

DAY 1



# San Marcos USD

JUNE 16-18, 2014



















**DOUBLE-DOUBLE<sup>®</sup>** *Double Meat & Double Cheese* **2<sup>65</sup>**

**CHEESEBURGER** **1<sup>75</sup>**

**HAMBURGER** **1<sup>50</sup>**

**FRENCH FRIES** **1<sup>05</sup>**

**SHAKES** *Chocolate  
Strawberry  
Vanilla* **1<sup>55</sup>**

<u>SM</u>	<u>MED</u>	<u>LG</u>	<u>X-LG</u>
<b>99</b>	<b>1<sup><u>10</u></sup></b>	<b>1<sup><u>29</u></sup></b>	<b>1<sup><u>49</u></sup></b>
<b>COKE</b> <i>Classic or Diet</i>			
<b>SEVEN-UP</b>			
<b>ROOT BEER</b>			
<b>DR PEPPER</b>			
<b>LEMONADE</b>			
<b>ICED TEA</b>			
<b>MILK</b>		<b>70</b>	
<b>COFFEE</b>		<b>70</b>	



**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

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Cashier: SAM  
GUEST #: 98

---

Counter-Eat In

Db Db	2.65
98 Meat Pty XChz	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

---

Db1 Db1	2.65
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2004-10-31

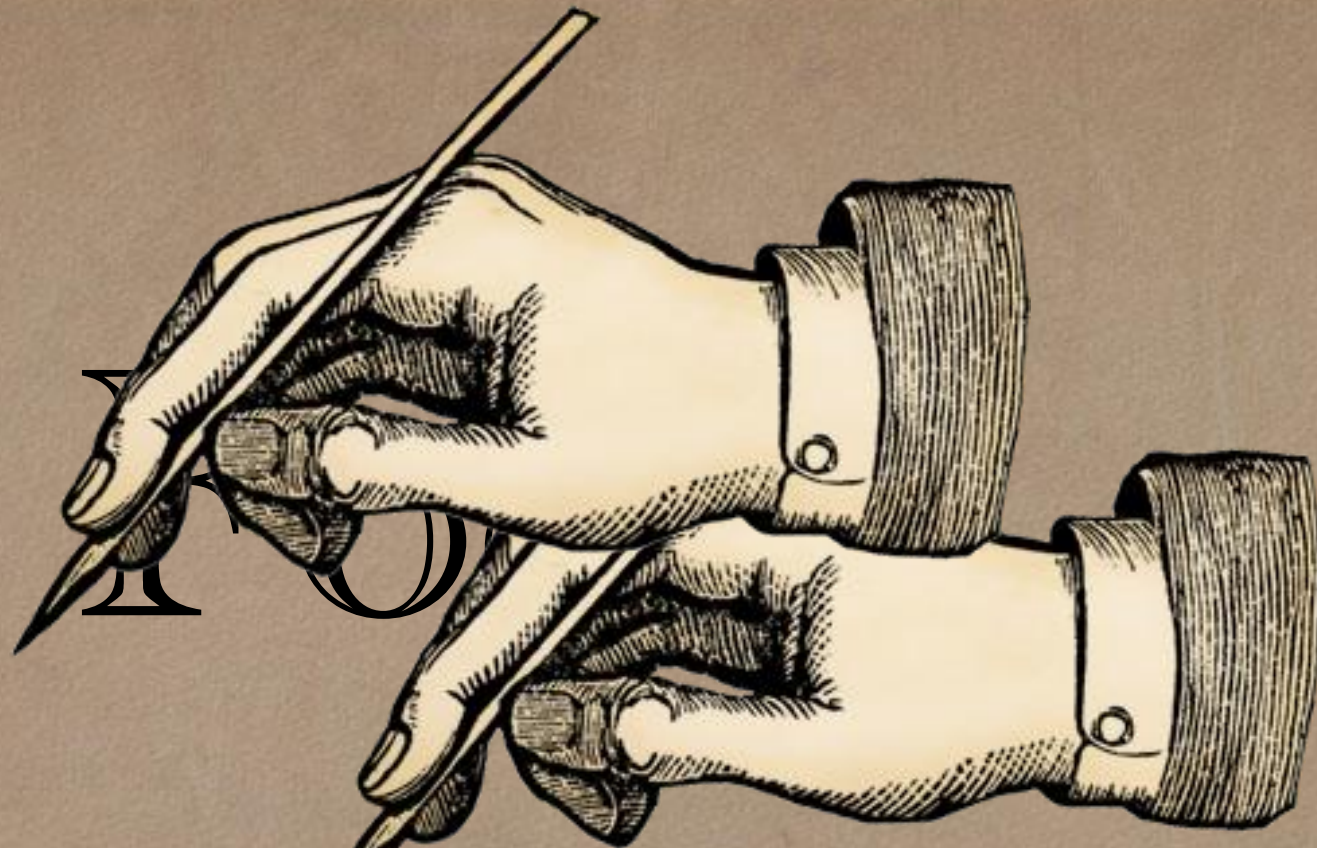
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	Serving Size (g)	Calories
Hamburger w/Onion	243	390
Cheeseburger w/Onion	268	480
Double-Double w/Onion	330	670



•



•

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  $100 \times 100$
- Common wrong answers included:
  - \$175.00 ( $\$1.75 \times 100$  cheeseburgers)
  - \$132.50 ( $\$2.65 \times 50$  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?
<ul style="list-style-type: none"> <li>• there 100 beef patties</li> <li>• costs 2.50</li> </ul>	<ul style="list-style-type: none"> <li>• How much does a regular cheeseburger cost. 25.1 -</li> </ul>
What is your conclusion?	
<p>To get the answer, I first figured out what the price of a regular &amp; double-double cheeseburgers are. From there I subtracted the price of the produce &amp; buns, then multiplied by 100. That gave me the answer, which I once again had to add the price of the buns &amp; produce.</p>	



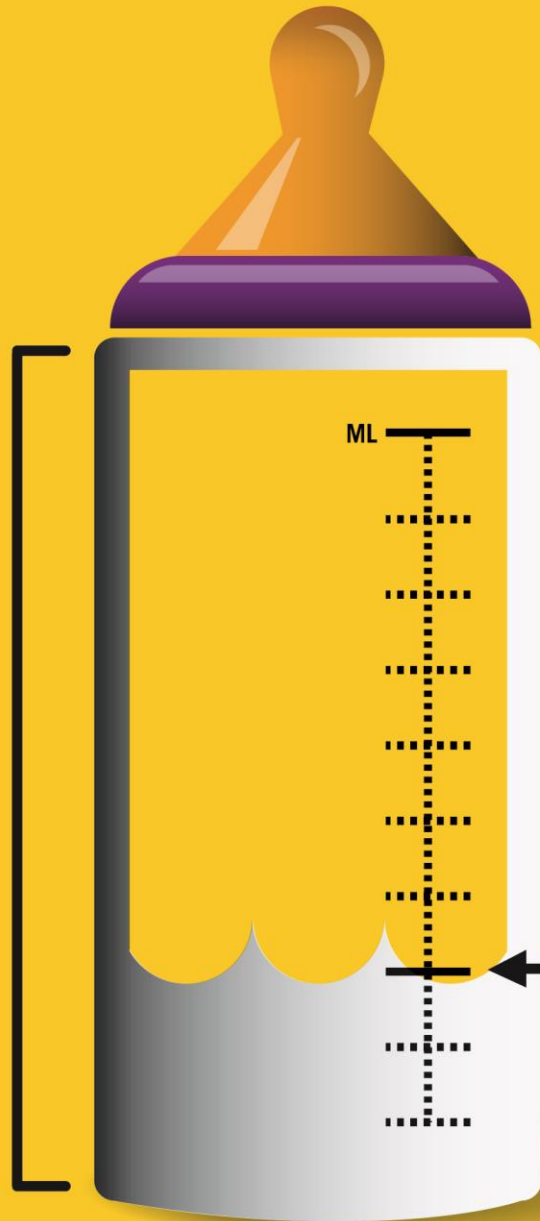
CHOOSE CAR SEAT:  
BY AGE & SIZE



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](http://SAFERCAR.GOV/THERIGHTSEAT)

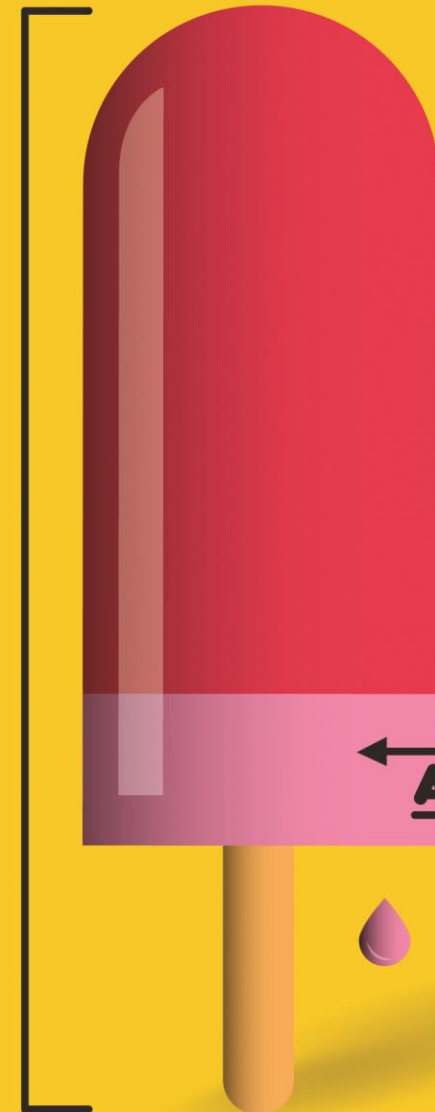


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# Math Question

- Solve the problem on your own. Do not work or share your answer with anyone else.
- You will have 30 seconds to complete it.
- Write your answer down on a paper.
- Pay attention to the emotions you feel while solving the problem and write those emotions down as well.



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 ( $125 \div 5$ )
- 0 students calculated the answer to be 625 ( $125 \times 5$ )
- 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.<sup>1</sup>

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.

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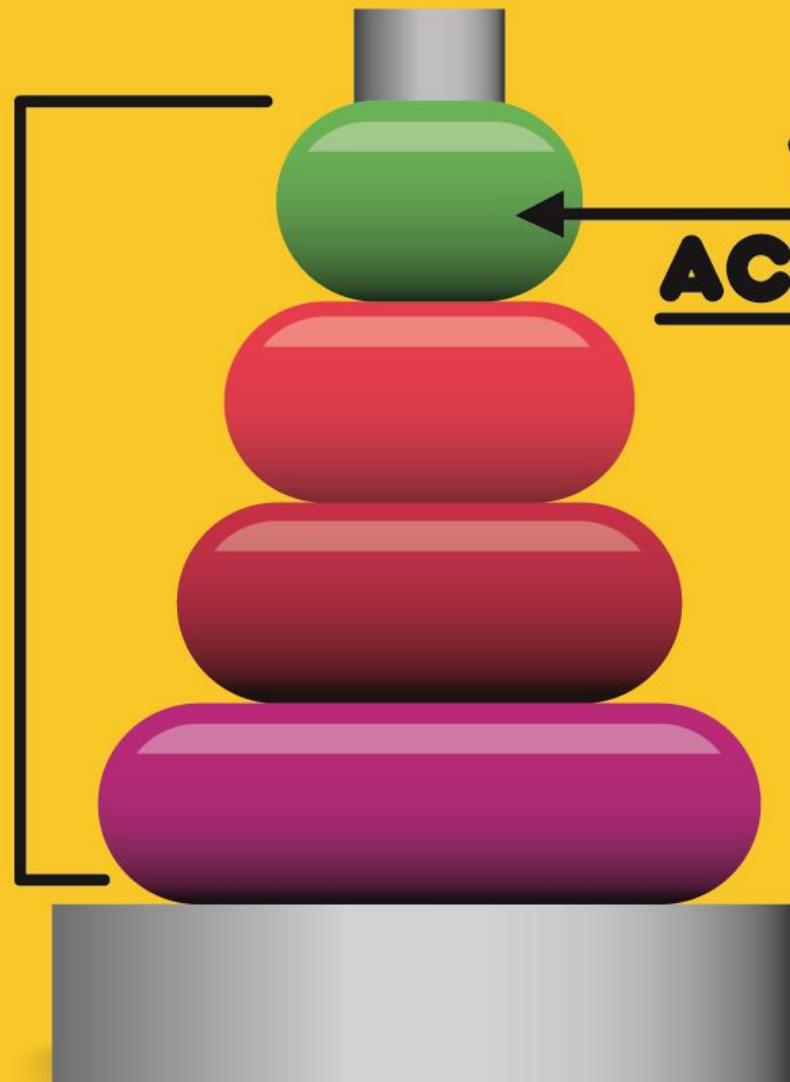
<sup>1</sup> Source: Based on the latest mortality data currently available from the CDC's National Center for Health Statistics.





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.**

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

**IF YOUR CHILD IS IN THE RIGHT CAR SEAT.**



VISIT [SAFERCAR.GOV/THERIGHTSEAT](http://SAFERCAR.GOV/THERIGHTSEAT)



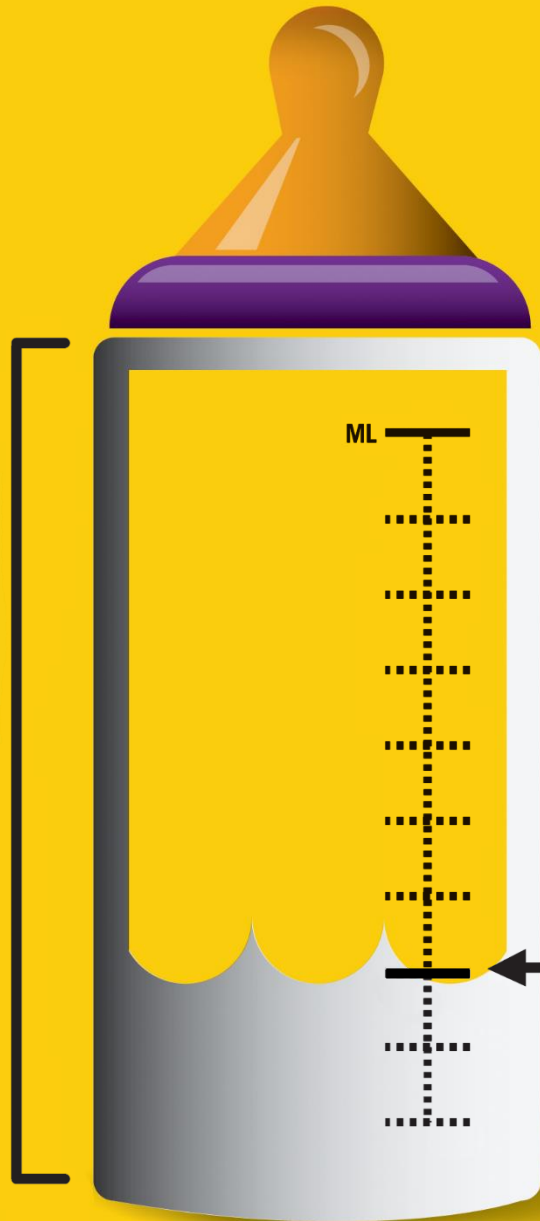
CHOOSE CAR SEAT:  
BY AGE & SIZE



THE NUMBER  
OF PEOPLE

**WHO  
THINK**

THEIR CAR  
SEATS ARE  
BEING USED  
CORRECTLY.



THE ONES  
**WHO  
ACTUALLY  
DO.**

**KNOW FOR SURE**  
IF YOUR CHILD IS IN THE RIGHT CAR SEAT.



VISIT [SAFERCAR.GOV/THERIGHTSEAT](http://SAFERCAR.GOV/THERIGHTSEAT)



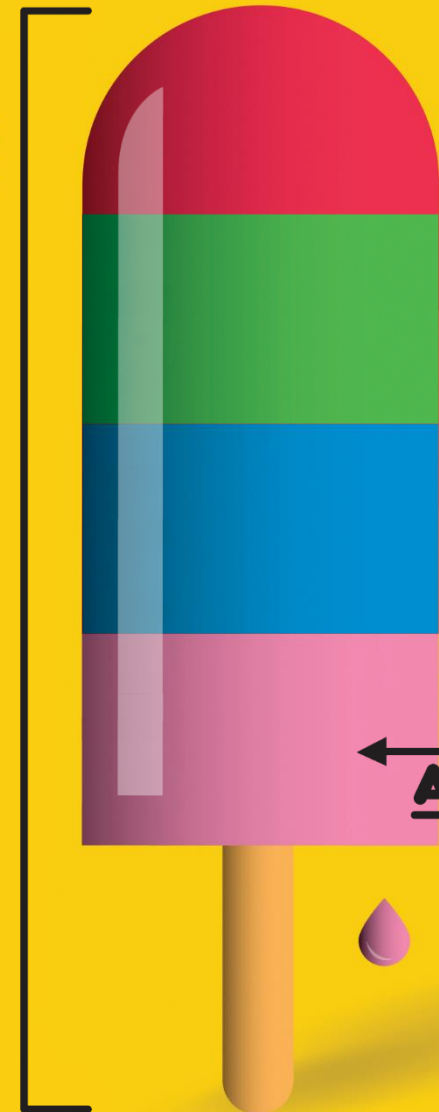
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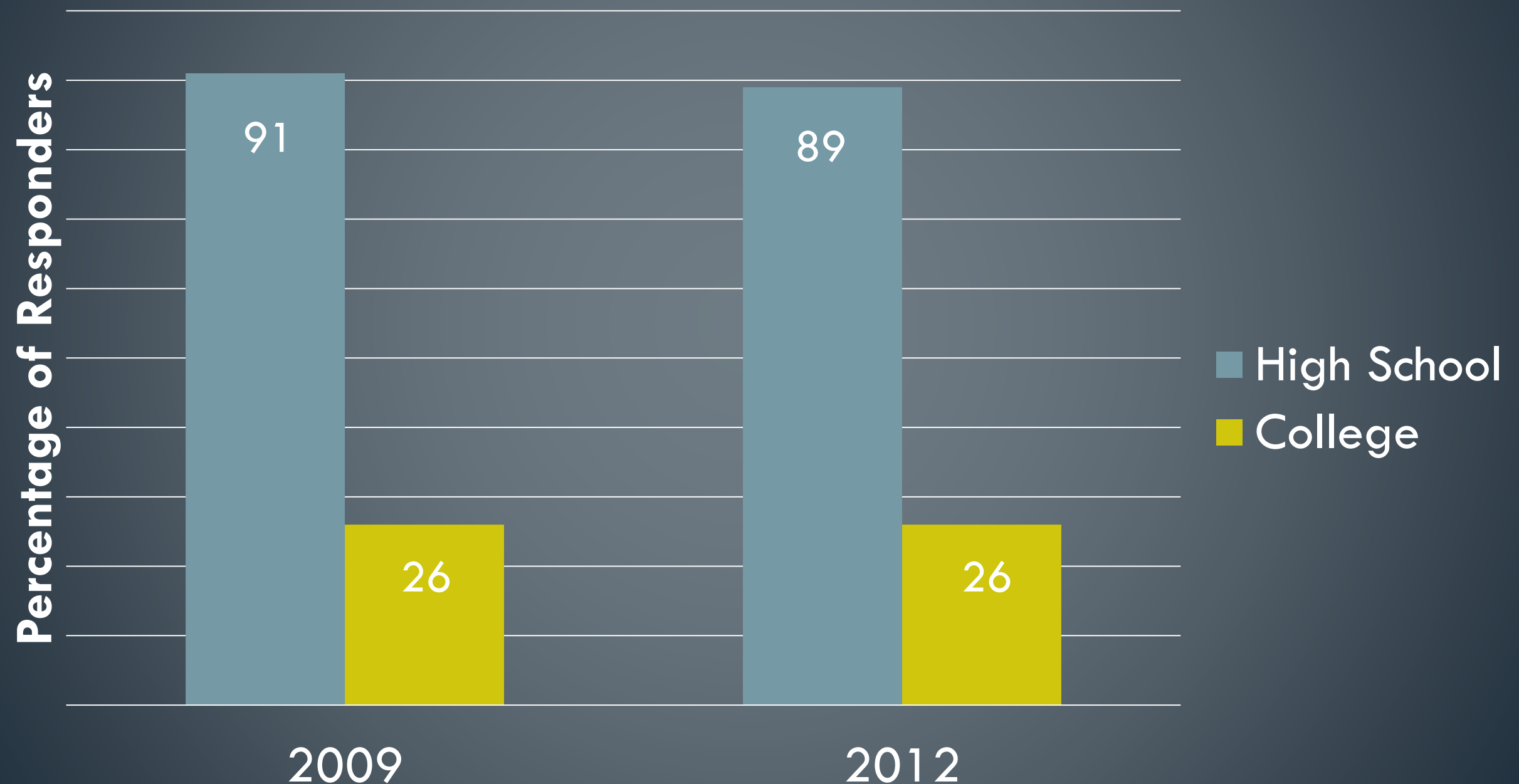




