED.3	A-REI.11
21	How Big Is The 2010 Guatemalan Sinkhole?	Volume of Cylinder	5.MD.3	5.MD.4	5.MD.5	8.G.9
22	How Can You Win Every Prize At Chuck E. Cheese's?	Decomposing Numbers and/or Systems of Equations	2.NBT.7	3.NBT.2	3.NBT.3	8.EE.8c
23	How Many Royal Flushes Will You Get?	Probability	7.SP.5	7.SP.6	7.SP.7	S-MD.5
24	How Much Does The Paint On A Space Shuttle Weigh?	Surface Area	6.G.4	7.G.6	8.G.7	G-MG.1
25	How Did Motel 6 Go From $6 to $66?	Percent Increase and Compound Interest	7.RP.3	A-SSE.1b	F-BF.1	F-IF.8b
26	How Much Does The Aluminum Foil Prank Cost?	Surface Area and Unit Rates	6.G.4	6.RP.2	6.RP.3	7.G.6
27	How Many Laps Is A 5k Race?	Perimeter	4.MD.3			
28	Which Toilet Uses Less Water?	Systems of Equations/Inequalities	8.EE.8c	A-CED.3	A-REI.11	F-BF.1
29	How Did Someone Get A $103,000 Speeding Ticket In Finland?	Linear Equations	A-CED.2	F-BF.1	F-IF.4	F-IF.6
30	Which Pizza Is A Better Deal?	Area or Circle, Square, and Unit Rates	3.MD.5	3.MD.6	3.MD.7	4.MD.3
31	How Big Is The World's Largest Deliverable Pizza?	Area of Square	3.MD.5	3.MD.6	3.MD.7	4.NBT.3
32	How Many Sheets Do You Need To Break Out Of Prison?	Integer Operations	5.NBT.6			
33	Do Hybrid Cars Pay For Themselves?	Systems of Equations or Rates	6.RP.2	6.RP.3	8.EE.8c	A-CED.3
34	How Many Hot Dogs Did They Eat?!	Linear and Quadratic Functions	8.F.3	8.F.4	F-BF.1	F-BF.2
35	How Much Purple Ribbon Will You Need?	Perimeter & Circumference	3.MD.8	4.MD.3	7.G.4	
36	Are We There Yet?	Adding Times	3.MD.1	4.MD.2		
37	Which Chinese Food Coupon Should I Use?	Percent Discount	7.RP.3			
38	How Big Is The Vehicle That Uses Those Tires?	Ratio and Proportions	7.RP.2			
39	Where Would The Angry Birds Have Landed?	Create Equation From Quadratic Graph	A-CED.1	F-BF.1	F-IF.4	F-IF.7a
40	How Many Movies Can You See In One Day?	Adding Times	3.MD.1	4.MD.2		
41	Which Carrots Should You Buy?	Unit Rates	6.RP.1	6.RP.2	6.RP.3	
42	How Fast Can You Throw A Baseball?	Converting Units and Unit Rates	5.MD.1	6.RP.2		

Problem-Based Lesson Search Engine

This search engine searches all of the sites below to quickly help you find a problem-based lesson (also called 3-Act Task, mathematical modeling, or application problem):

Submit

The links below are the pages that are being searched by the search engine:

- 101 Questions
- Andrew Stadel
- Dan Meyer
- Dane Ehlert
- Emergent Math's Problem Based Curriculum Maps
- Estimation180
- Geoff Krall

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ERIK
ALISE
ADAM


ERIK
ALISE
ADAM
Audrey
SYDNEY
SAM
Brandon

productive struggle

unproductive struggle

productive struggle > unproductive struggle

Goals

- [x] Engaging problem solving
  - [x] Real world problem-based learning
  - [x] Higher depth of knowledge problems
- [ ] Better implementation
  - [x] Improve our ability to ask questions
  - [ ] Practice preparing to implement a lesson
  - [ ] Figure out how to deal with uncomfortable situations

Source: Andrew Stadel via www.estimation180.com

Height:
72 inches

Source: Andrew Stadel via www.estimation180.com

Height:
72 inches

Width:
36 inches

Source: Andrew Stadel via www.estimation180.com

Height:
72 inches

Width:
36 inches

Depth:
18 inches

Source: Andrew Stadel via www.estimation180.com

Sticky note

Dimensions:
3” x 3”

Source: Andrew Stadel via www.estimation180.com

Source: Andrew Stadel via www.estimation180.com

PERFORMANCE TASK

CEREAL BOXES

A cereal company uses cereal boxes that are rectangular prisms The boxes have the dimensions shown.

- 12 inches high
- 8 inches wide
- 2 inches deep

The managers of the company want a new size for their cereal boxes. The new boxes have to be rectangular prisms. You will evaluate one box design the company proposed. Then you will create and propose your own design for the company.

Requirements for the new boxes:

- The new boxes have to use less cardboard than the

1

Determine the volume of the current cereal box with the dimensions 12 inches high, 8 inches wide, and 2 inches deep.

Find the volume, V, in cubic inches, of each box.

Volume of Original Box: $V =$ __ in^3

1 2 3
4 5 6
7 8 9
0 . -

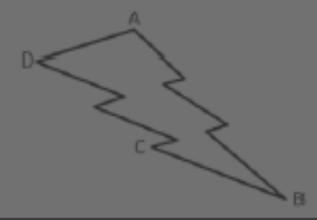
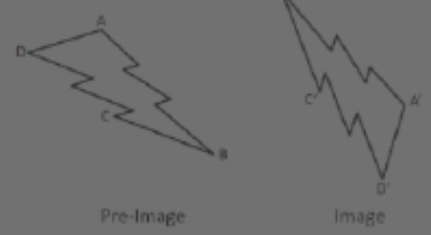
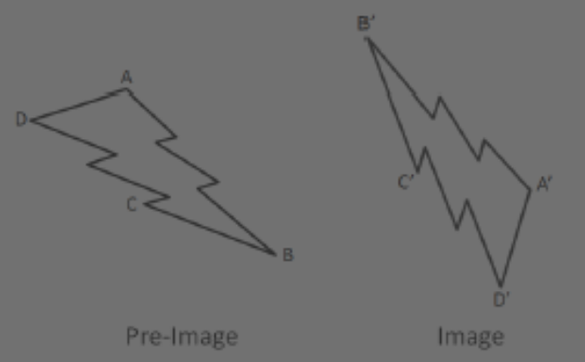
2

Label the dimensions of the net for the current cereal box with dimensions 12 inches high, 8 inches wide, and 2 inches deep.