***WHAT IS THE  
PURPOSE OF  
A K-12  
EDUCATION?***

- 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

■ More ■ Less ■ Same

Critical thinking and analytical reasoning skills

Analyzing and solving complex problems

Communicating effectively orally and in writing

Applying knowledge and skills to real-world setting

Working w/ numbers and understanding statistics







IVE

FOX  
NEWS

4:00 PM

Junction





**PGR**

PROCURADURIA  
GENERAL DE  
LA REPUBLICA

**SUBPROCURADURIA  
DE INVESTIGACIÓN ESPECIALIZADA  
EN DELINCUENCIA ORGANIZADA**

**PGR**

PROCURADURIA  
GENERAL DE  
LA REPUBLICA







**FOX**



# ***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.*



# ***PROBLEM- BASED LEARNING FAQ***

- *How often do teachers do problem-based learning?*
- *How long do problem based lessons take?*
- *Do teachers use problem-based lessons to introduce a topic or after you've already taught it?*
- *How is problem-based learning assessed?*
- *How much time does it take to create a problem-based lesson?*

# ***WHAT DOES IT LOOK LIKE...***

- when students have procedural skill but not conceptual understanding or the ability to apply mathematics?
- when students struggle to process mathematics at a higher depth of knowledge?

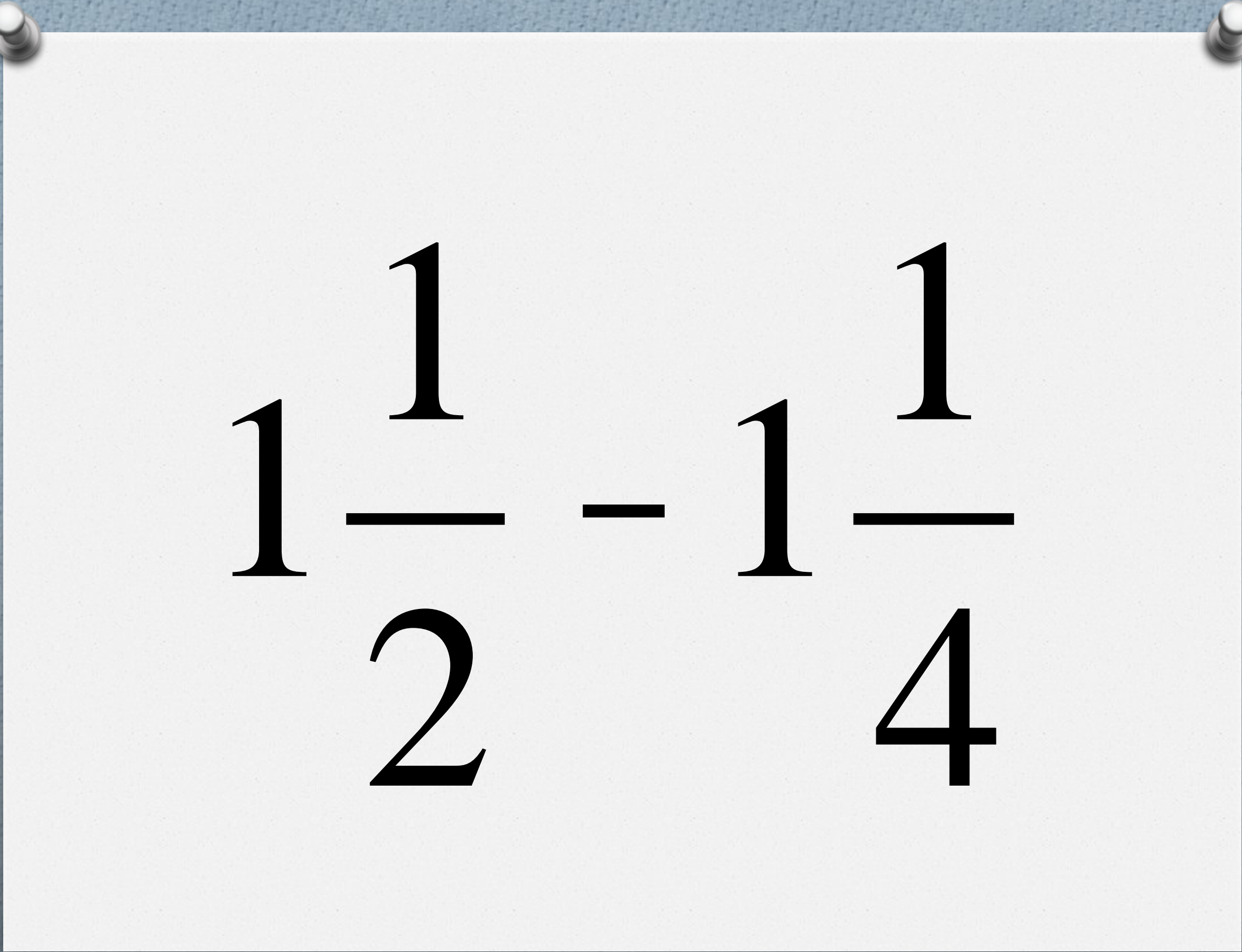


How far apart are the exits on this freeway: Jct 90 and Jefferson Blvd?







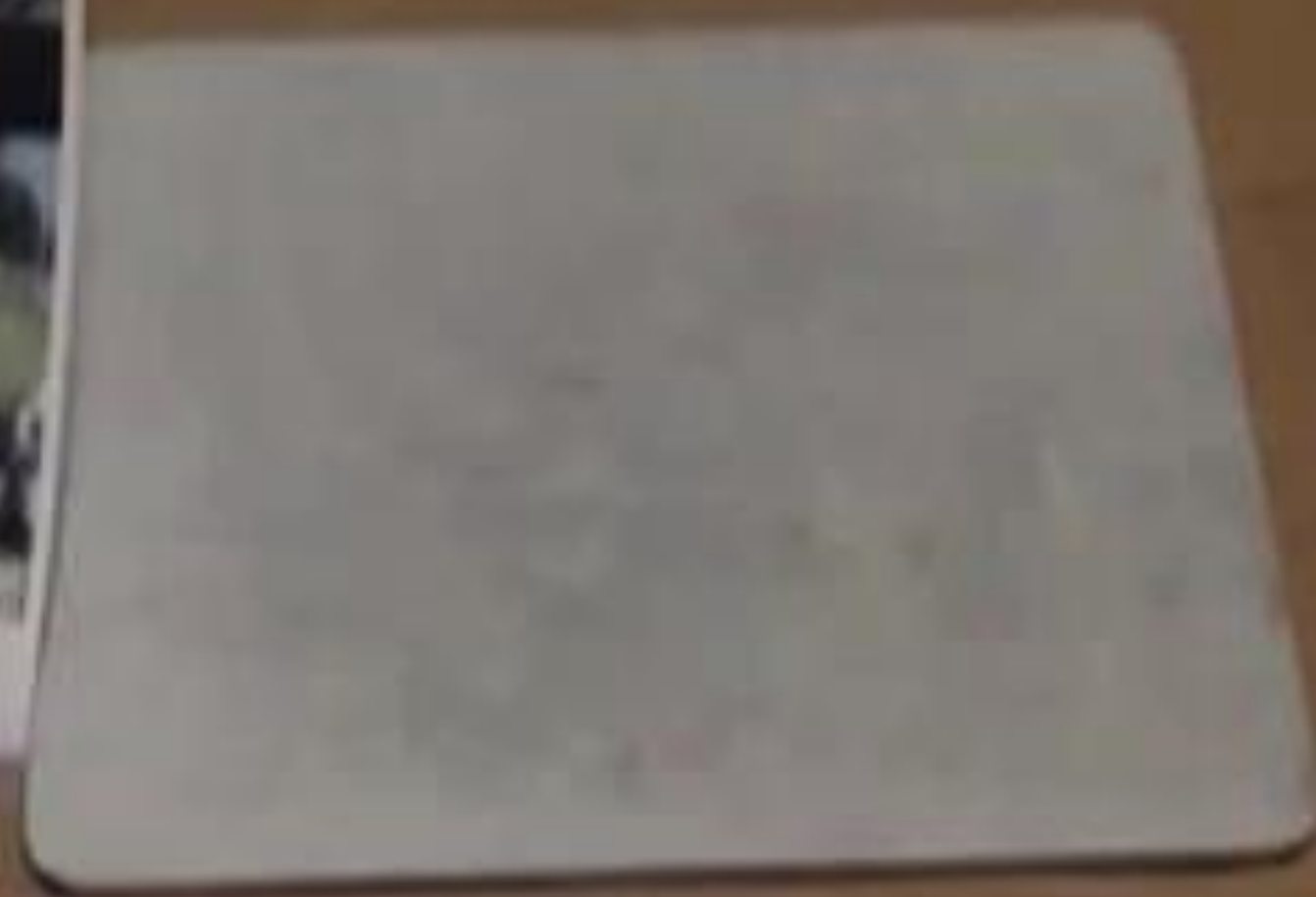

$$1\frac{1}{2} - 1\frac{1}{4}$$

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

$$\begin{array}{r} 2\frac{1}{2} \\ 1\frac{1}{4} \\ 1\frac{1}{4} \\ 1\frac{1}{4} \\ 1\frac{1}{4} \end{array}$$





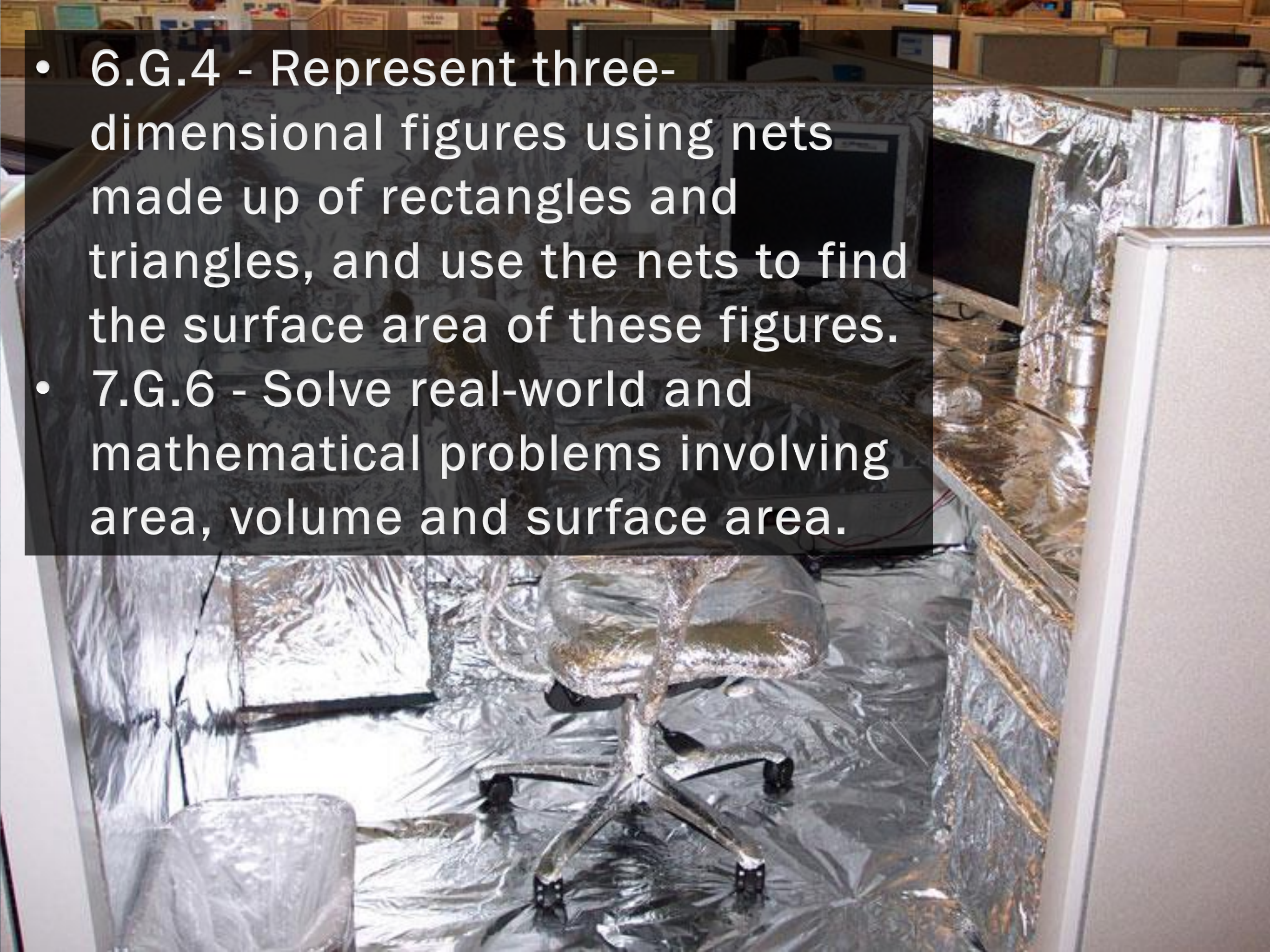


# The Four C's

- o Communication
- o Curiosity

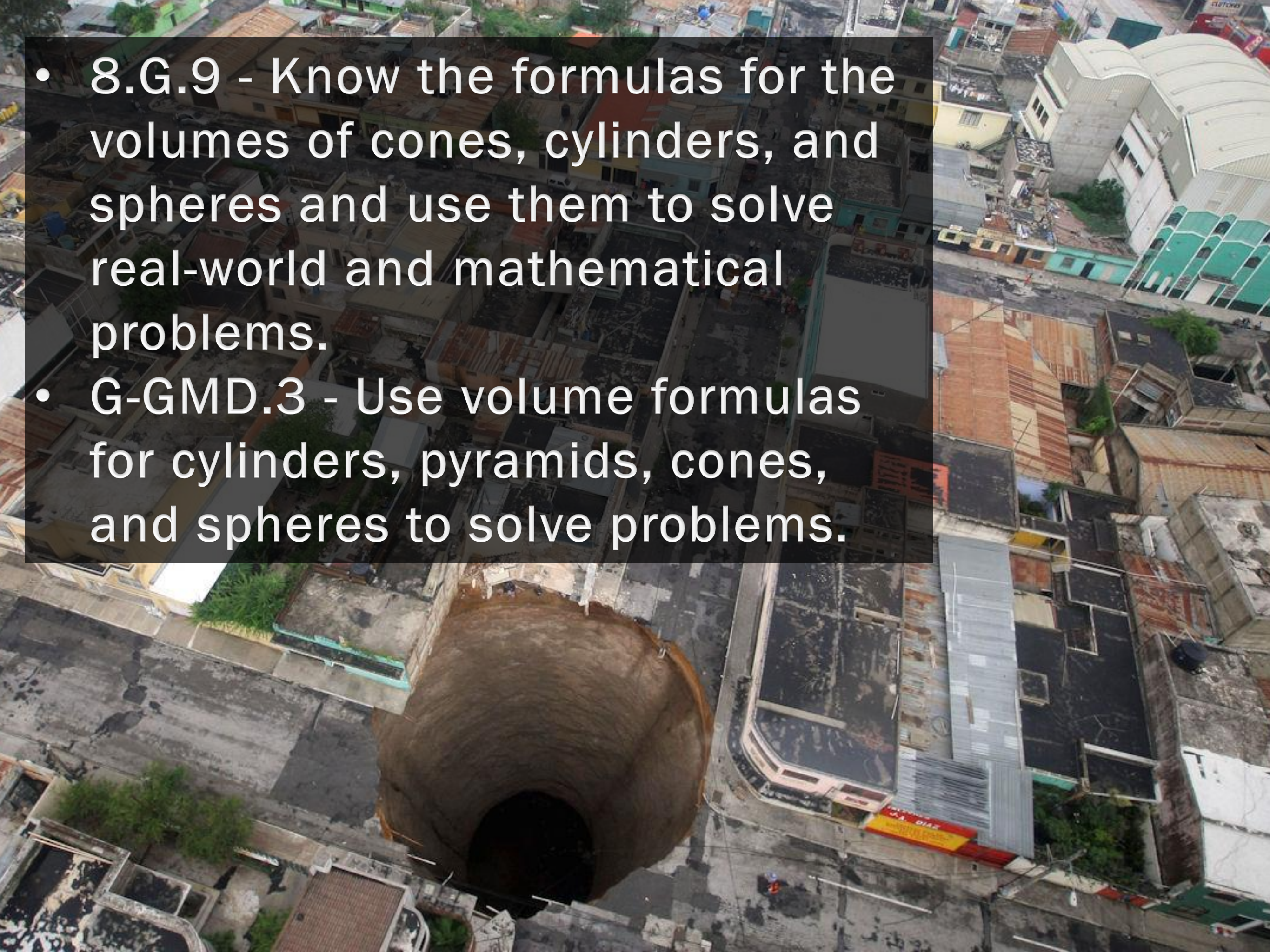


- 6.G.4 - Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures.
- 7.G.6 - Solve real-world and mathematical problems involving area, volume and surface area.



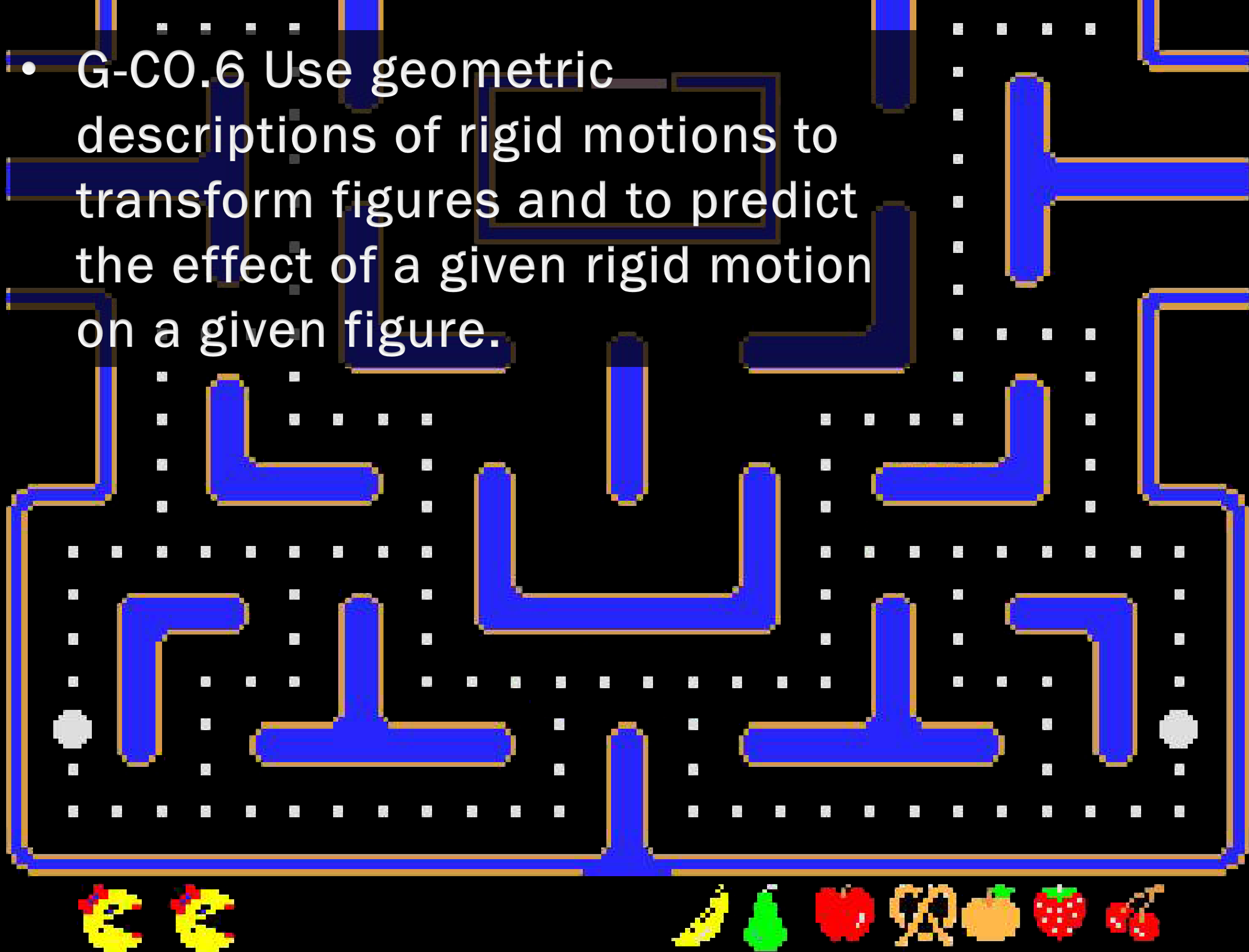


- 8.G.9 - Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
- G-GMD.3 - Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

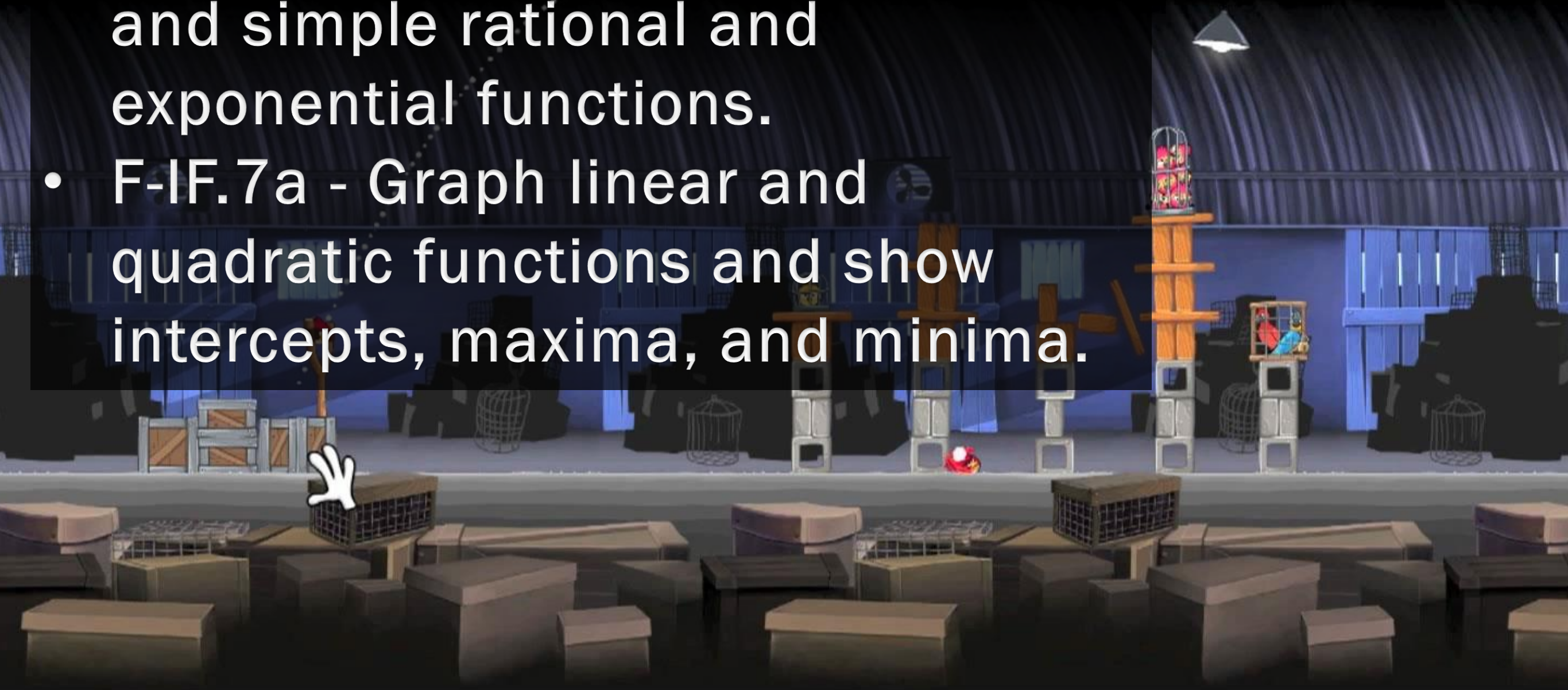




- G-CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure.



- 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

- o Communication
- o Curiosity
- o Critical Thinking



# Problem Solving Framework

- Inspired by Geoff Krall's resources at [emergentmath.com](http://emergentmath.com)

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

What problem are you trying to figure out?

What do you already know from the problem?

What do you need to know to solve the problem?

What is your conclusion?

# The Four C's

- o Communication
- o Curiosity
- o Critical Thinking
- o Content Knowledge



# 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.

# Depth of Knowledge

- What?



# Depth of Knowledge Examples

## Perimeter

- DOK 1 – What is the perimeter of a rectangle with that measures 8 units by 4 units?
- DOK 2 – List the dimensions of a rectangle with a perimeter of 24 units.
- DOK 3 – Of all the rectangles with a perimeter of 24 units, which one has the most area?

## Surface Area

- DOK 1 – What is the surface area of a rectangular prism that measures 8 units by 4 units by 3 units?
- DOK 2 – List the dimensions of a rectangular prism with a surface area of 20 square units.
- DOK 3 – Of all the rectangular prisms with a surface area of 20 square units, which one has the most volume?

# Depth of Knowledge

- What?
- How?
- Why?

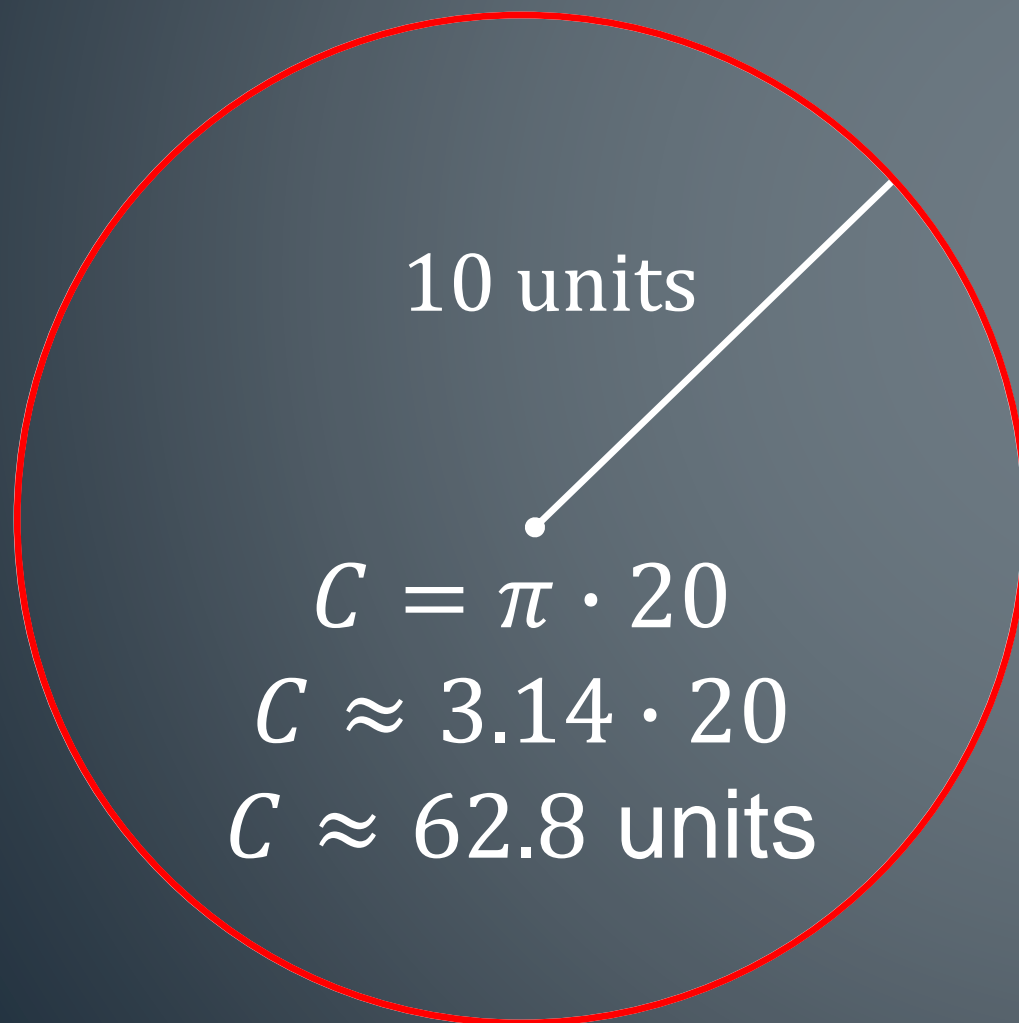


# ***DOK SORT***

- You will be given six questions related to solving two-step equations.
- Work in groups to determine each question's depth of knowledge.
- Be prepared to give a justification for how you reached your conclusion.

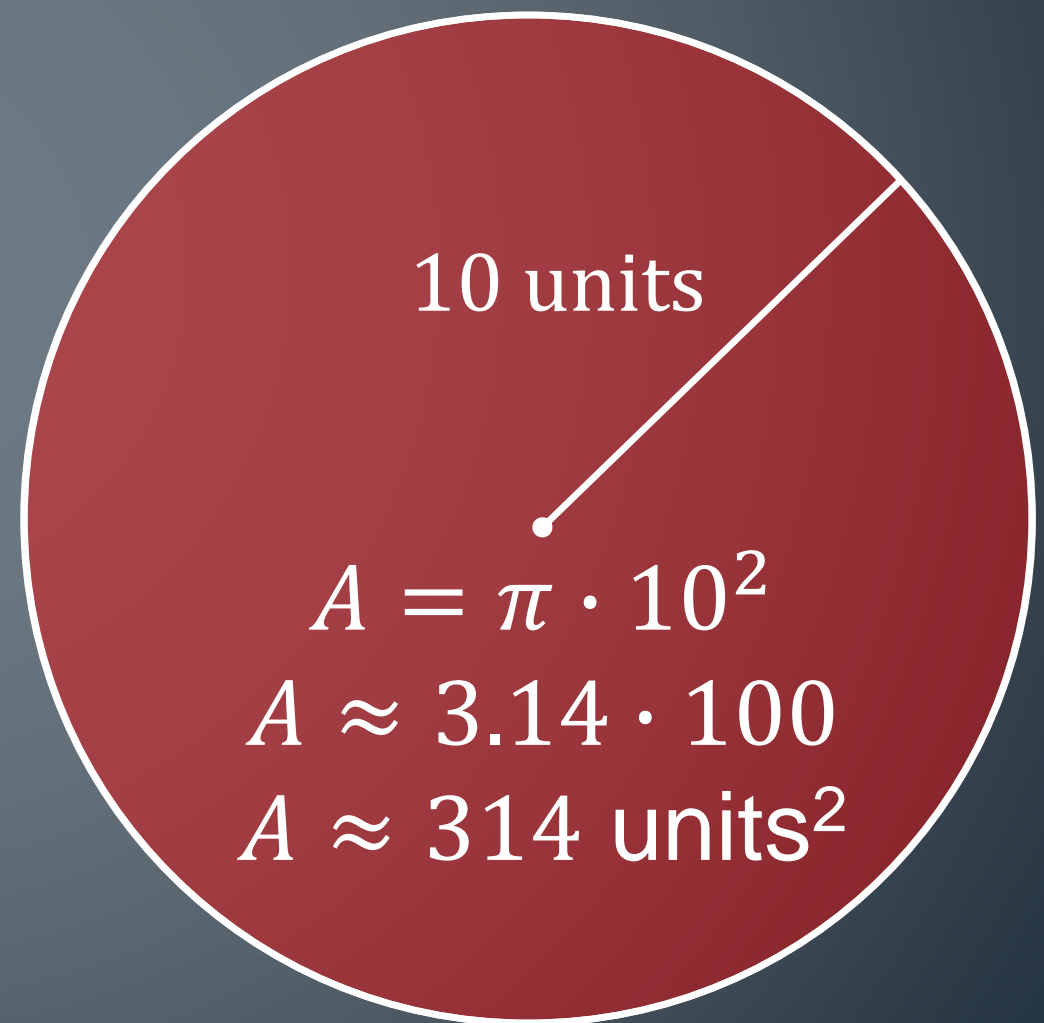
# Depth of Knowledge – Level One

What is the circle's circumference?  $\pi \approx 3.14$



$$C = \pi d \text{ or } C = 2\pi r$$

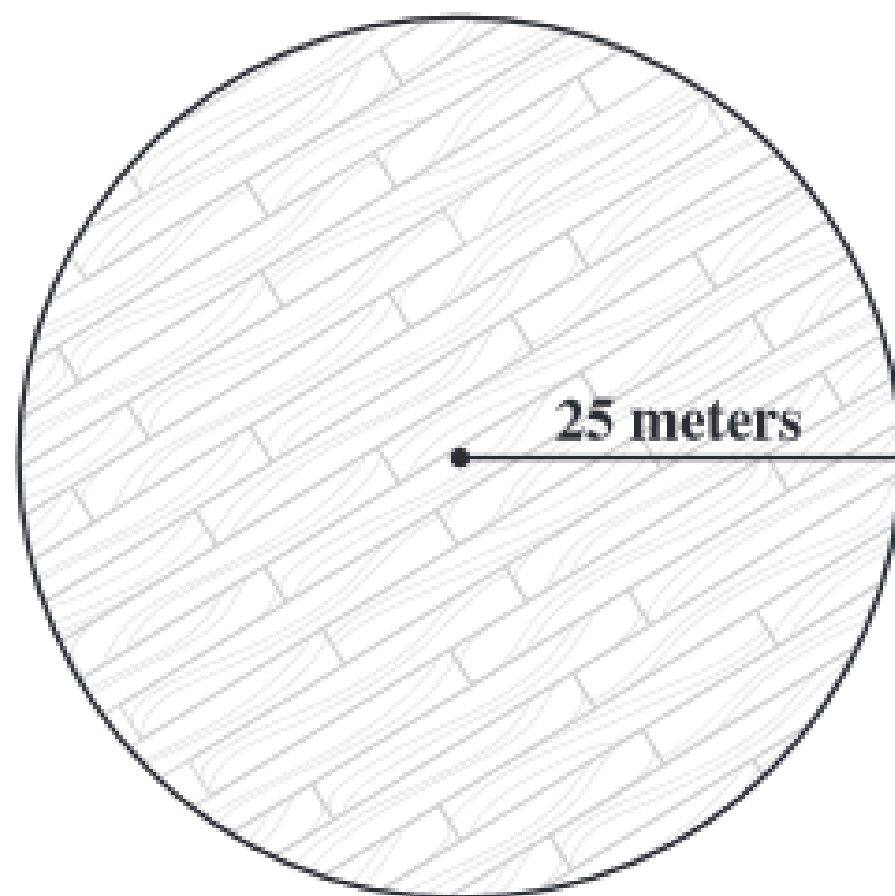
What is the circle's area?  $\pi \approx 3.14$



$$A = \pi r^2$$



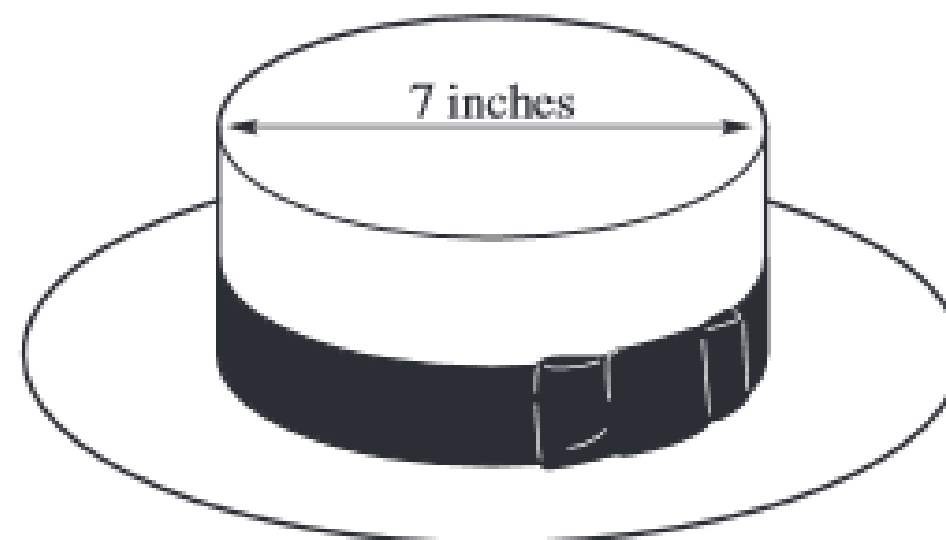
- 70** This circular stage has a radius of 25 meters.