12 in

Delete

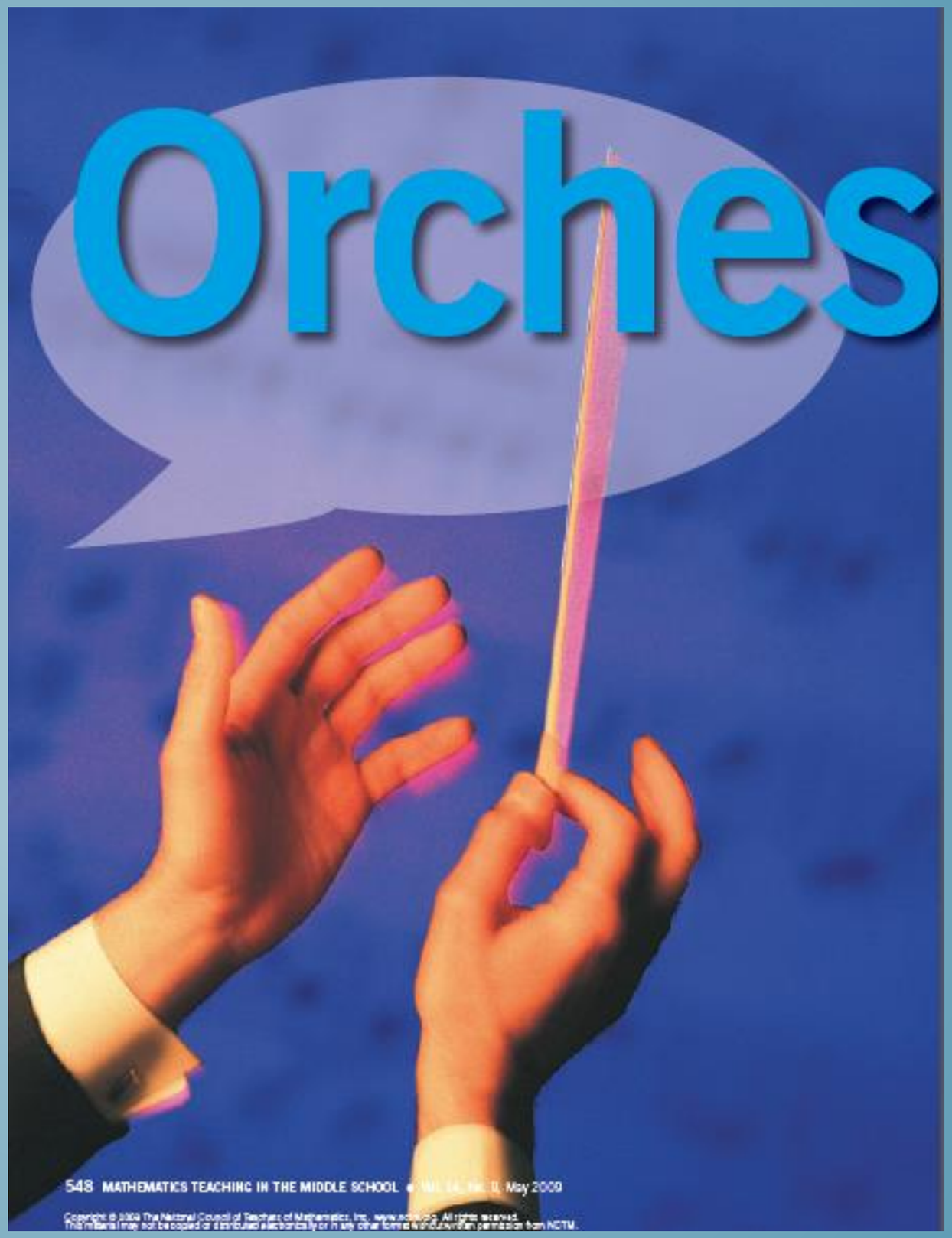
DOK | Distinguishing Between Depth of Knowledge Levels in Mathematics

Topic	Surface Area and Volume	Probability	Transformations	Factoring Quadratics	Quadratics in Vertex Form
CCSS Standard(s)	• 6.G.4 • 7.G.6	• 7.SP.5 • 7.SP.7	• 8.G.1 • G-CO.5	• A-SSE.3a	• F-IF.7a
DOK 1 Example	Find the surface area of a rectangular prism that measures 3 units by 4 units by 5 units.	What is the probability of rolling a sum of 5 using two 6-sided dice?	Rotate the image below 90° counterclockwise and reflect it across a horizontal line. 	Find the factors: $2x^2 + 7x + 3$	Find the roots and maximum of the quadratic equation below. $y = -3(x-4)^2 - 3$
DOK 2 Example	List the measurements of three different rectangular prisms that each has a surface area of 20 square units.	What value(s) have a 1/12 probability of being rolled as the sum of two 6-sided dice?	List three sequences of transformations that take pre-image ABCD to image A′B′C′D′. 	Fill in the blank with integers so that the quadratic expression is factorable. $x^2 + \_\_x + 4$	Create three equations for quadratics in vertex form that have roots at 3 and 5 but have different maximum and/or minimum values.
DOK 3 Example	What is the greatest volume you can make with a rectangular prism that has a surface area of 20 square units?	Fill in the blanks to complete this sentence using the whole numbers 1 through 9, no more than one time each. Rolling a sum of ___ on two ___-sided dice is the same probability as rolling a sum of ___ on two ___-sided dice.	What is the fewest number of transformations needed to take pre-image ABCD to image A′B′C′D′? 	Fill the blank by finding the largest and smallest integers that will make the quadratic expression factorable. $2x^2 + 3x + \_\_$	Create a quadratic equation with the largest maximum value using the whole numbers 1 through 9, no more than one time each. $y = -\square(x-\square)^2 + \square$

Discussion Questions

- How will problem-based lessons like these prepare students for a performance task like the Cereal Box?
- What skills might students still be lacking to be successful with a problem like this?

FIVE PRACTICES



Discussion Questions

- "Giving students too much or too little support, or too much direction, can result in a decline in the cognitive demands of the task." (p. 550) Why?
- "By making purposeful choices about the order in which students' work is shared, teachers can maximize the chances that their mathematical goals for the discussion will be achieved." (p. 554) What ways do teachers currently select students? How would you suggest they change their selection process after reading this?
- What challenges might teachers have when trying to "connect" student solutions? (p. 554)

Implementing the Five Practices

1. Pick a selection strategy you anticipate using before looking at the student work.
2. Next, review the student work to simulate the reality that you won't know what students will actually do.
3. Figure out which students you would have share their mathematical work.
4. Determine the order you would have those students present their work.
5. Decide on which connections you would emphasize between the students' work and mathematical ideas.

Posters

- At the top of the poster, list the selection strategy used by your group. For example:
  - Starting with the most commonly used strategy and moving to one that few students used.
  - Starting with a strategy that is more concrete and moving to strategies that are more abstract.
  - Incorporating wrong answers to address common misconceptions.
- Attach those students' work to the poster in the order that you would present it.
- Next to the student work list the questions you would ask the student(s) or ideas that you would want to come out as a result of showing that student's work.

struggle: none
feedback: none
reward: none


struggle: low
feedback: low
reward: high

struggle: medium
feedback: high
reward: medium

struggle: high
feedback: high
reward: high

Goals

- [x] Engaging problem solving
  - [x] Real world problem-based learning
  - [x] Higher depth of knowledge problems
- [ ] Better implementation
  - [x] Improve our ability to ask questions
  - [x] Practice preparing to implement a lesson
  - [ ] Figure out how to deal with uncomfortable situations