Which equation could be used to find the area of the stage in square meters?

- A  $A = 25\pi$
- B  $A = 50\pi$
- C  $A = \pi \cdot 25^2$
- D  $A = \pi \cdot 50^2$

- 72** The top part of this hat is shaped like a cylinder with a diameter of 7 inches.

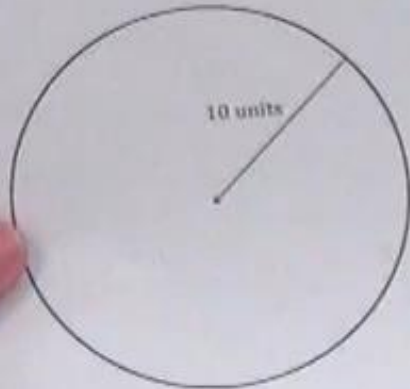


Which measure is *closest* to the length of the band that goes around the outside of the hat?

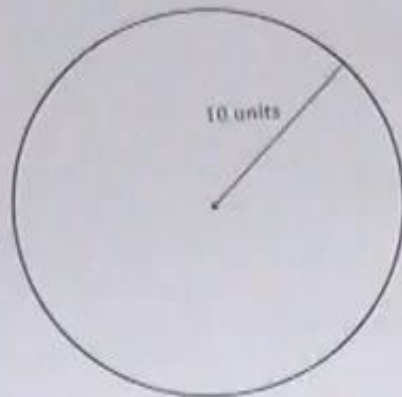
- A 10.1 inches
- B 11.0 inches
- C 22.0 inches
- D 38.5 inches

CSM00268

What is the circle's circumference?  $\pi \approx 3.14$



What is the circle's area?  $\pi \approx 3.14$





# Student Data Facts

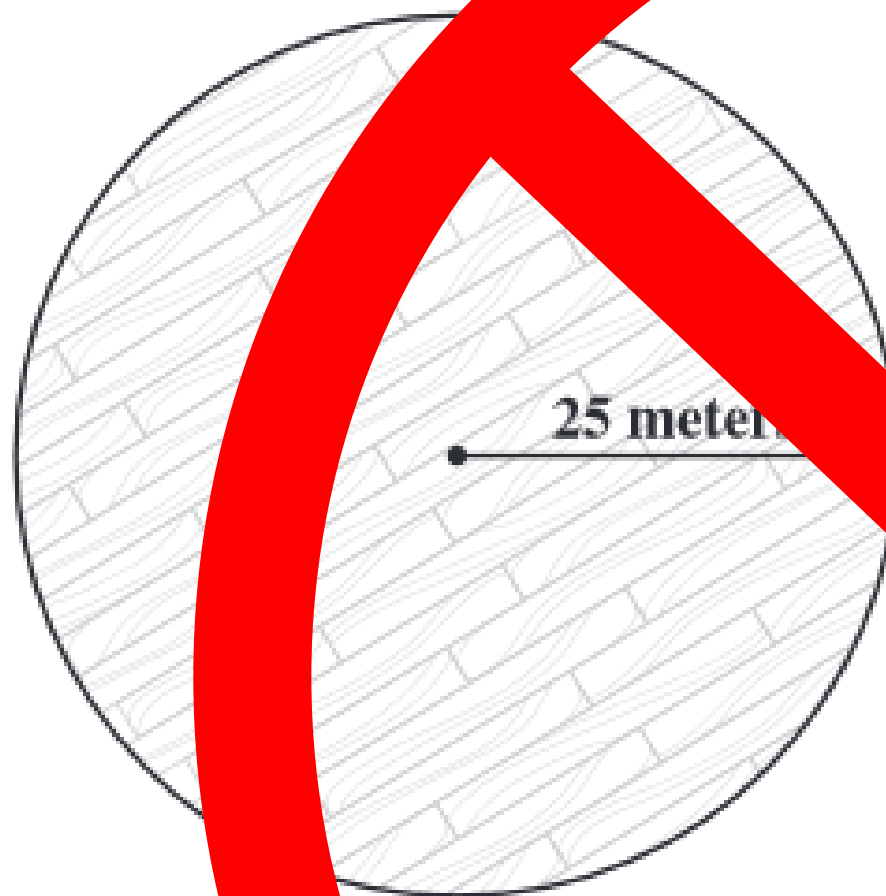
- 396 seventh grade students were assessed
- 68.26% correctly answered the circumference question
- 78.59% correctly answered the area question

# Mathematics Preliminary Summative Assessment Blueprint Target Sampling Mathematics Grade 7—Table 6b

Claim	Content Category	Assessment Targets	DOK	Minimum # Scored Tasks		Minimum # Items per Item Type		Min/Max Number of Items
				CAT	PT/ECR	SR	CR	
		A. Analyze proportional relationships and use them to solve real-world and mathematical problems.	1,2	p(9)=1.0				
Supporting	Supporting Cluster	E. Draw, construct, and describe geometrical figures and describe the relationship between them.						2,3
		F. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.						1,2
		problems involving angle measure, area, surface area, and volume.	1,2					
		G. Use random sampling to draw inferences about a population.	1,2		0	2	1	5/8
		H. Draw informal comparative inferences about two populations.	1,2					
		I. Investigate chance processes and develop, use, and evaluate probability models.	1,2	p(2)=1.0				



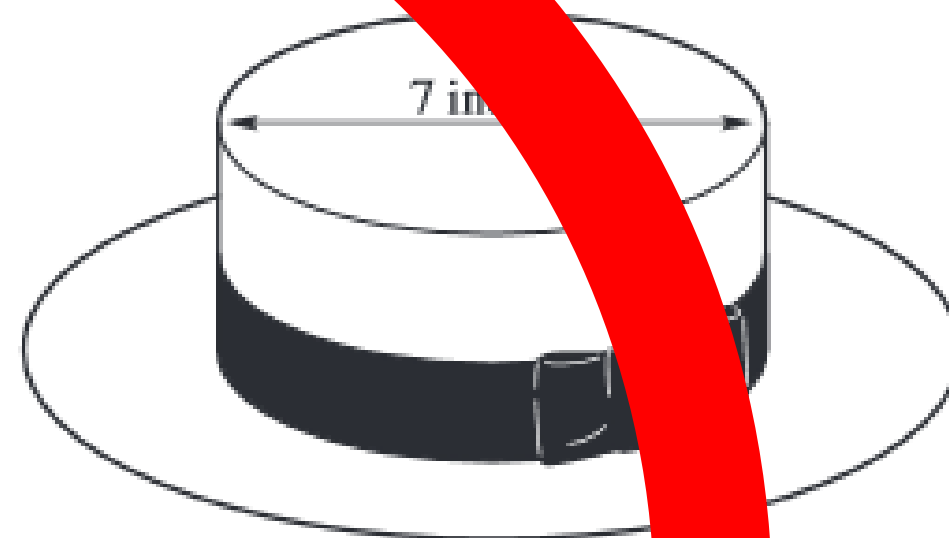
**70** This circular stage has a radius of 25 meters.



Which equation could be used to find the area of the stage in square meters?

- A  $A = 25\pi$
- B  $A = 50\pi$
- C  $A = \pi \cdot 25^2$
- D  $A = \pi \cdot 50^2$

**72** The crown of this hat is shaped like a cylinder with a diameter of 7 inches.



Which measure is *closest* to the length of the band that goes around the circle of the hat?

- A 10.1 inches
- B 22.8 inches
- C 22.8 inches
- D 38.5 inches

# Depth of Knowledge – Level Two

Which circle is bigger? How do you know?

Circle A

$$\text{Area} = 36 \text{ units}^2$$

$$C = \pi \cdot 2 \cdot r$$

$$36 \approx 6.28 \cdot r$$

$$\frac{36}{6.28} \approx r$$

$$5.73 \text{ units} \approx r$$

Circle B

$$\text{Circumference} = 36 \text{ units}$$

$$A = \pi \cdot r^2$$

$$A \approx 3.14 \cdot 5.73^2$$

$$A \approx 3.14 \cdot 32.83$$

$$A \approx 103.15 \text{ units}^2$$



# SBAC Constructed Response Rubric

- For full credit (2 points):
  - Student reaches the correct conclusion.

AND

  - Student provides sufficient reasoning to support this conclusion.
- For partial credit (1 point):
  - Student reaches the correct conclusion but does not provide sufficient reasoning to support this conclusion.

OR

  - Student does not reach the correct conclusion but provides reasoning to support this conclusion that contains a minor conceptual or computation error.

Which circle is bigger? How do you know?

Circle A  
Area = 36 units<sup>2</sup>

Circle B  
Circumference = 36 units





# Video Facts

- Of the ten students interviewed:
  - Ten correctly answered both of the DOK 1 questions.
  - One earned two points on the DOK 2 question.
  - Six earned one point on the DOK 2 question.
  - Three earned zero points on the DOK 2 question.

# Student Data Facts

- Of the 396 seventh grade students who were assessed, 12.12% earned two points on the DOK 2 question.
- 97.92% of the students who correctly answered the DOK 2 question also correctly answered both of the two DOK 1 questions.
- 10.61% of the students who correctly answered both of the two DOK 1 questions also correctly answered the DOK 2 question.

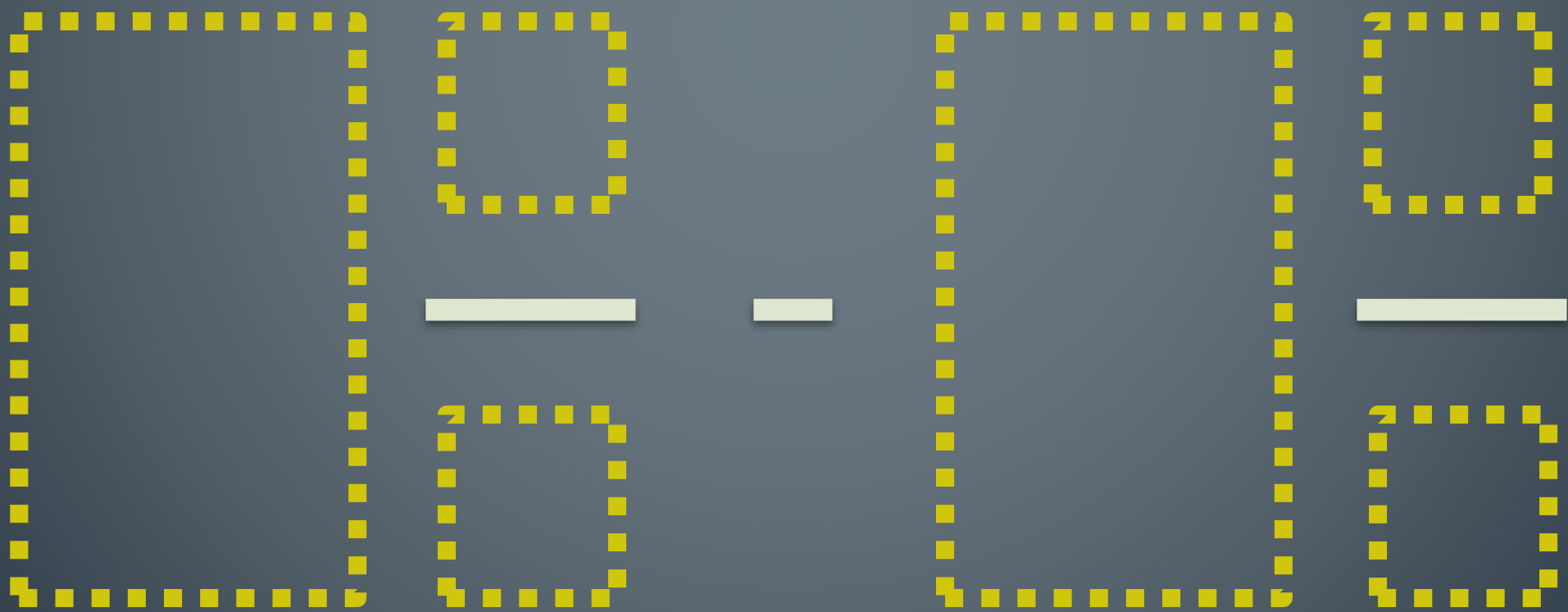


# More Student Data Facts

- 28.28% of the students earned only one point.
- All of them earned one point by choosing Circle B and providing insufficient reasoning.
- 59.59% of the students earned no points.

# Assessing Deeper Understanding

Make the smallest difference using the numbers 1 through 9 no more than one time each.





# Implementing Higher DOK Problems

- Attempt #1: DOK 3 Subtracting Mixed Numbers
  - Lesson learned

## ORDER OF OPERATIONS

## RECTANGLES: MAXIMIZING AREA

Directions: What is the greatest area you can make on a rectangle with a perimeter of 24 units?

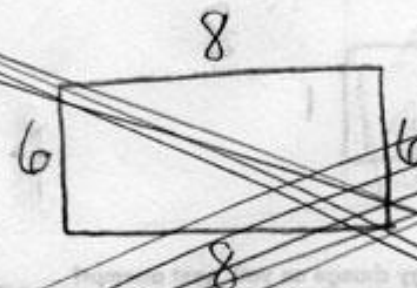
$... \div ... ( ... + ... ) \dots \cdot ... - ...$

- Attempt #3: DOK 3 Area and Perimeter
  - Lessons learned:
    - Most of the 8<sup>th</sup> graders struggled even with this problem.
    - Would have been wiser to start with a DOK 1, then a DOK 2, and then this DOK 3 problem.

# STUDENT WORK

First attempt:

Points: \_\_\_\_/2 attempt \_\_\_\_/2 explanation



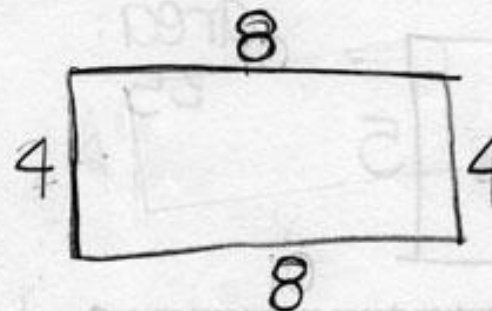
area:  
48

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



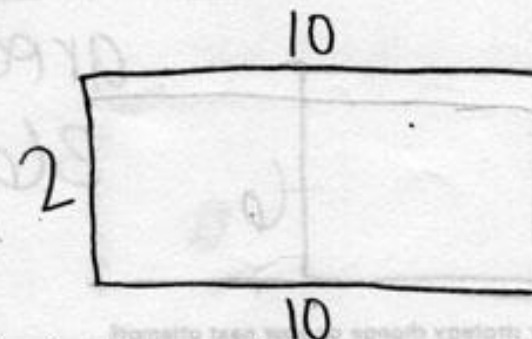
area:  
32

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 # strategy:

Third attempt:

Points: \_\_\_\_/2 attempt \_\_\_\_/2 explanation



area:  
20

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

I learned that the perimeter is 24 but there's a bigger area strategy:





# Open Middle Problems

- Open middle problems require a higher depth of knowledge than most problems that assess procedural and conceptual understanding.
- They often have a “closed beginning” meaning that they all start with the same initial problem
- They often have a “closed end” meaning that they all end with the same answer
- They have an “open middle” meaning that there are multiple ways to approach and ultimately solve the problem

[www.openmiddle.com](http://www.openmiddle.com)



# 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>

- Geoff Krall: <http://tinyurl.com/PrBLmaps>

- Dan Meyer's TED talk: <http://tinyurl.com/meyer-TED>





How Many Sheets Do You Need To Break Out Of Prison?

Operations with rational numbers



## 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 an instructor for UCLA, he also taught math

## Lessons







How Much Is One Third Of A Cup Of Butter?



How Do Skytypers Write Messages?





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





Google Search

I'm Feeling Lucky

## 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):

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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Problem-Based Lessons

**101qs.com**

**Andrew Stadel**

**Dan Meyer**

**Mathalicious**

**Problem Based Curriculum Maps**

## ***JOURNAL***

- *Write a journal entry to reflect on what we have accomplished today.*



# Contact

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[@robertkaplinsky](https://twitter.com/robertkaplinsky)





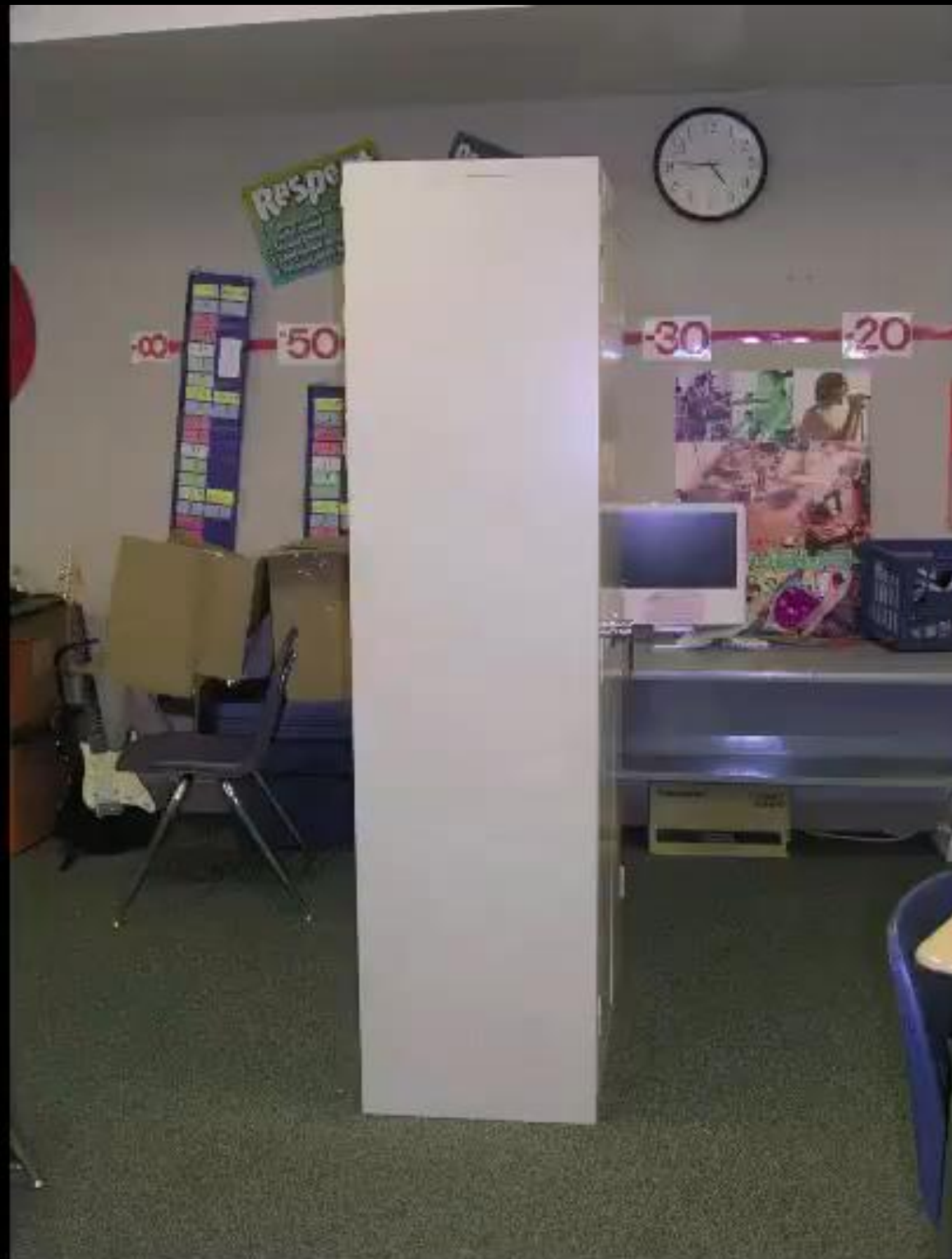
DAY 2





# San Marcos USD

JUNE 16-18, 2014



Source: Andrew Stadel via [www.estimated180.com](http://www.estimated180.com)





**Height:  
72 inches**

Source: Andrew Stadel via [www.estimated180.com](http://www.estimated180.com)





**Height:  
72 inches**



**Width:  
36 inches**







**Height:  
72 inches**



**Width:  
36 inches**

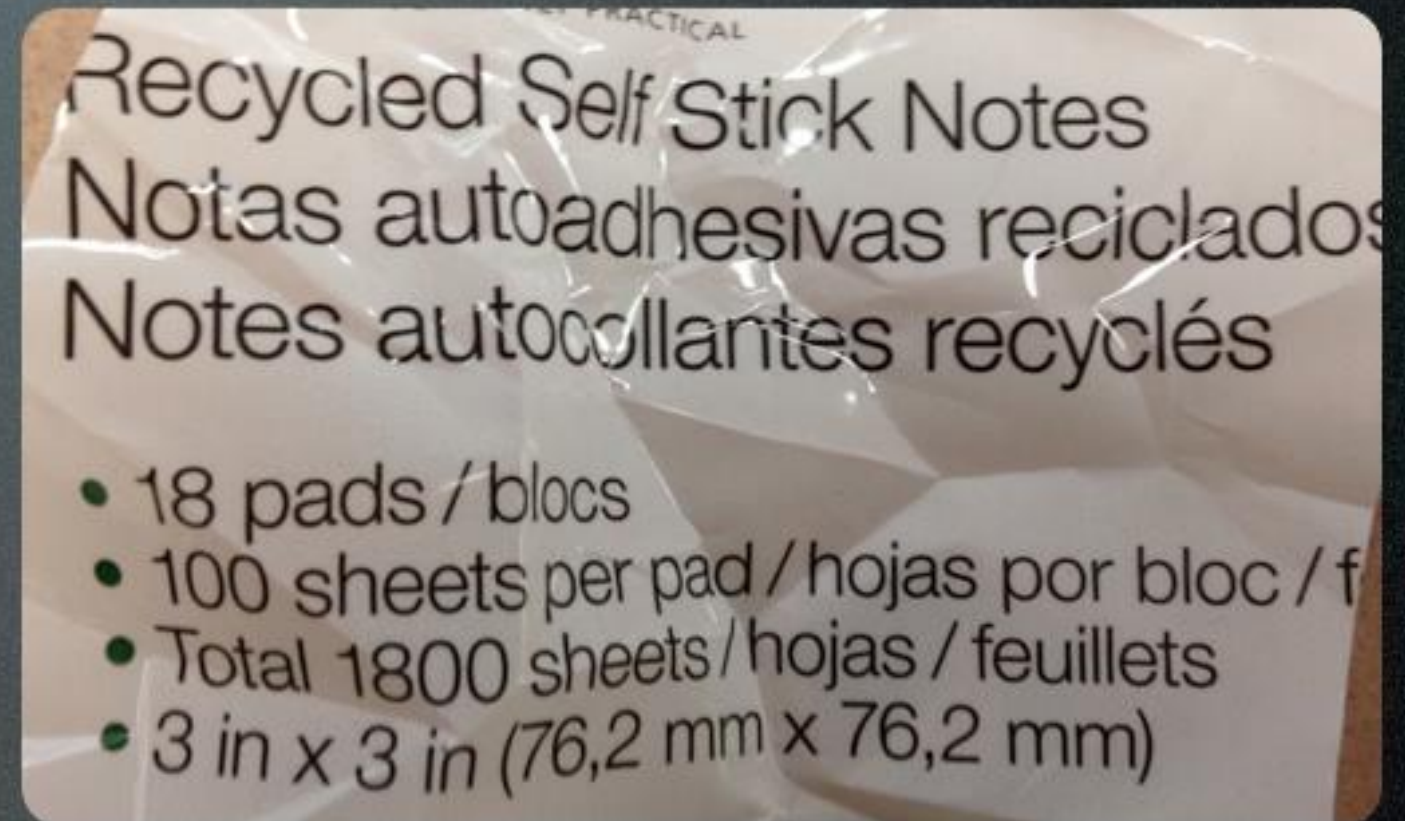


**Depth:  
18 inches**





**Sticky note**



**Dimensions:  
3" x 3"**





Source: Andrew Stadel via [www.estimated180.com](http://www.estimated180.com)

# 6<sup>TH</sup> GRADE 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:  $V = \underline{\hspace{1cm}} \text{ in}^3$

←

→

↶

↷

✖

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

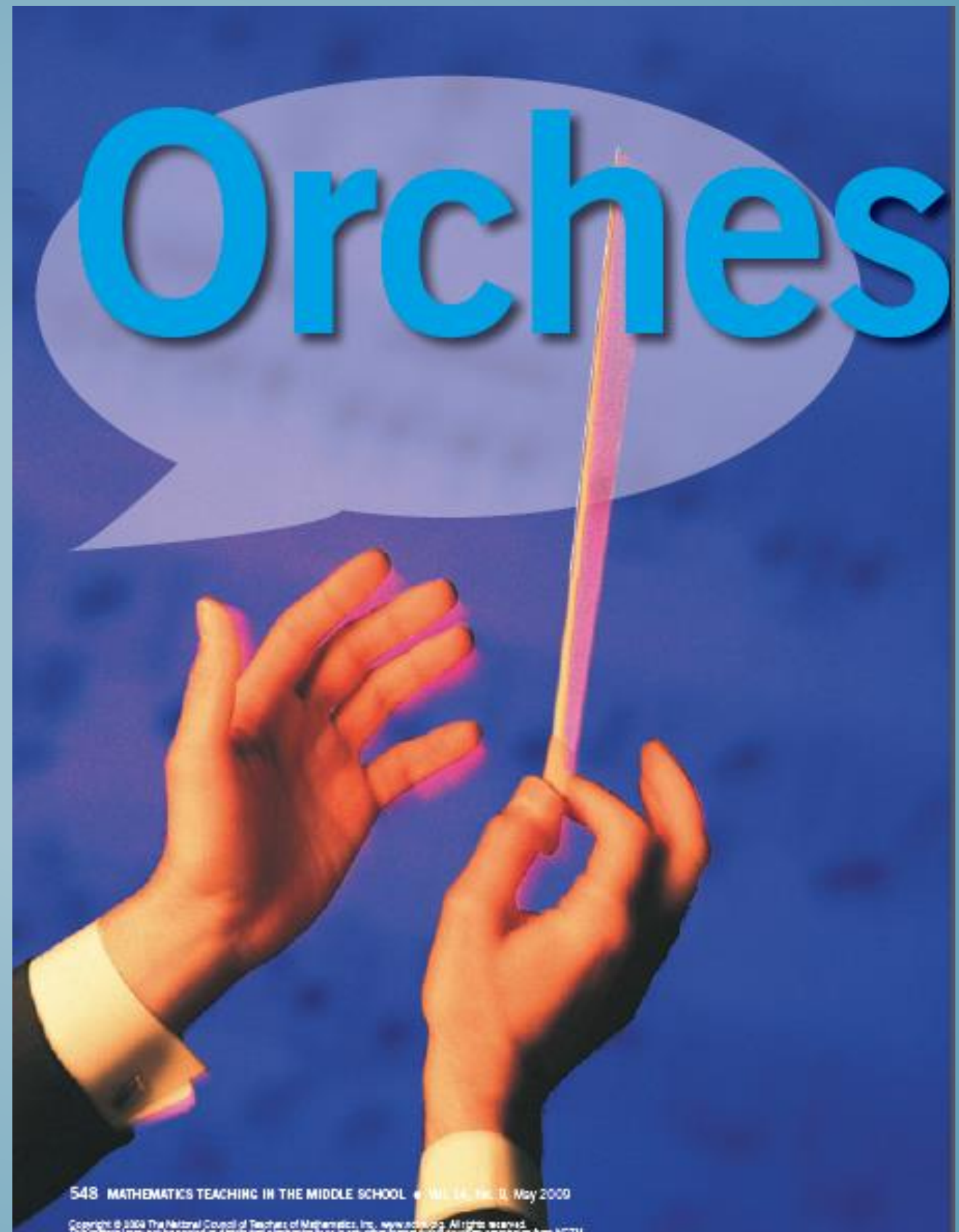
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Delete

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# ***FIVE PRACTICES***



# Implementing the Five Practices

1. Anticipate potential student responses to the file cabinet problem.
2. Review the ten student work samples that represent students in your classroom.
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.







# 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

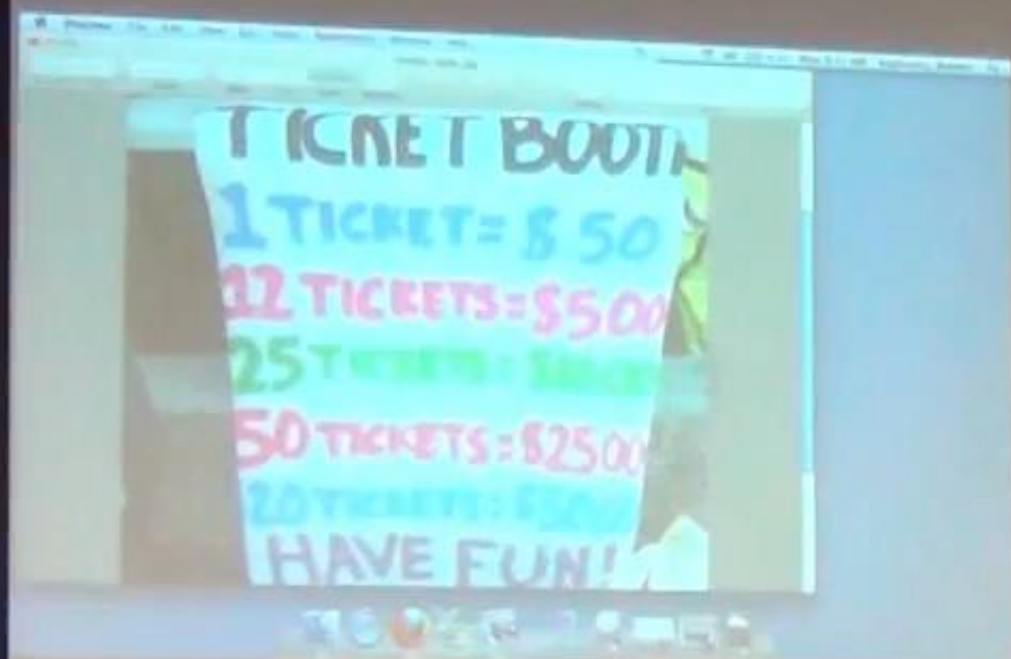
50 TICKETS = \$25.00

120 TICKETS = \$50.00

HAVE FUN!







PLACE VALUE SYSTEM											
Billions			Millions			Thousands			Units		
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>

3/11/14 Agenda

7<sup>th</sup> Grade

8<sup>th</sup> Grade

Video Lesson

Video Lesson

Homework

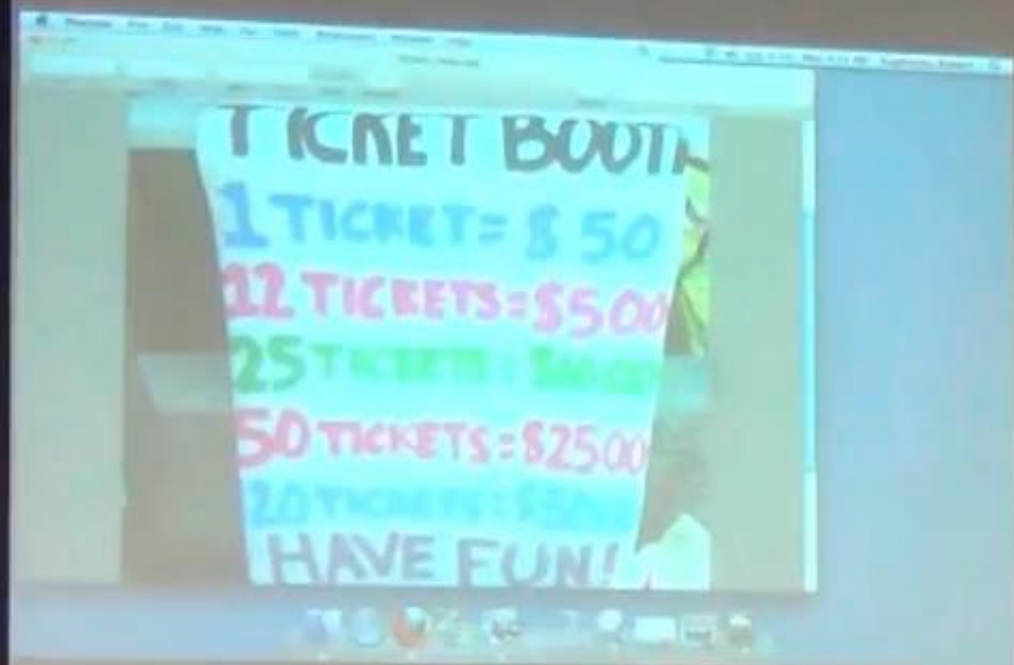
Homework

Mr. Kaplinsky

40 objectives due







PLACE VALUE SYSTEM									
ns	Billions			Millions			Thousands		
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>
10 <sup>9</sup>	10 <sup>8</sup>	10 <sup>7</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>4</sup>	10 <sup>3</sup>	10 <sup>2</sup>	10 <sup>1</sup>	10 <sup>0</sup>

3/17/14 agenda

7<sup>th</sup> Grade

Video Lesson

Homework

8<sup>th</sup> Grade

Video Lesson

Homework

Mr. Kaplinsky

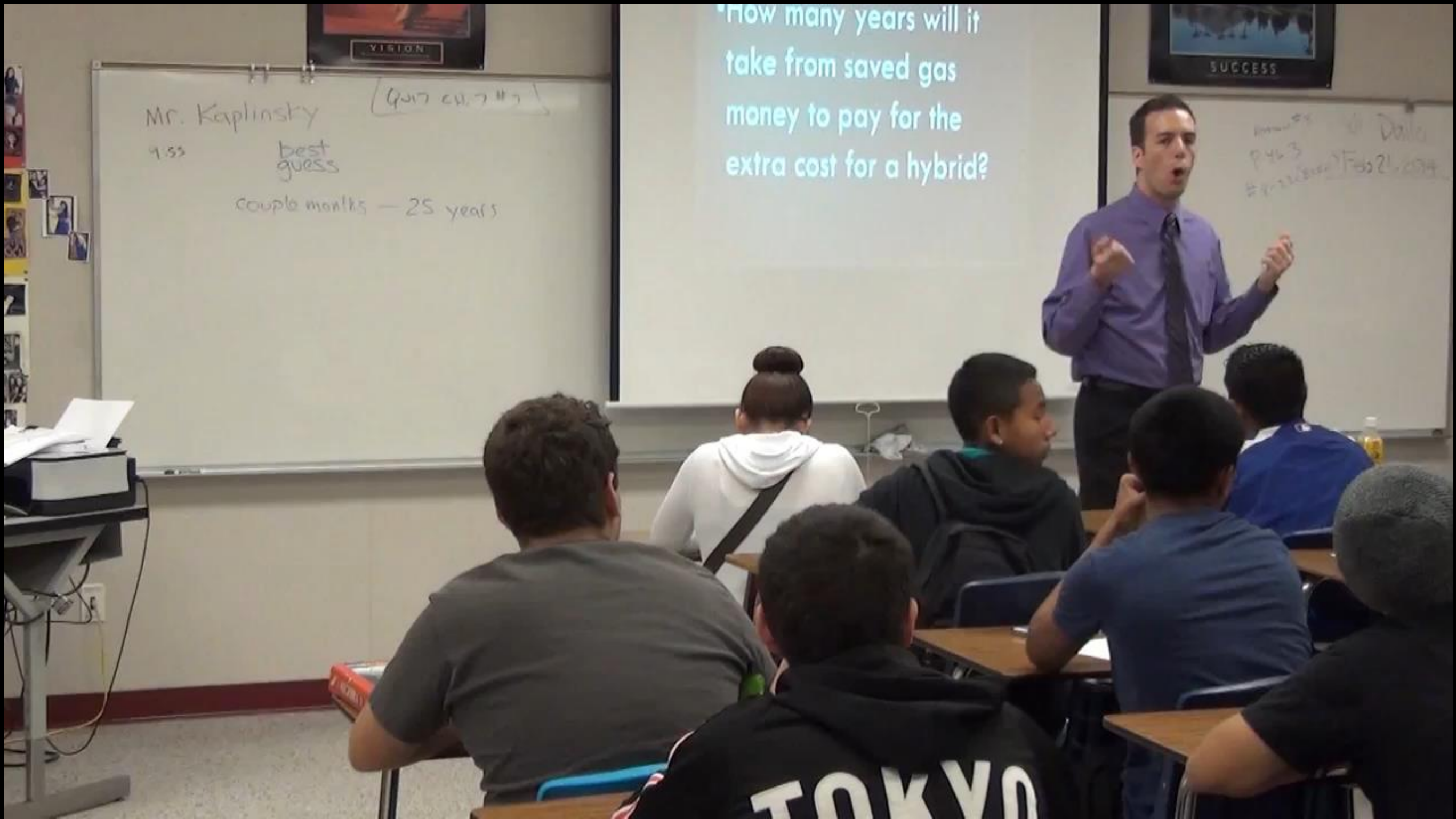
- # of tickets for a ride
- How many rides there are
- How much money you need
- # of people in group
- How long you will stay

40 objectives due by 4/30



Does a  
hybrid car  
pay for  
itself?