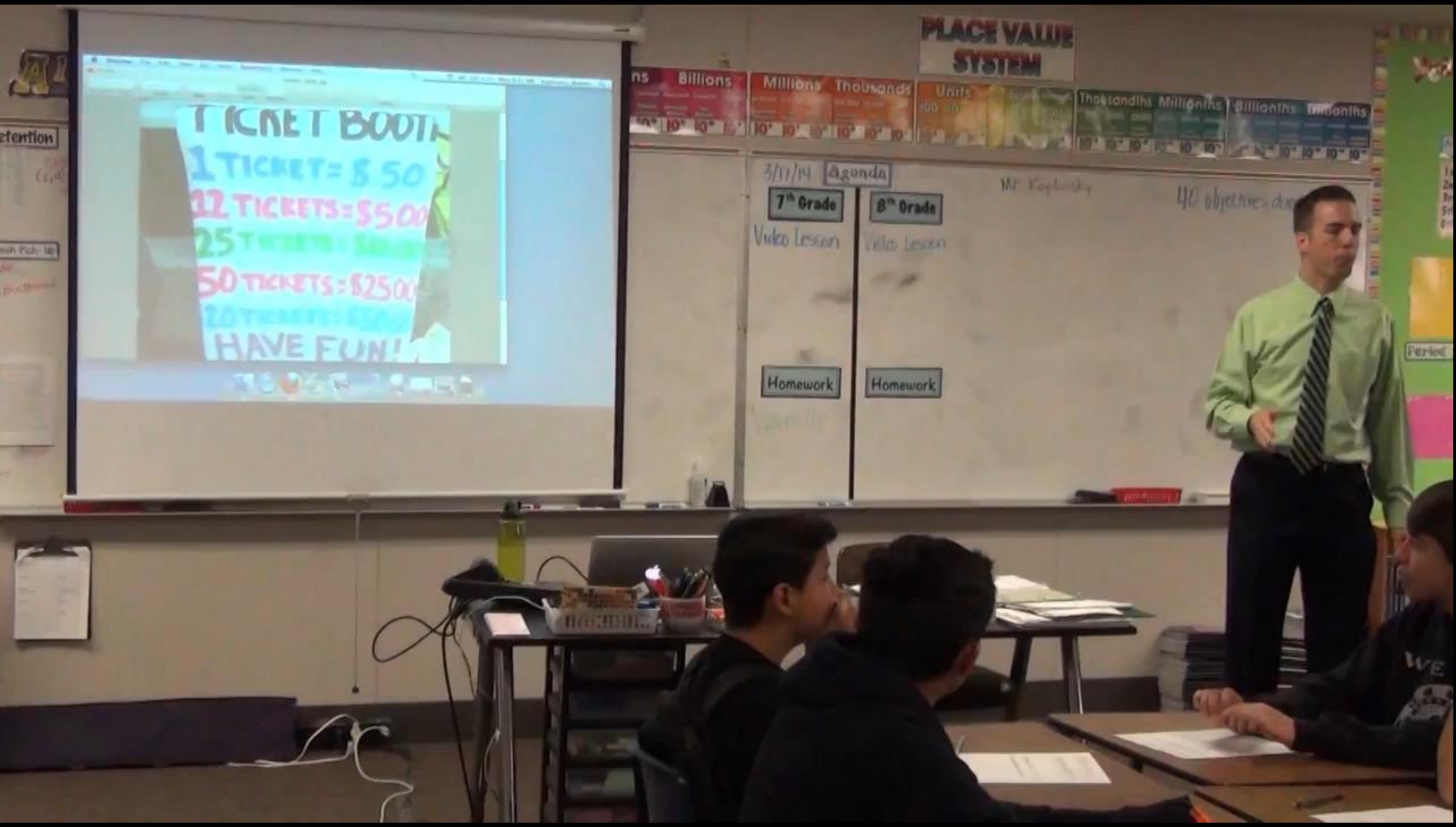
Pre-Mortem

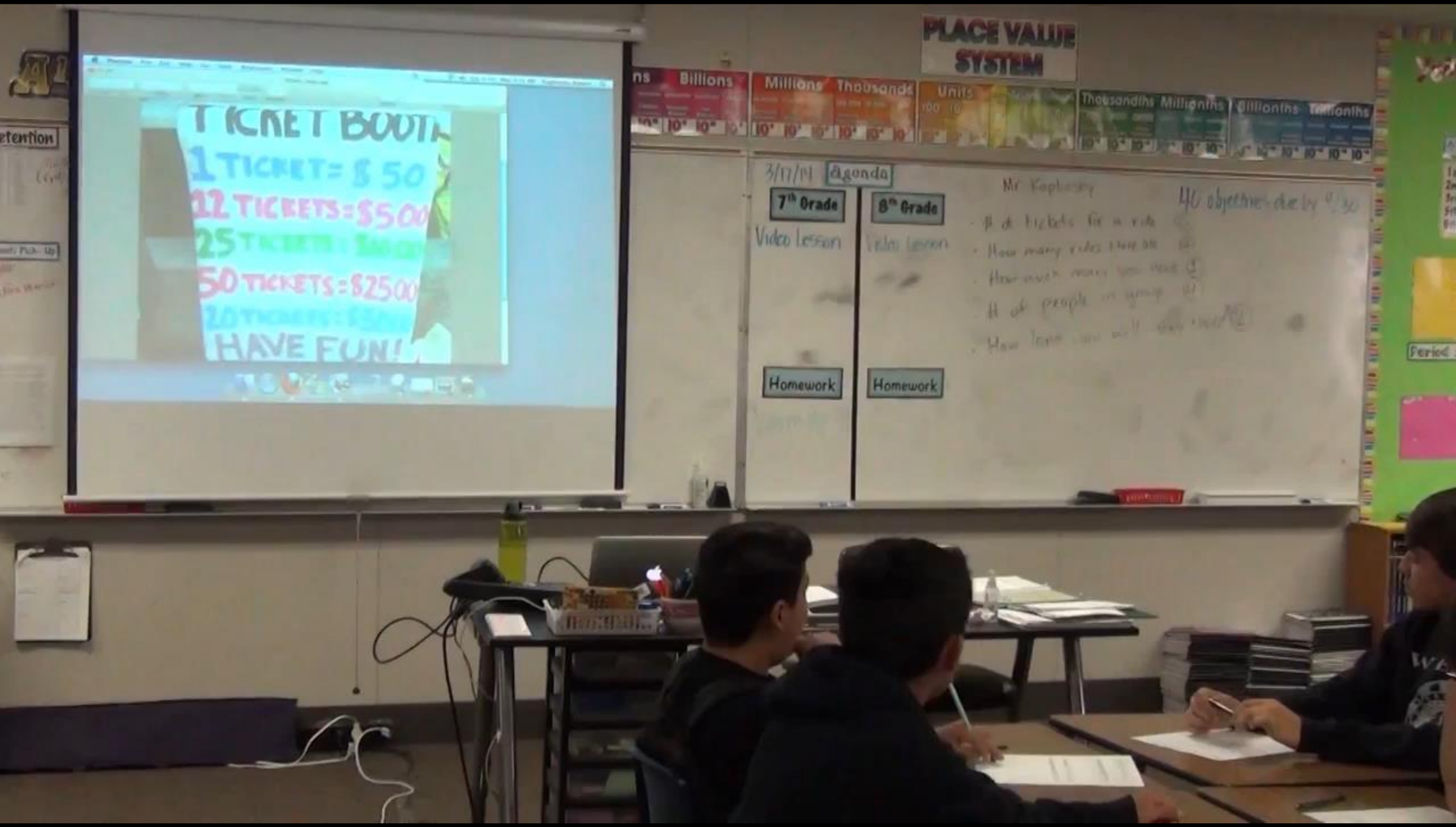
- The lesson flopped. What went wrong?
- You have sixty seconds to write down all the reasons the lesson did not go well.
- Create a combined list with your neighbors.
- Then discuss “less helpful” and “more helpful” was you could address them if they do happen.

Setting Up The Problem

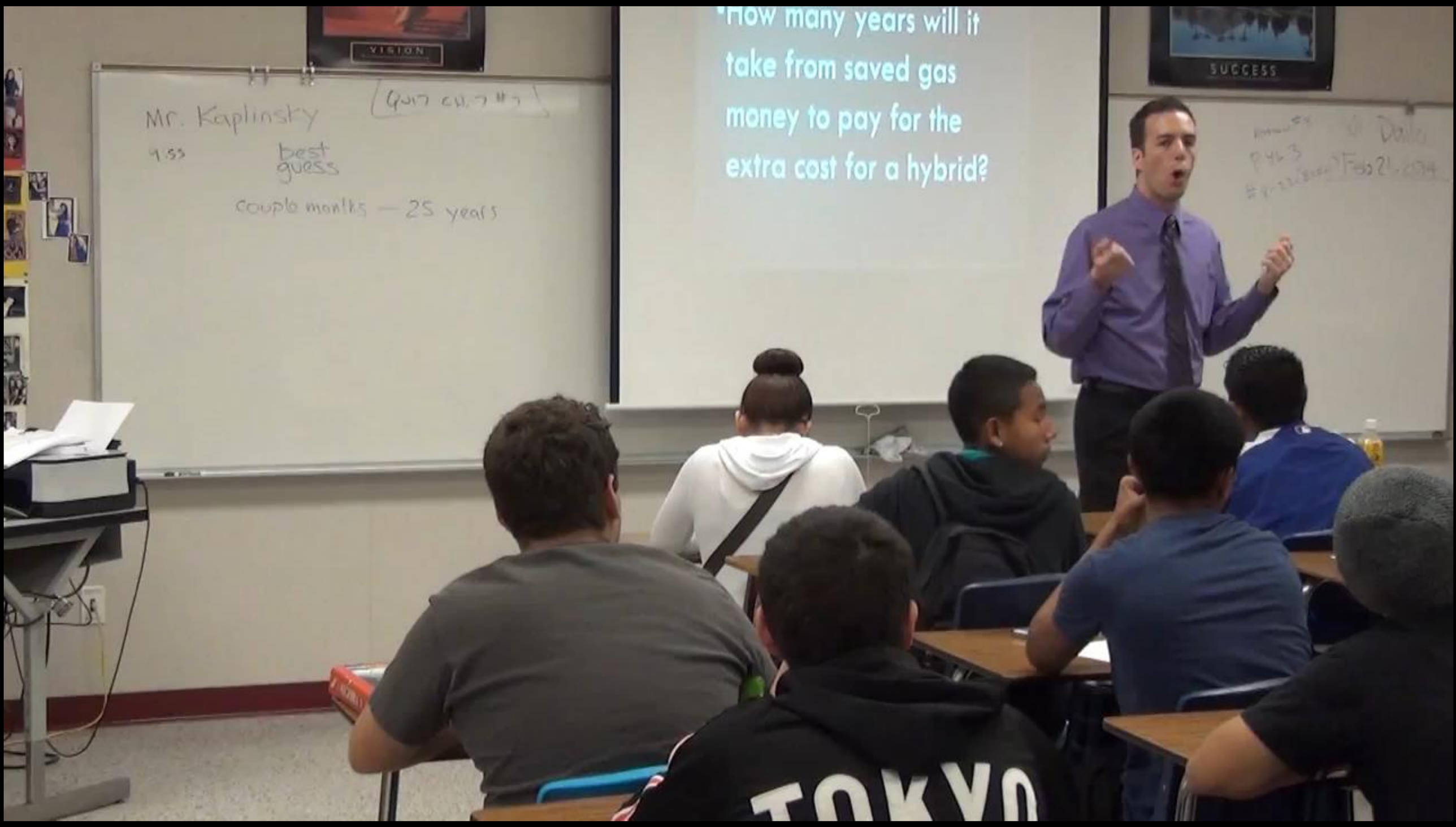
- What do you do when students ask for data/information I don't have, hadn't considered, or forgot to get?
- What do you do when students ask for information that is probably not important or that they don't actually need?


TICKET BOOTH
1 TICKET = $.50
12 TICKETS = $5.00
25 TICKETS = $10.00
50 TICKETS = $25.00
120 TICKETS = $50.00
HAVE FUN!

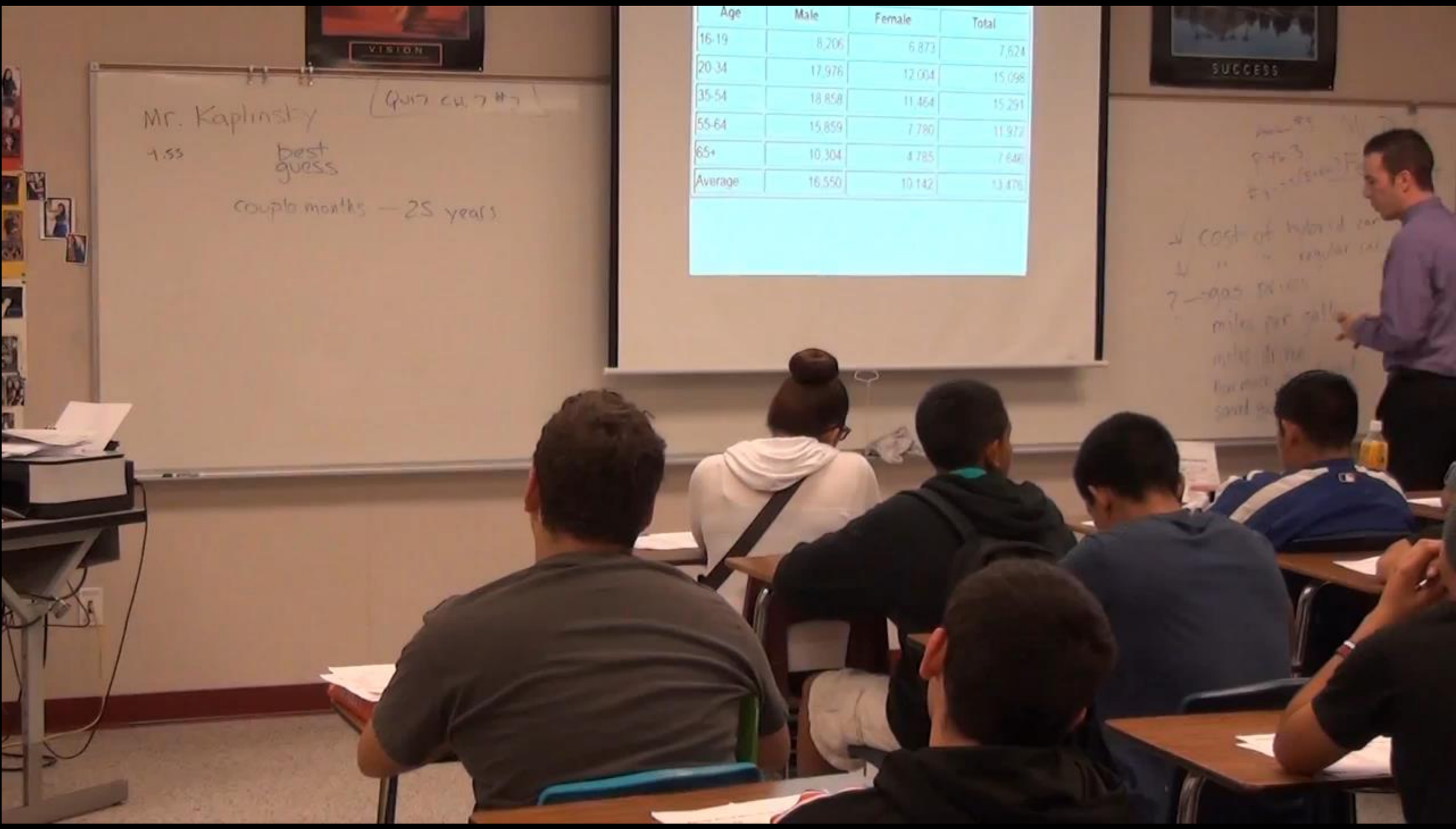

PLACE VALUE SYSTEM
Billions
Millions
Thousands
Units
Thousandths
Millionths
Billionths
Trillionths
3/11/14
Agenda
7th Grade
8th Grade
Video Lesson
Video Lesson
Homework
Homework
1 TICKET = $ 50
HAVE FUN!


TICKET BOOTH
1 TICKET = $ 50
12 TICKETS = $500
25 TICKETS
50 TICKETS = $2500
HAVE FUN!
PLACE VALUE SYSTEM
Billions
Millions
Thousands
Units
Thousandths
Millionths
Billionths
Trillionths
3/17/11
Agenda
7th Grade
8th Grade
Video lesson
Homework
Homework
Period

Does a hybrid car pay for itself?