Age	Male	Female	Total
16-19	8,206	6,873	7,620
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	7,640
Average	16,550	10,142	13,478



Mr. Kaplinsky

9.55

best  
guess

couple months — 25 years

Quiz ch. 7 #3

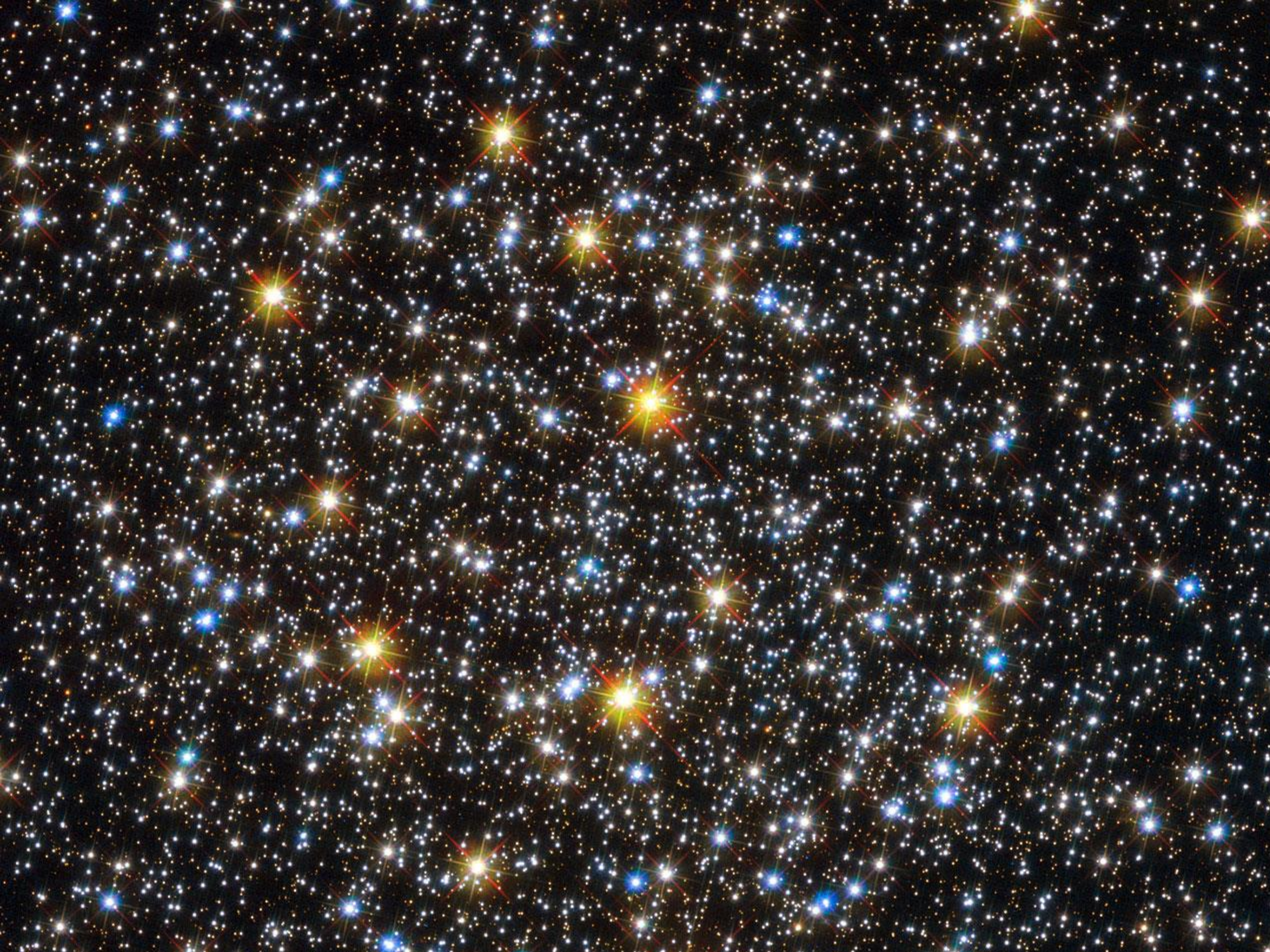
Age	Male	Female	Total
16-19	8,206	6,873	15,079
20-34	17,976	13,004	30,980
35-54	18,850	11,454	30,304
55-64	15,859	7,780	23,639
65+	10,304	4,785	15,089
Average	16,550	10,142	26,692

SUCCESS

From 09 to Dallas  
8423  
04-22-2009 Feb 26, 2009

Cost of hybrid car  
" " regular car  
gas prices  
miles per gallon  
miles per gallon  
miles per gallon  
miles per gallon  
miles per gallon

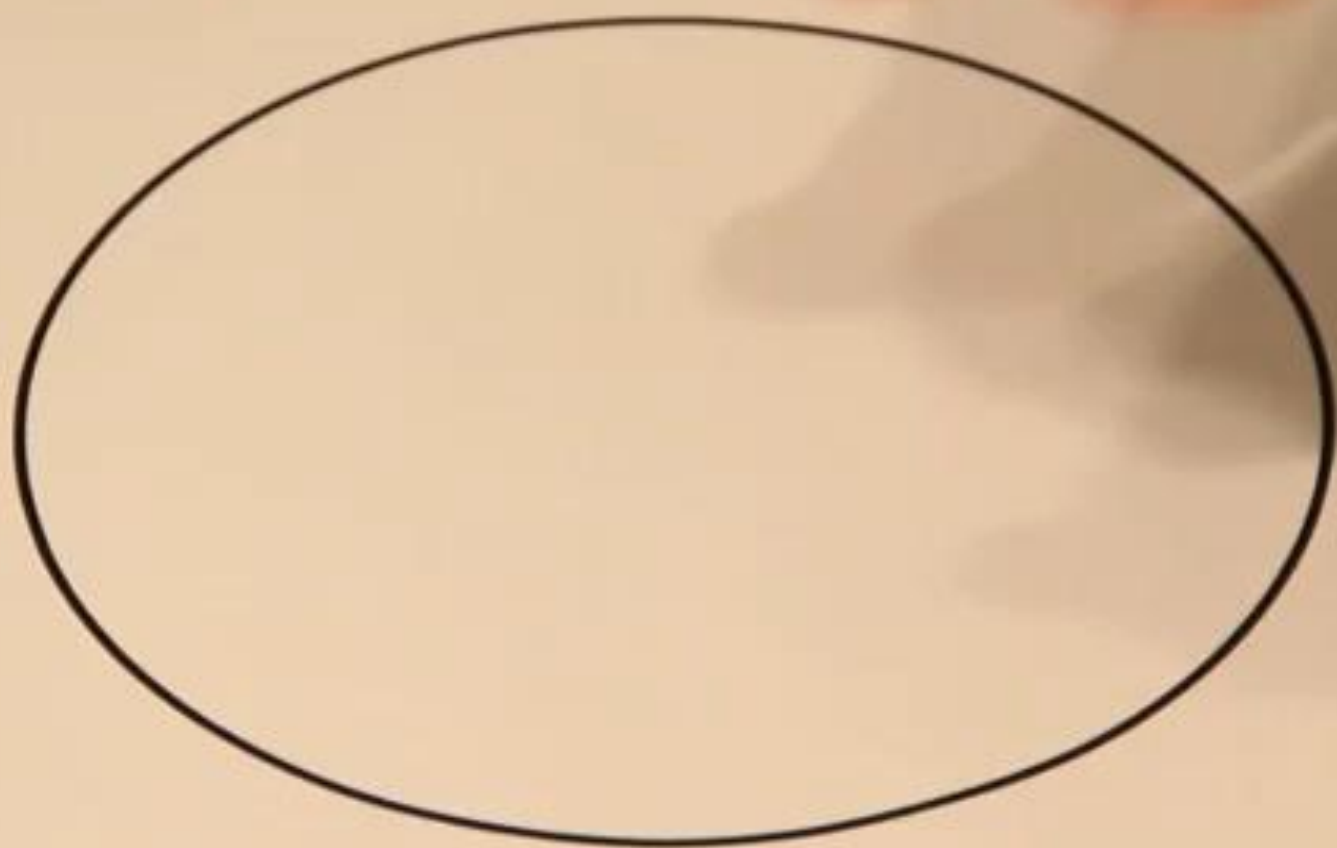






# Setting Up The Problem

- 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?



# TICKET BOOTH

1 TICKET = \$.50

12 TICKETS = \$5.00

25 TICKETS = \$10.00

50 TICKETS = \$25.00

120 TICKETS = \$50.00

HAVE FUN!







*American Standard*

### 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



**Elongated**  
Alargada  
18.5 in  
46.99 cm



**Chair Height**  
Altura de silla  
16.5 in  
41.91 cm



Recorder # P117364

Item | Artículo: 84065  
Model | Modelo: 3381.216.020

- 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



*American Standard*

### 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

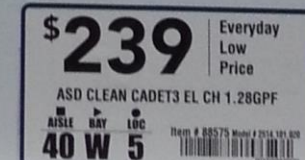
Dimensiones generales: 40,01 cm de ancho x 78,11 cm de alto x 76,84 cm de profundidad  
Dimensiones aproximadas: 30,48 cm  
Tamaño de canal de sifón: 5,24 cm



**Elongated**  
Alargada  
18.5 in  
46.99 cm



**Chair Height**  
Altura de silla  
16.5 in  
41.91 cm



Recorder # P117363

Item | Artículo: 88575  
Model | Modelo: 2514.101.020

- 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







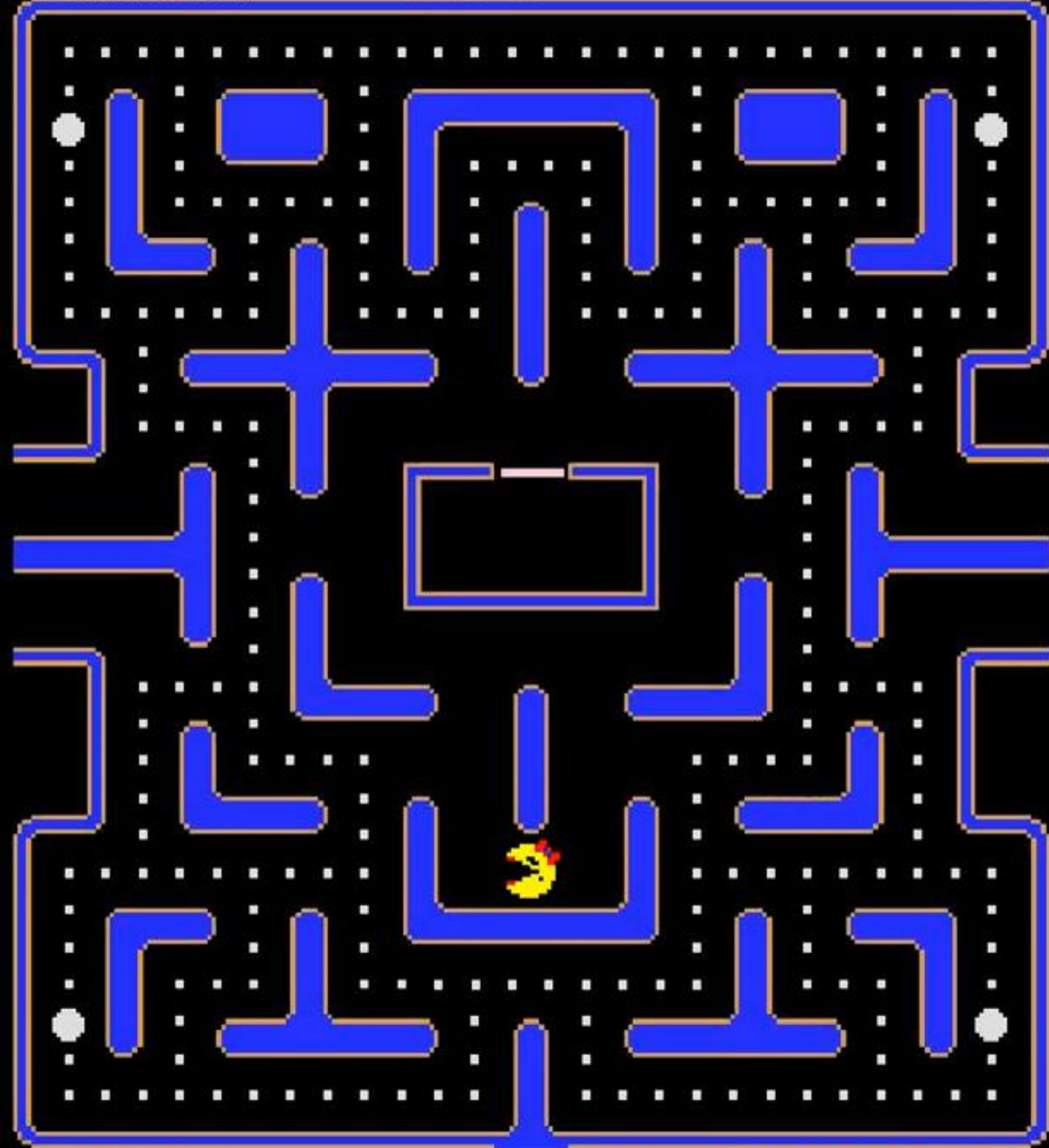
# Problem Solving Process

- 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

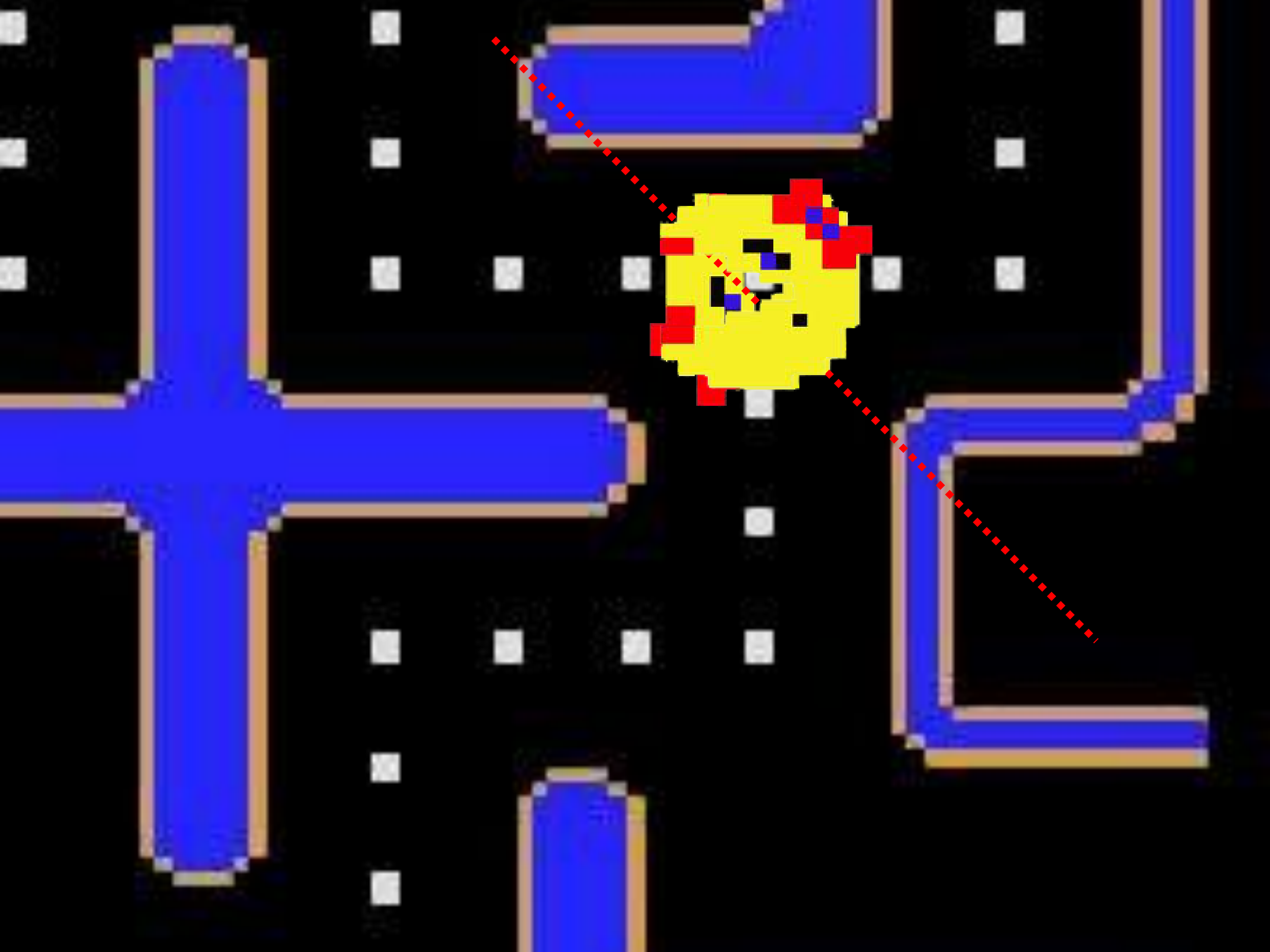
















# Problem Solving Process

- 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?

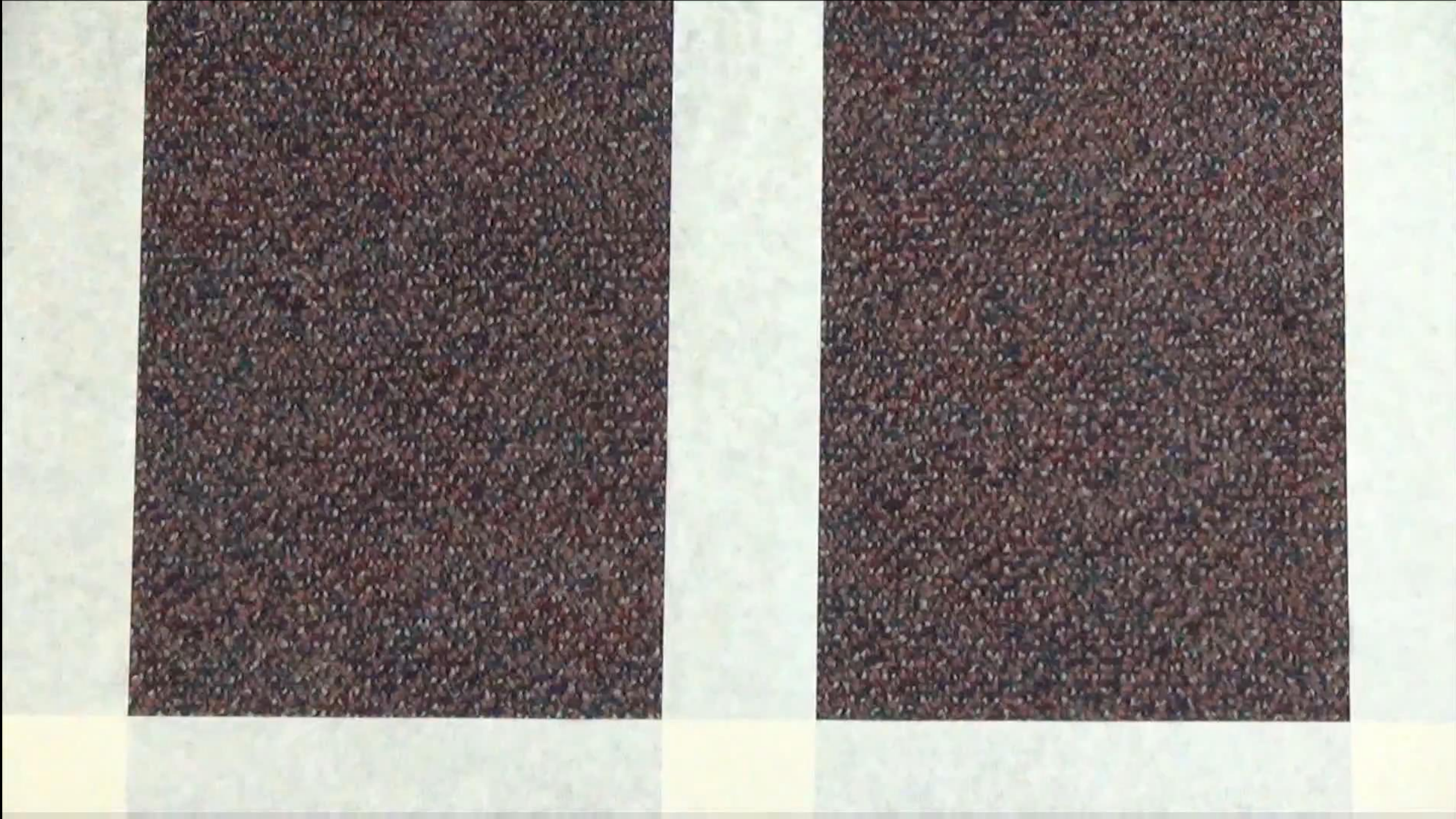


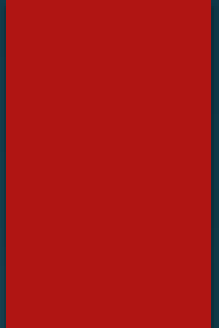


**NON-STAGGERED**

**STAGGERED**







How much  
shorter are 20  
layers of  
staggered  
pipe stacks?