VISION
Mr. Kaplinsky
best guess
couple months — 25 years
*How many years will it take from saved gas money to pay for the extra cost for a hybrid?
SUCCESS
TOKYO

Age	Male	Female	Total
16-19	8,206	6,873	7,624
20-34	17,976	12,004	15,098
35-54	18,858	11,464	15,291
55-64	15,859	7,780	11,972
65+	10,304	4,785	7,648
Average	16,550	10,142	13,476



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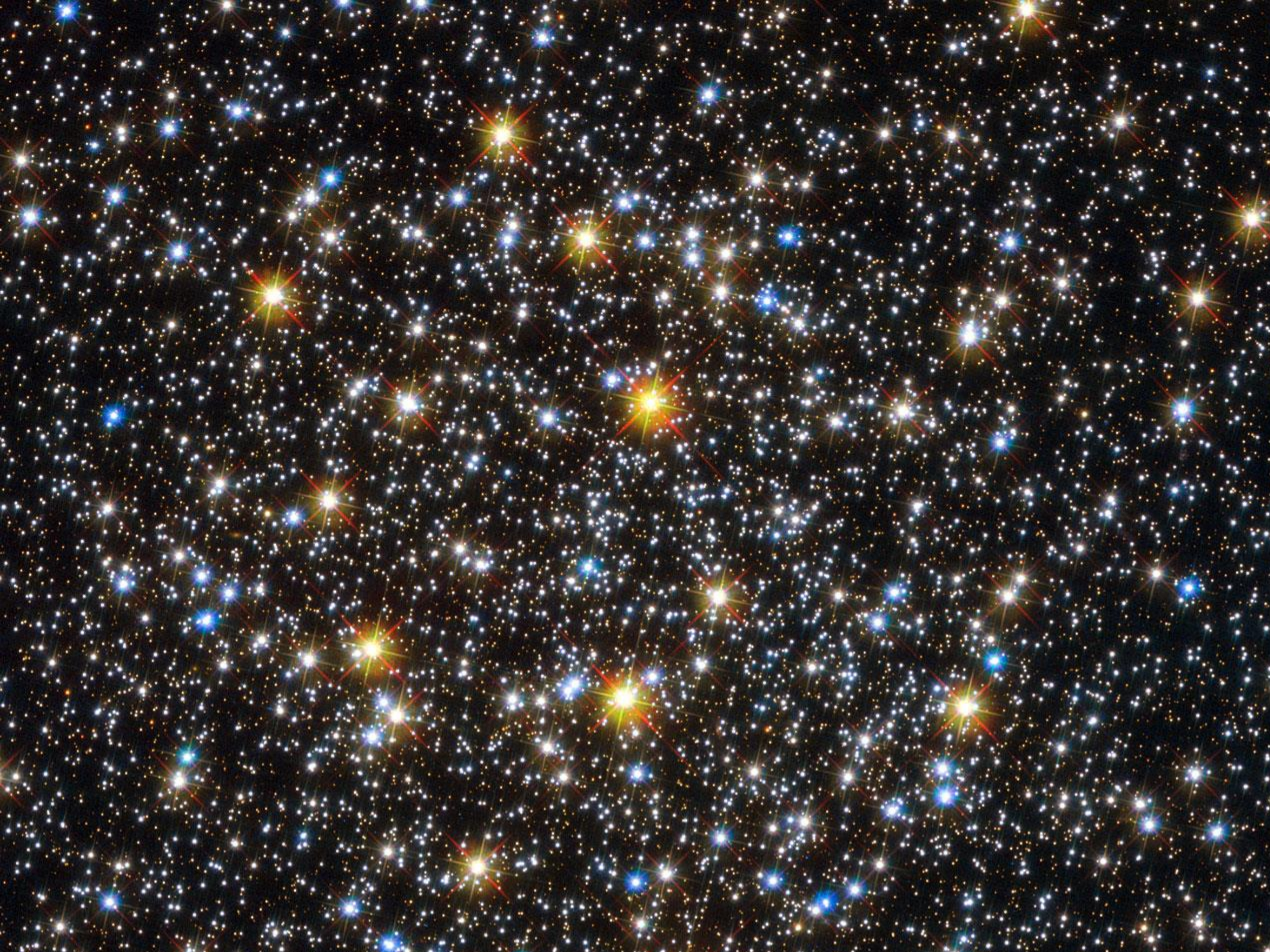
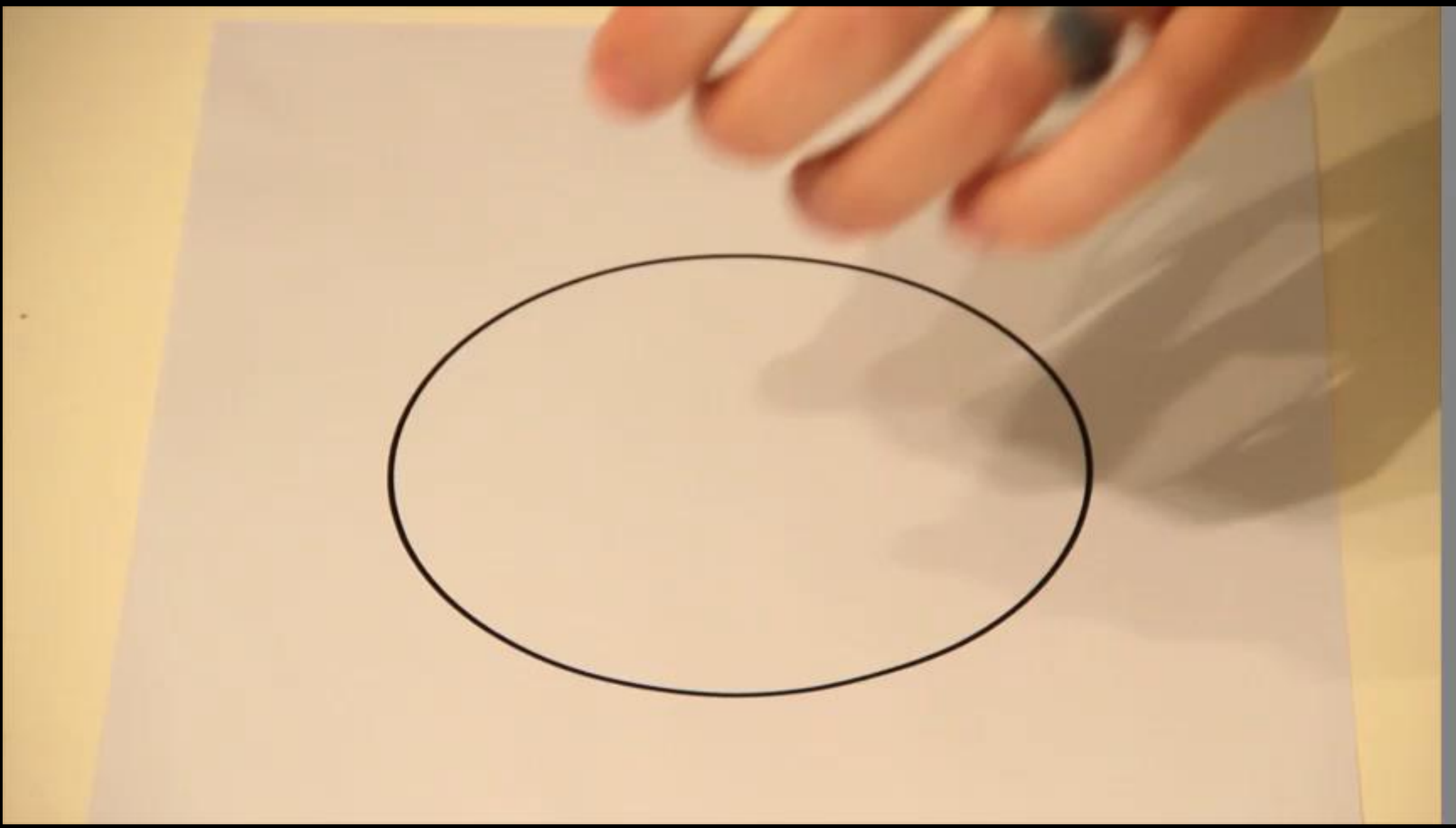
65+	10,304	4,735	7,646
Average	16,550	10,142	13,478



Setting Up The Problem

- What do you do when students ask for data/information I don't have, hadn't considered, or forgot to get?
- What do you do when students ask for information that is probably not important or that they don't actually need?
- What do you do when students don't know what to write for what they know and don't know?
- What do you do when you ask for a guess and they don’t know?
- What do you do when they don't ask you for information that they need to solve the problem?



Problem Solving Process

- What do you do when students don't use the strategy you anticipated they would use?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25 TICKETS = $10.00
50 TICKETS = $25.00
120 TICKETS = $50.00
HAVE FUN!

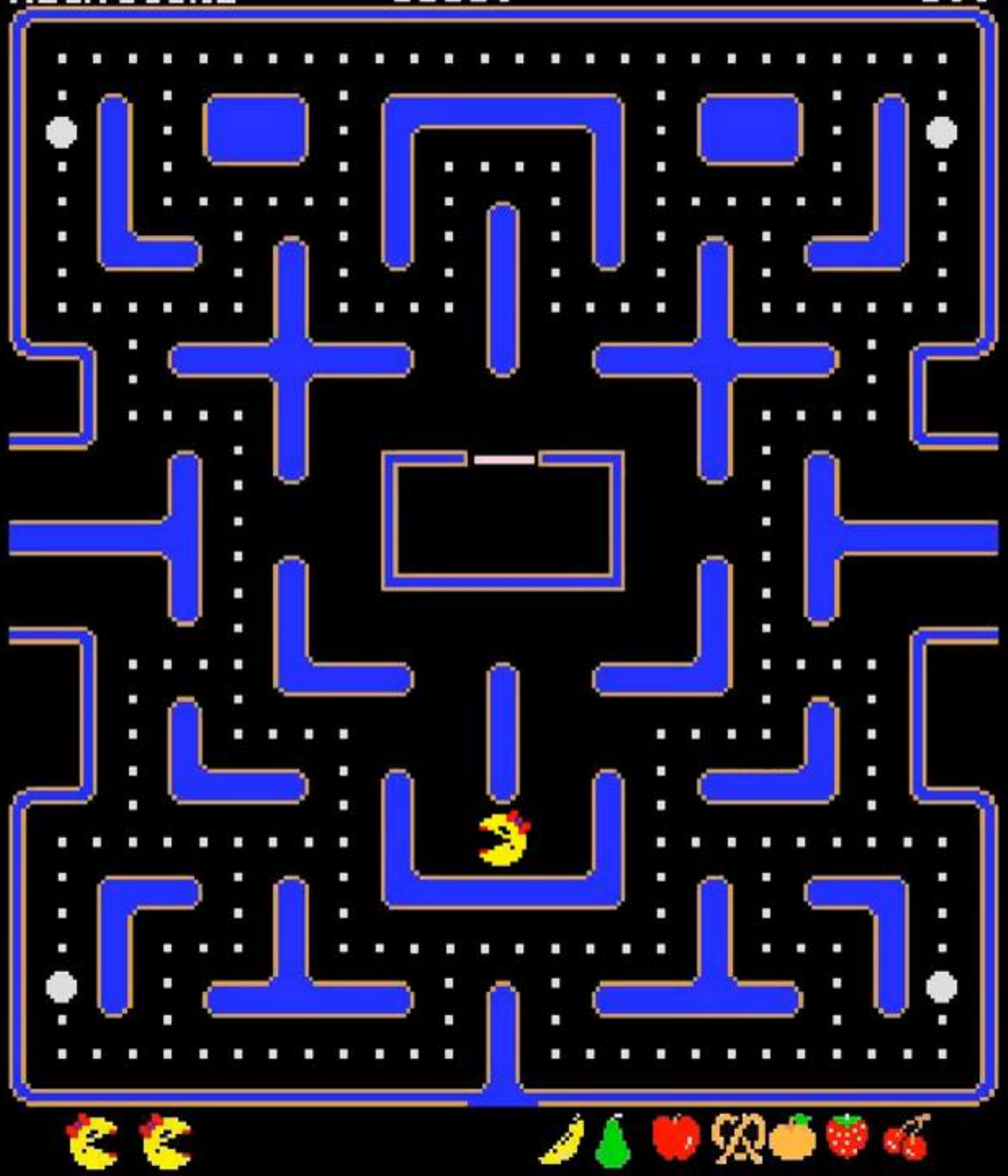

Dual Flush
Descarga Doble
1.0
gallon flush
for liquids
1.6
gallon flush
for solids
Dual Flush
1.0 gallon flush for liquids
1.6 gallon flush for solids
American Standard
Style That Works Better
American Standard
Item | Artículo: 84065
Model | Modelo: 3381.216.020
Clean™ Cadet® 3
Overall dimensions: 15 in W x 31 in H x 29-3/4 in D
Rough-in dimensions: 12 in
Trapway size: 2 in
Dimensiones generales: 38,10 cm de ancho x 78,74 cm de alto x 75,57 cm de profundidad
Dimensiones aproximadas: 30,48 cm
Tamaño de canal de sifón: 5,08 cm
• High-efficiency, dual flush toilet—1.6 gal. or 1.0 gal. flush
• Stays cleaner longer with EverClean® surface & PowerWash™ flush
• Features No Tools™ installation
• ADA approved chair height
• Inodoro de descarga doble de alta eficiencia con descarga de 6,06 litros o 3,79 litros
• Permanece limpio por más tiempo con la superficie EverClean® y la descarga PowerWash™
• Cuenta con instalación No Tools™
• Altura de silla aprobada por ADA
Elongated
Alargada
18.5 in
46,99 cm
Chair Height
Altura de silla
16.5 in
41,91 cm
10 Year Año
Limited Warranty
Garantía limitada
$199
Everyday Low Price
CLEAN CADET 3 DUAL FLUSH CH EL H
AISLE 40 W
BAY
LOC 1
Item # 84065
WaterSense
Meets EPA Criteria
Certified by IAPMO R&T
Reorder # P117364