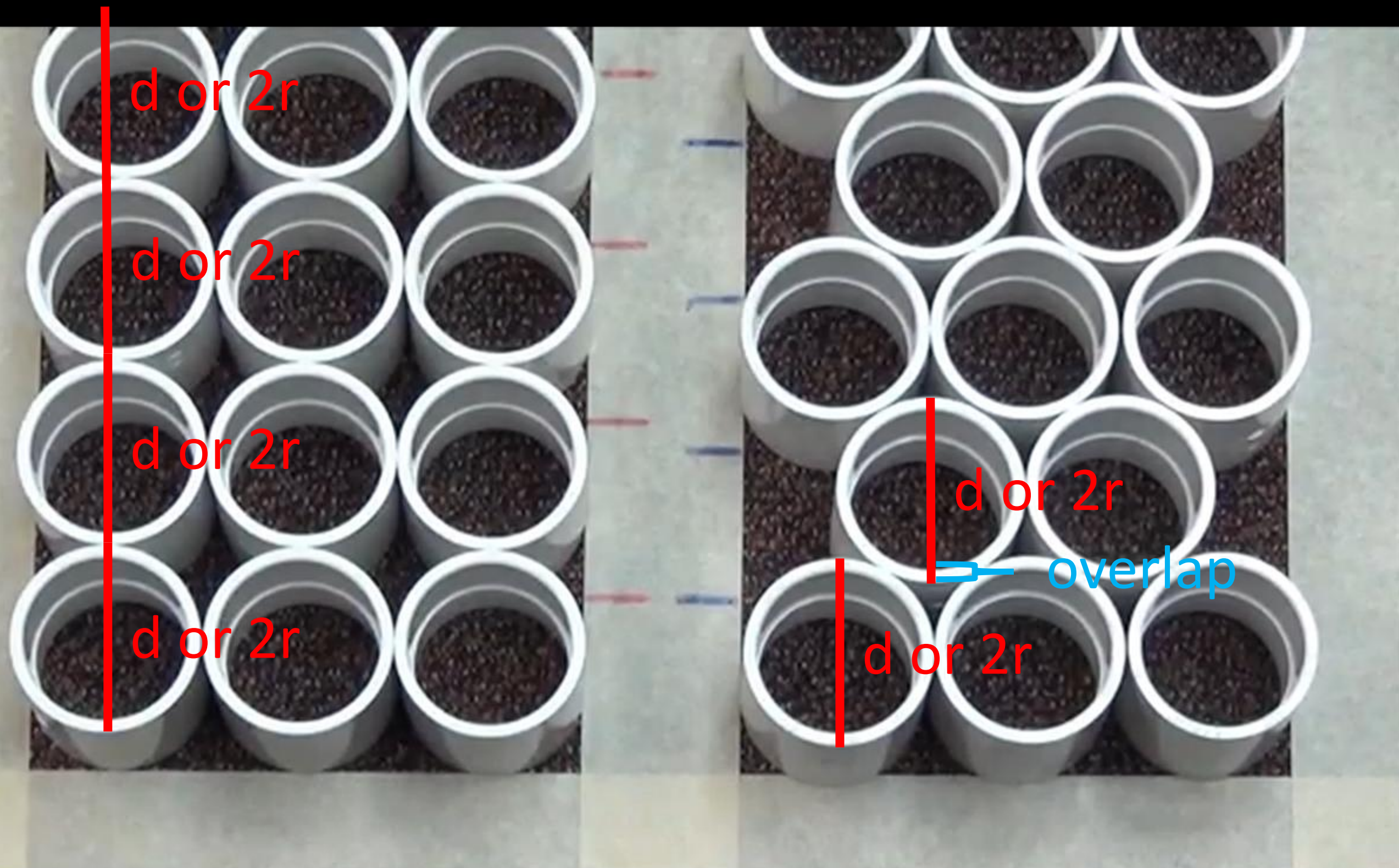


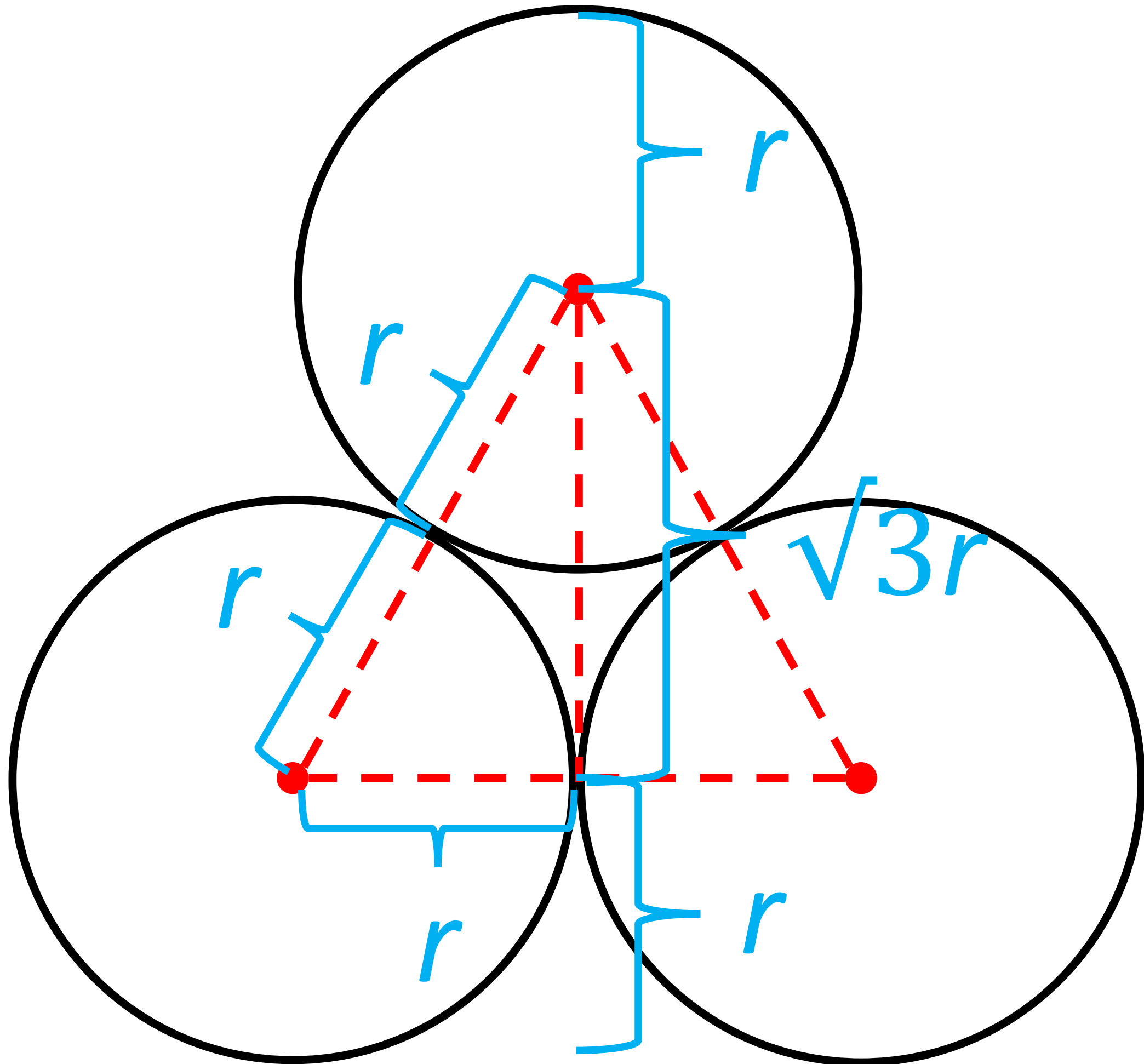
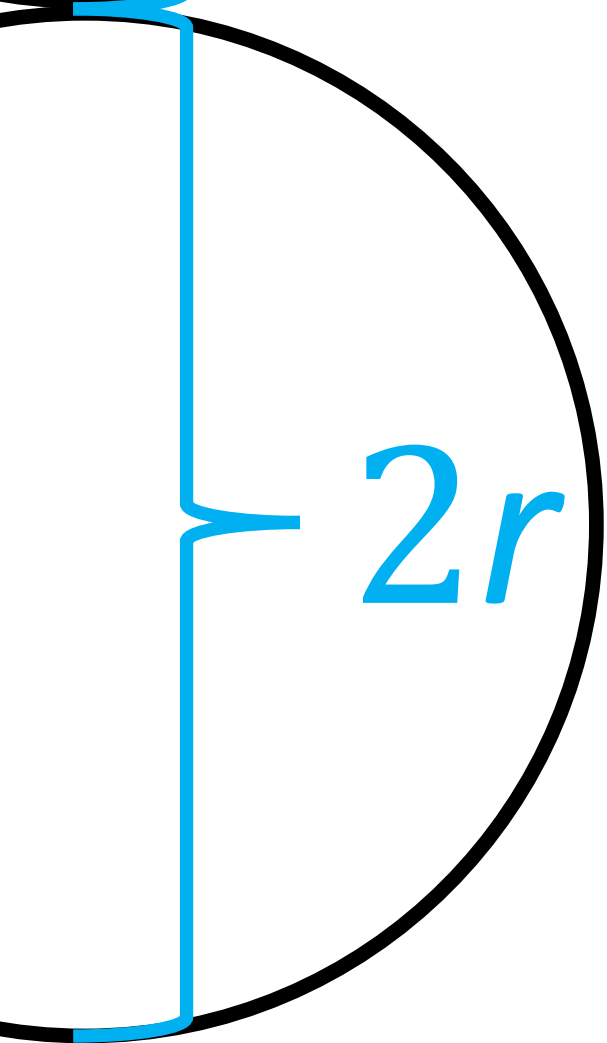
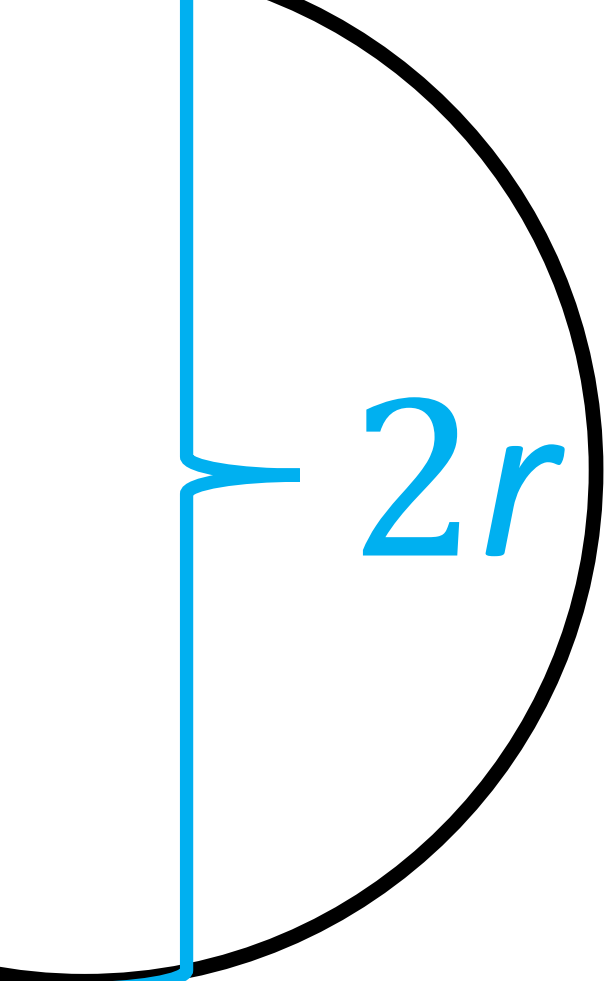












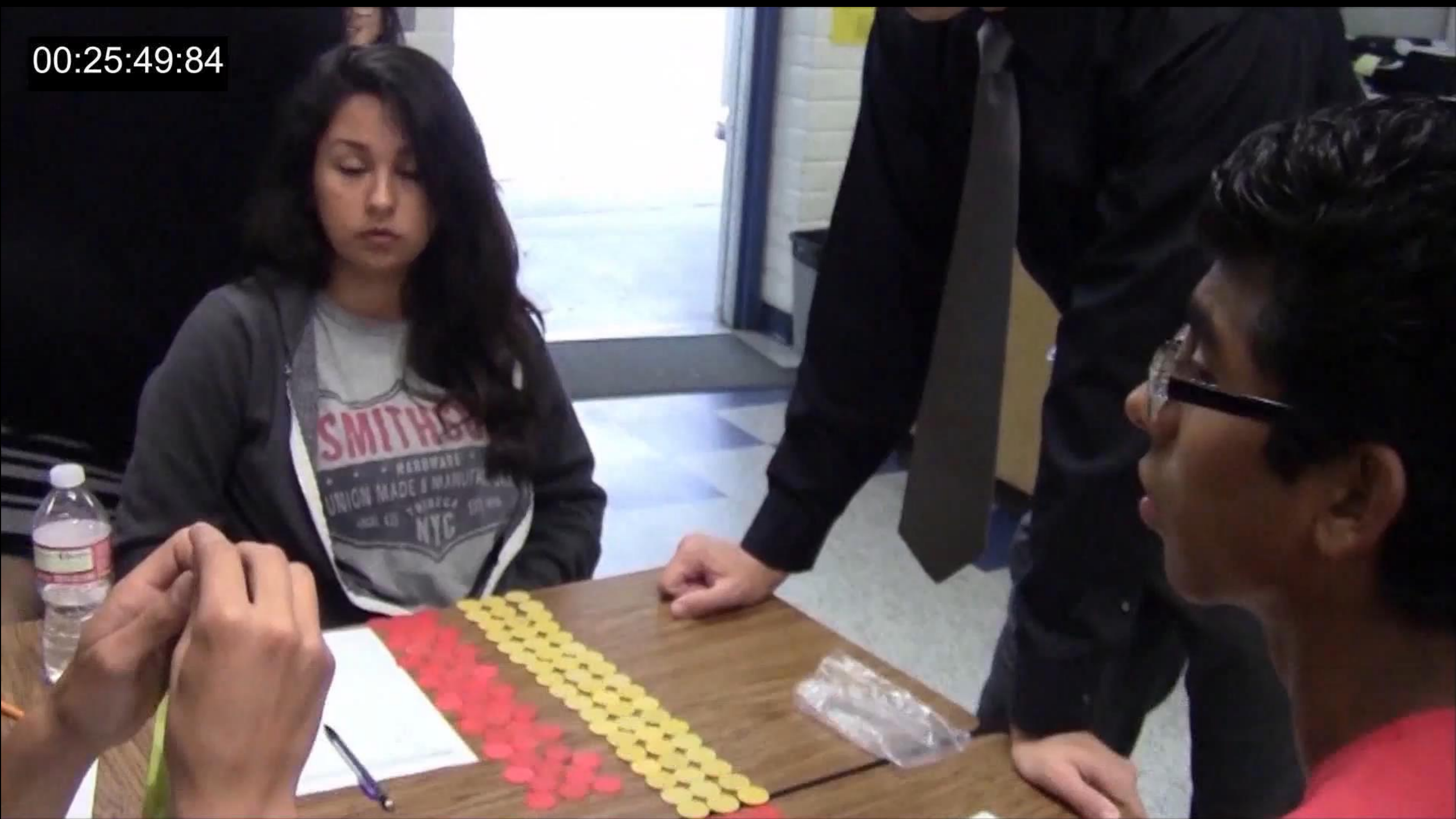


00:00:00:00





00:25:49:84





# 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?

00:32:29:68





# 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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**Take 20% off  
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Also excludes Dyson vacuums and Miele

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(1-800-462-3966)

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BEYOND®**

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BEYOND

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G47QR-V2

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any purchase  
of \$15 or more.

Present this coupon.



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Valid for in-store use only. Copies not accepted. Limit one coupon, Savings Certificate, special offer or discount (including price match) per item. Coupon must be surrendered at time of purchase; any return of purchase will reduce your savings proportionally. The price of gift cards, shipping, or sales tax are not counted toward any minimum purchase required, and coupon cannot be applied to such items. Offer excludes the following: Alessi, Arthur Court, Breville®, Britto™ Collection, Brookstone®, DKNY, kate spade, Kenneth Cole Reaction Home, Kosta Boda, Le Creuset®, Lladró®, Monique Lhuillier, Nambe®, Nautica®, Orrefors, Riedel, Shun, Swarovski, T-Tech, Vera Wang®, Victorinox Luggage, Vitamix®, Waterford®, Wusthof®, or Zwilling; Baby Brezza®, Baby Jogger™, BÉABA®, BOB, Bugaboo, Bumbleride™, Destination Maternity®, ERGObaby®, Foundations®, Maxi-Cosi®, Mountain Buggy, Oeuf, Orbit Baby™, Peg Pérego®, Petunia Pickle Bottom®, Phil & Teds®, Quinny®, Svan®, Teutonia®, Under Armour®, UPPAbaby®, baby furniture, diapers, wipes, formula, baby food or portrait studio services.