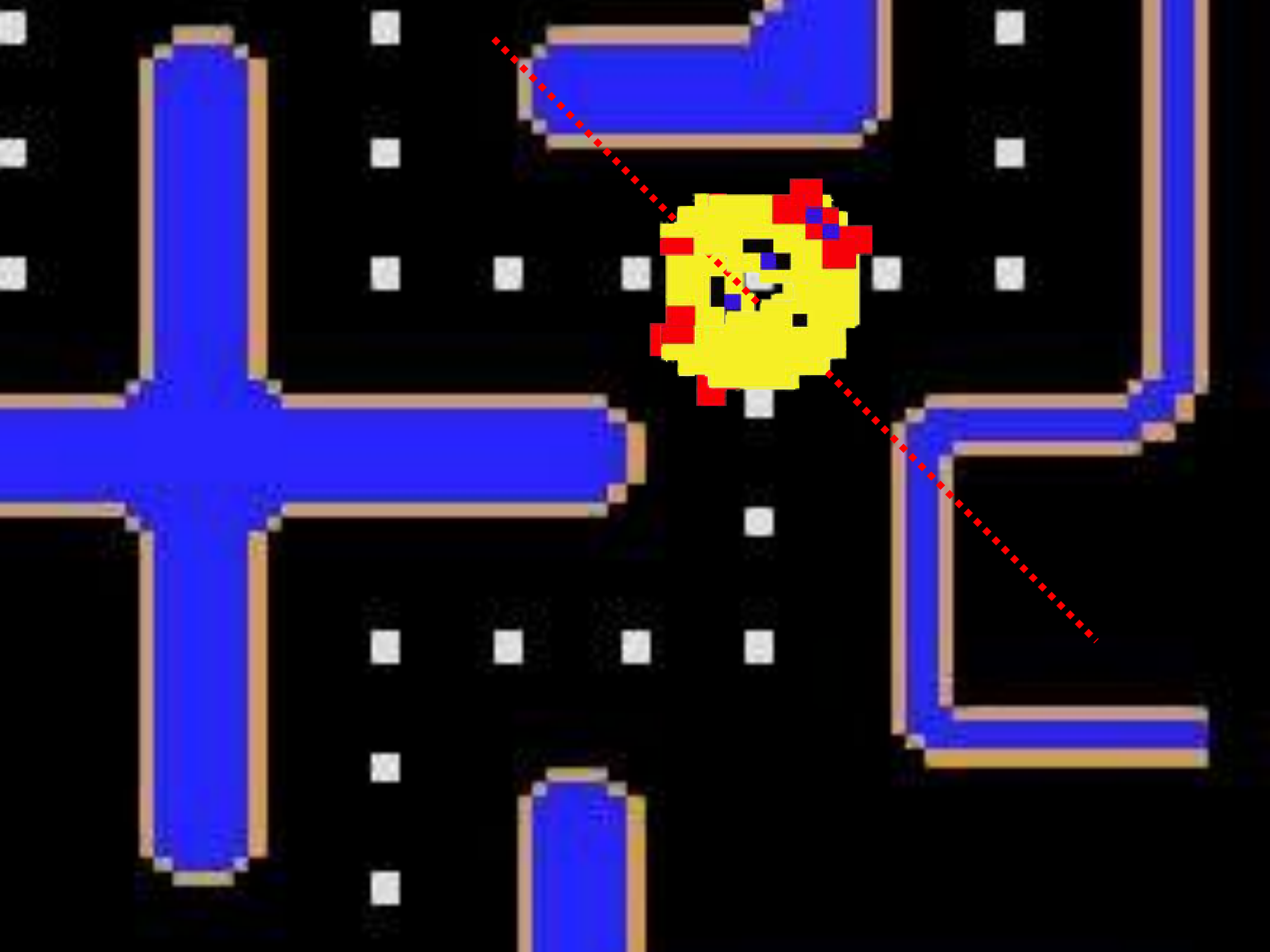

American Standard
Item | Artículo: 88575
Model | Modelo: 2514.101.020
Clean™ Cadet® 3
Overall dimensions: 15-3/4 in W x 30-3/4 in H x 30-1/4 in D
Rough-in dimensions: 12 in
Trapway size: 2-1/16 in
Dimensiones generales: 40,01 cm de ancho x 78,11 cm de alto x 76,84 cm de profundidad
Dimensiones aproximadas: 30,48 cm
Tamaño de canal de sifón: 5,24 cm
• Smooth-sided toilet design
• Stays cleaner longer with EverClean® surface & PowerWash™ flush
• Features No Tools™ installation
• ADA approved chair height
• Diseño de inodoro de lados lisos
• Permanece limpio por más tiempo con la superficie EverClean® y la descarga PowerWash™
• Cuenta con instalación No Tools™
• Altura de silla aprobada por ADA
Elongated
Alargada
18.5 in
46,99 cm
Chair Height
Altura de silla
16.5 in
41,91 cm
10 Year Año
Limited Warranty
Garantía limitada
$239
Everyday Low Price
ASD CLEAN CADET3 EL CH 1.28GPF
AISLE 40 W
BAY
LOC 5
Item # 88575
WaterSense
Meets EPA Criteria
Certified by IAPMO R&T
Reorder # P117363

Problem Solving Process

- What do you do when students don't use the strategy you anticipated they would use?
- What do you do when a student comes up with a strategy for solving the problem that I do not understand?

HIGH SCORE 36550 800






USA

Problem Solving Process

- What do you do when students don't use the strategy you anticipated they would use?
- What do you do when a student comes up with a strategy for solving the problem that I do not understand?
- What do you do when the answer we calculate does not match with the actual answer?
- What do you do when students get stuck during the problem solving process and are not sure what to do?

Problem Solving Process

- What do you do when students don't use the strategy you anticipated they would use?
- What do you do when a student comes up with a strategy for solving the problem that I do not understand?
- What do you do when the answer we calculate does not match with the actual answer?
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- What do you do when you ask students questions and few to no people are ready to respond?

Problem Solving Process

- What do you do when students don't use the strategy you anticipated they would use?
- What do you do when a student comes up with a strategy for solving the problem that I do not understand?
- What do you do when the answer we calculate does not match with the actual answer?
- What do you do when students get stuck during the problem solving process and are not sure what to do?
- What do you do when you ask students questions and few to no people are ready to respond?
- What do you do when the student conclusions are low quality and/or effort?

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Ver. 1

What is your conclusion? How did you reach that conclusion?

IA conclusion each conclusion Each Item is good for different Items

instore purchace, exclusions

What is your conclusion? How did you reach that conclusion?

If the Item is $15 use the $5 off because

15-5 = $10 and
15 - 20% = $12

If the Item is $47 it is better to use the 20% off coupon because

47 - 5 = $42
$5 off

47 - 20% = 37.60
20% off

42 vs 37.60

$5 off 20% off
18 vs 18.40

23 - 5 = 18

23 - 20% = 18.40

	Orange Chicken	5.25	
	Chicken Lo Mein	5.25	
	Cashew Nut Chicken	5.25	
🌶	Pungent Chicken	5.25	
	Sweet & Sour Chicken	5.25	
	Curry Chicken	5.25	
	Lemon Chicken	5.25	
	Vegetable Chicken	5.25	
	Mongolian Beef	5.25	
	Broccoli Beef	5.25	
🌶	Pungent Beef	5.25	
	Sweet & Sour Pork	5.25	

🌶	Eggplant with Garlic Sauce	5.25
🌶	Ma Po Tofu	5.25
🌶	Broccoli with Garlic Sauce	5.25
🌶	String Bean with Garlic Sauce	5.25
	Vegetable Delight	5.25
	Bamboo Fungus Tofu	5.25
	Shrimp with Asparagus	6.25
	Shrimp with Lobster Sauce	6.25
🌶	Fish Fillet with Szuchuan Sauce	6.25
🌶	Fish Fillet with Black Bean Sauce	6.25
	Crab meat with Asparagus	6.25
	Sweet & Sour Shrimp	6.25

FREE ORANGE CHICKEN
WITH COUPON
with purchase from $50+tax/up
Not redeemable on lunch & special dinners & party items or with any other coupon
exp. 3/31/07

FREE CHICKEN LO MEIN
WITH COUPON
with purchase from $25+tax/up
Not redeemable on lunch & special dinners & party items or with any other coupon
exp. 3/31/07

FREE Cheese Wonton
WITH COUPON
with purchase from $25+tax/up
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10% OFF
WITH COUPON
with purchase from $20+tax/up
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exp. 3/31/07

10% OFF
WITH COUPON
with purchase from $20+tax/up
Not redeemable on lunch & special dinners & party items or with any other coupon
exp. 3/31/07

Free ~~10~~ chicken lomein if spended $25 and not redeemable on lunch, special dinners and Party Items

and chicken to main.

What is your conclusion? How did you reach that conclusion?

The 10% coupon is best with high Prices and small orders is best with the free chicken lomein or chesse wonton

What is your conclusion? How did you reach that conclusion?

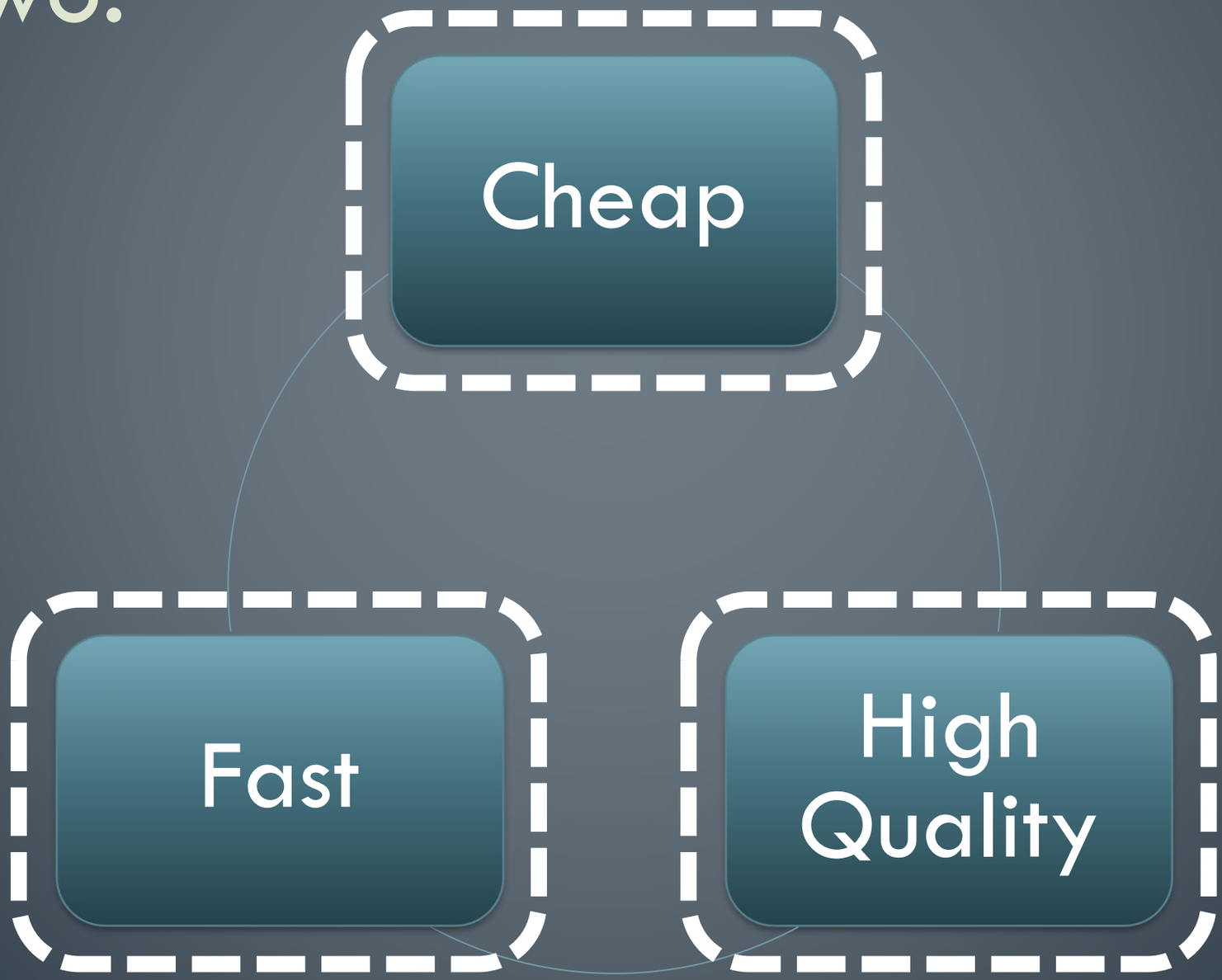
You can use the 10% off when you pay 20-24.99 or more the Free chicken LoMein when you pay 25-49.99 or more and the Free orange Chiken when you pay 50 or more

Goals

- Engaging problem solving
  - Real world problem-based learning
  - Higher depth of knowledge problems
- Better implementation
  - Improve our ability to ask questions
  - Practice preparing to implement a lesson
  - Figure out how to deal with uncomfortable situations

Construction

- Pick two:

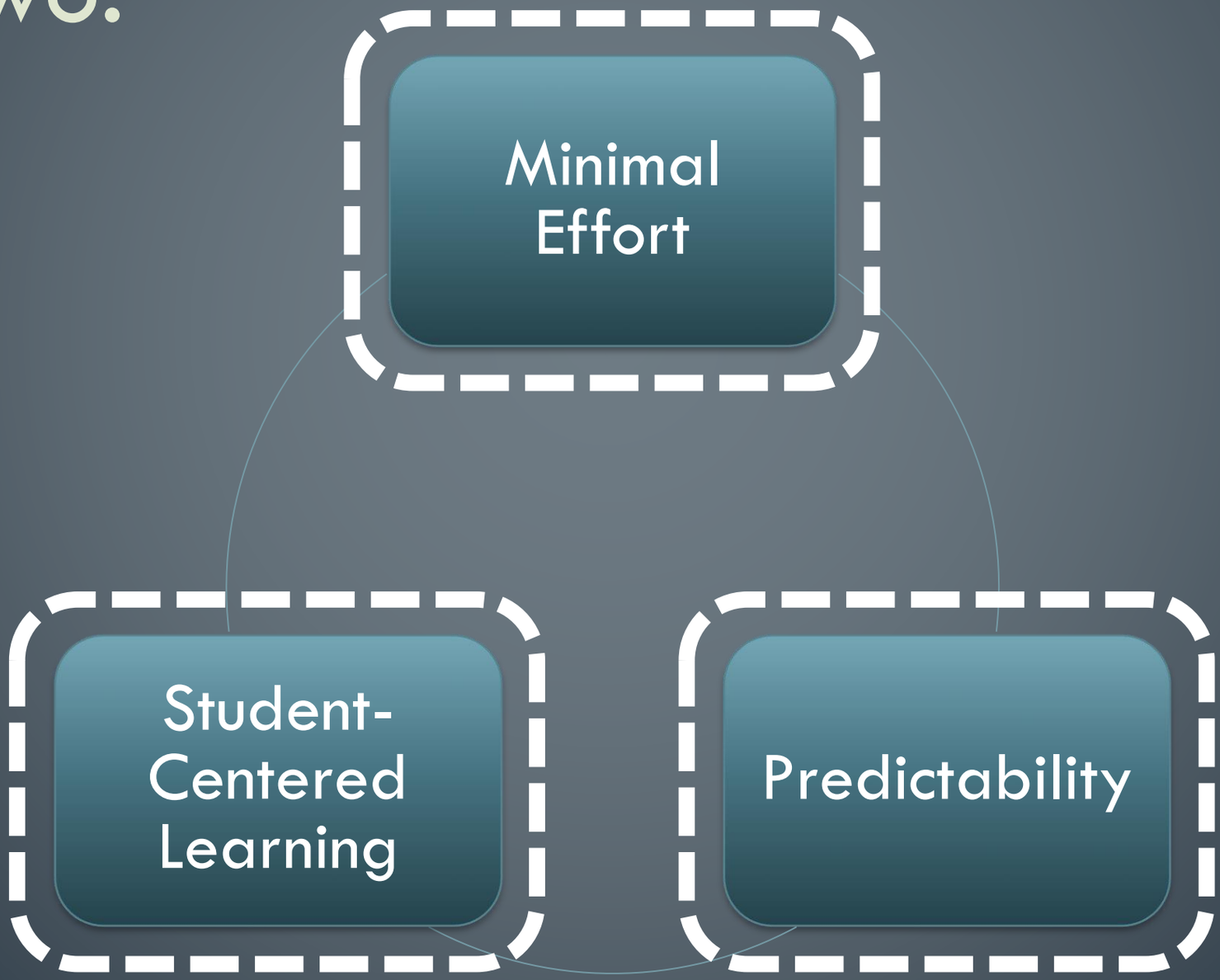


Family

- Pick two:

Problem-Based Learning

- Pick two:



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bonita