Ver. 1



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

IA conclusion each conclusion Each Item is good  
for different Items



Orange Chicken	5.25	 Eggplant with Garlic Sauce	5.25
Chicken Lo Mein	5.25	 Ma Po Tofu	5.25
Cashew Nut Chicken	5.25	 Broccoli with Garlic Sauce	5.25
 Pungent Chicken	5.25	 String Bean with Garlic Sauce	5.25
Sweet & Sour Chicken	5.25	Vegetable Delight	5.25
Curry Chicken	5.25	Bamboo Fungus Tofu	5.25
Lemon Chicken	5.25	Shrimp with Asparagus	6.25
Vegetable Chicken	5.25	Shrimp with Lobster Sauce	6.25
Mongolian Beef	5.25	 Fish Fillet with Szuchuan Sauce	6.25
Broccoli Beef	5.25	 Fish Fillet with Black Bean Sauce	6.25
 Pungent Beef	5.25	Crab meat with Asparagus	6.25
Sweet & Sour Pork	5.25	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

Not redeemable on lunch &  
special dinners & party items or  
with any other coupon  
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

**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 ~~to~~ chicken lomein  
if spend \$25 and not redeemable  
on lunch, special dinners and  
Party Items

and chicken 10 main.

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

The 10% carbon is Best with high  
Prices and small orders is best  
with the free chicken lomein or chesse warden

in store purchase, exclusions

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

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

$$15 - 5 = 10 \text{ and } 15 - 20\% = 12$$

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

$$47 - 5 = 42 \quad 47 - 20\% = 37.60$$

$\$5 \text{ off}$        $20\% \text{ off}$   
 $42 \text{ vs } 37.60$

$$\begin{array}{ll} \$5 \text{ off} & 20\% \text{ off} \\ 18 \text{ vs } & 18.40 \end{array}$$

$$23 - 5 = 18$$

$$23 - 20\% = 18.40$$

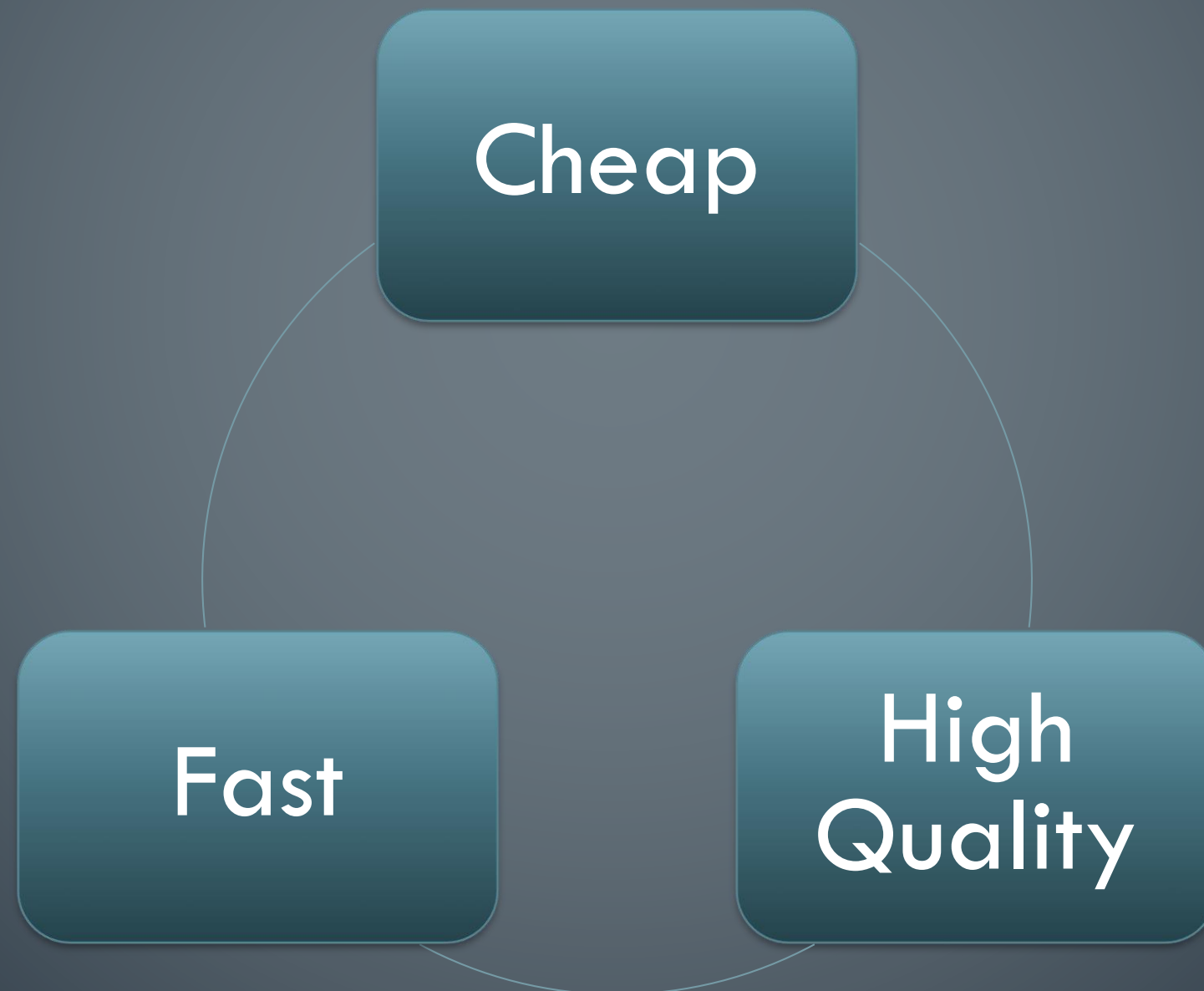


What is your conclusion? How did you reach that conclusion?

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

# Construction

- Pick two:





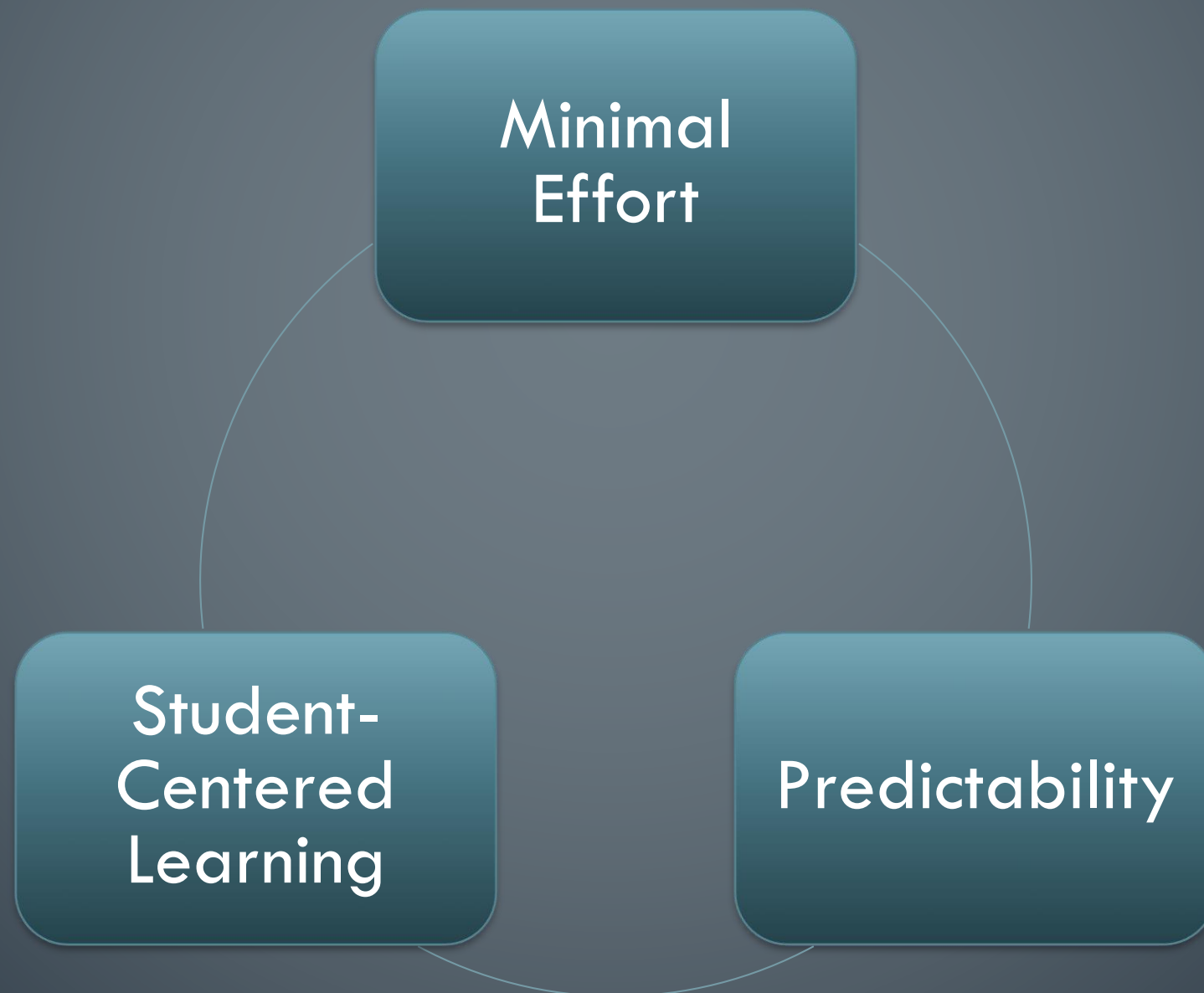
# Family

- Pick two:



# Problem-Based Learning

- Pick two:





## ***JOURNAL***

- *Write a journal entry to reflect on what we have accomplished today.*



# Contact

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DAY 3



# San Marcos USD

JUNE 16-18, 2014



# Goals

- Supplementing Units
  - Three components of rigor
    - Procedural skill and fluency
    - Conceptual understanding
    - Application
  - Depth of Knowledge

# Cylindrical Volume

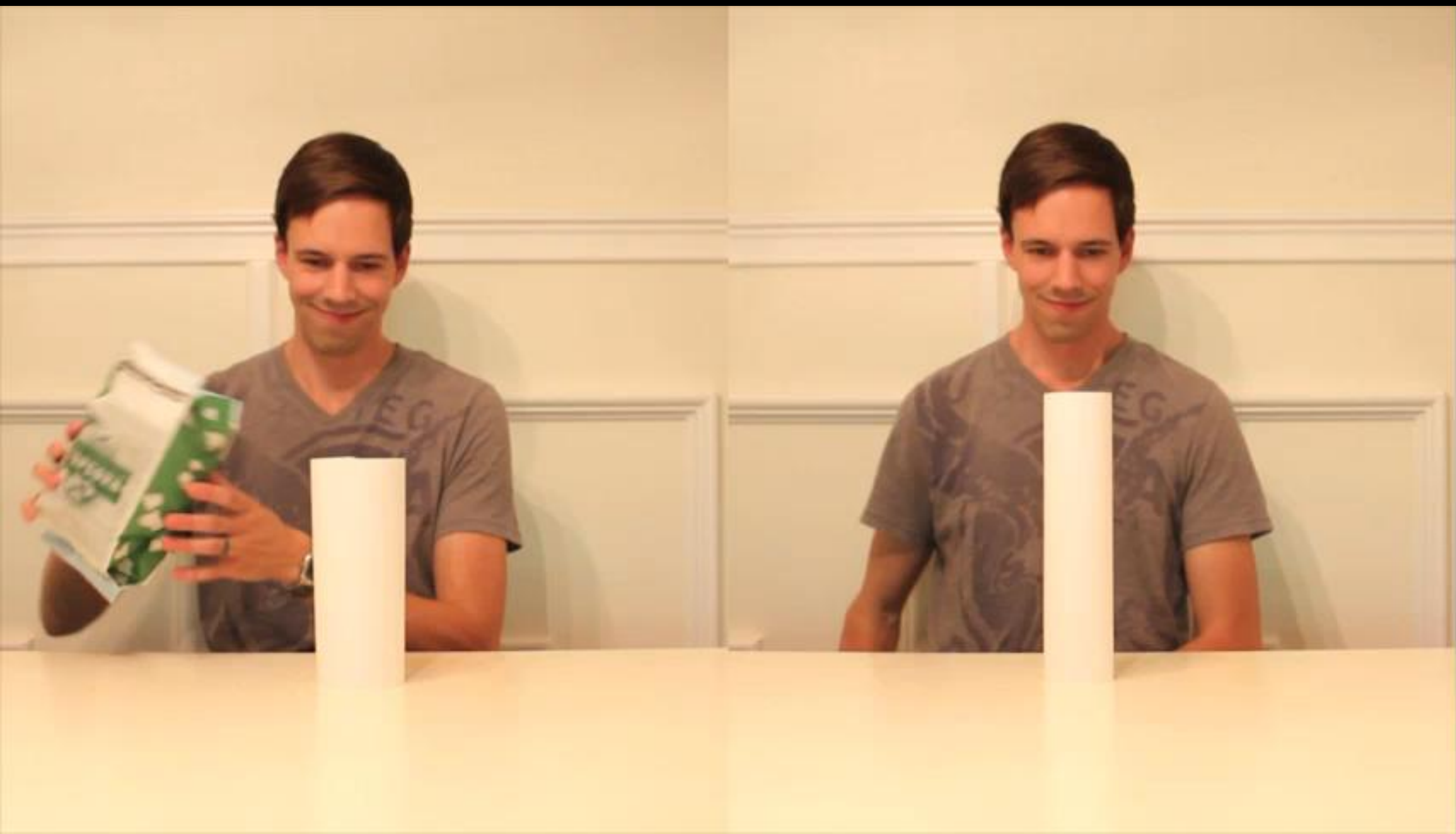


# CCSS Content Standards

- CCSS 8.G.9 – Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.
- CCSS G-GMD.3 – Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
- CCSS G-MG.1 – Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

















# Cylindrical Volume – DOK 1

- What is the volume of a cylinder that has a radius of 3 feet and a height of 3 feet?

# Cylindrical Volume – DOK 2

- List two possible sets of dimensions for a cylinder that has a volume of  $25\pi$  cubic meters.



# Cylindrical Volume – DOK 3

- Using whole numbers only, provide the radius and height for 3 different tanks that hold between 110 and 115 cubic feet of water.























# 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”

## ***SLATE'S ANSWER***

- *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."*



# Probability

# CCSS Content Standards

- CCSS 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around  $\frac{1}{2}$  indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.



# CCSS Content Standards

- CCSS 7.SP. 6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

# CCSS Content Standards

- CCSS 7.SP.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.



# CCSS Content Standards

- CCSS S-MD.5 Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
- CCSS S-MD.6 Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
- CCSS S-MD.7 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).







# Questions

- How many Royal Flushes would you expect?
- How many straight flushes would you expect?
- How many flushes would you expect?
- How many straights would you expect?
- How many pairs of Jacks or better would you expect?

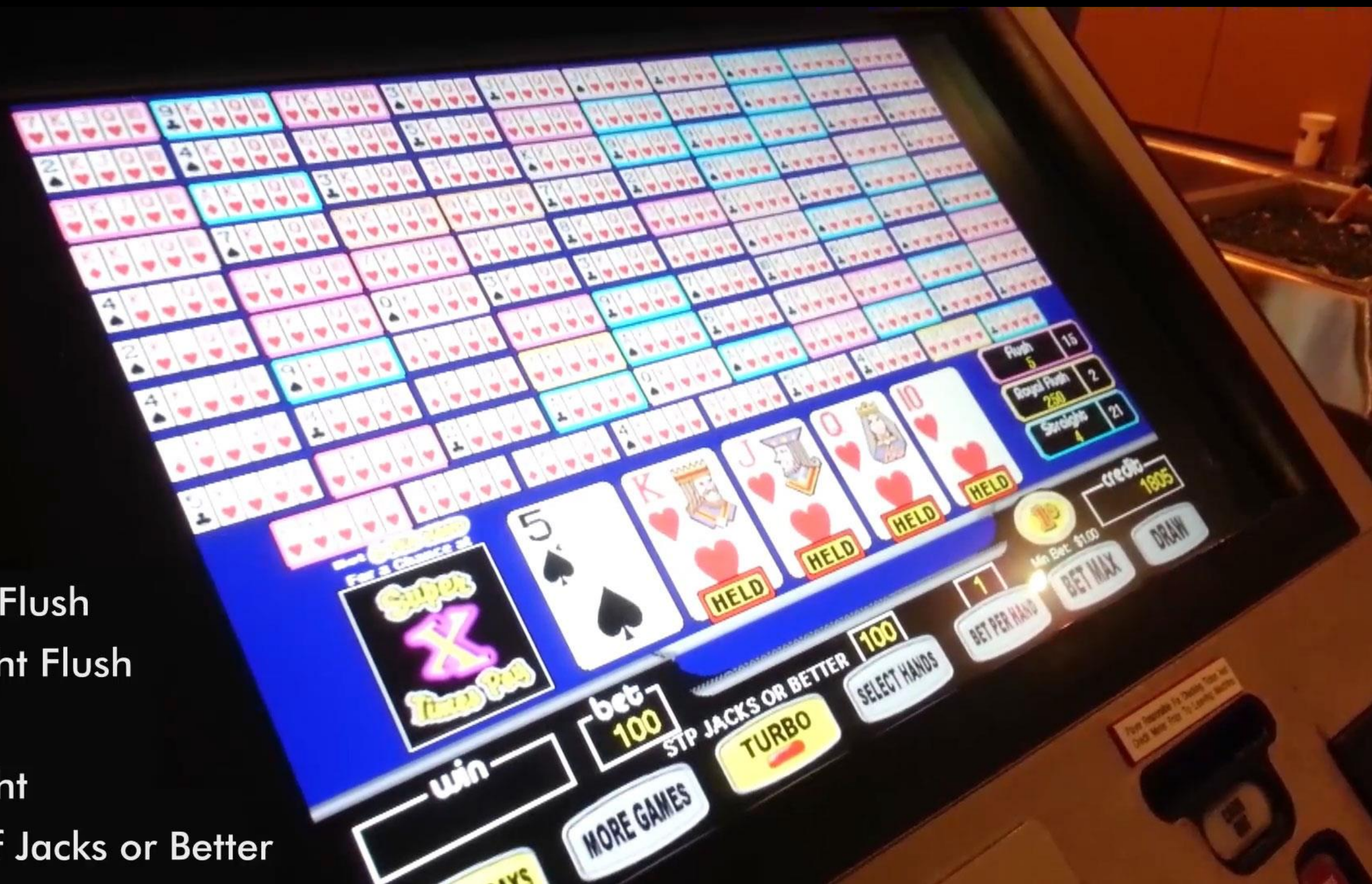




- 0 Royal Flush
- 0 Straight Flush
- 0 Flush
- 0 Straight
- 0 Pair of Jacks or Better



2 Royal Flush  
2 Straight Flush  
15 Flush  
21 Straight  
12 Pair of Jacks or Better





# Probability – DOK 1

- What is the probability of rolling a 7 using two 6-sided dice?



# Probability – DOK 2

- What values have a  $\frac{1}{12}$  chance of being rolled by two 6-sided dice?

# Probability – DOK 3

- Using the whole numbers 1 through 9 at most one time each, fill in the blanks to complete this sentence:  
Rolling a \_\_\_\_\_ on two \_\_\_\_\_-sided dice is the same probability as rolling a \_\_\_\_\_ on two \_\_\_\_\_-sided dice.

Source: Audrey Mendivil, Daniel Luevanos, and Robert Kaplinsky







How many of these packs will have exactly one yellow Starburst? How many will have exactly two?



287 packs





yellow



pink



orange

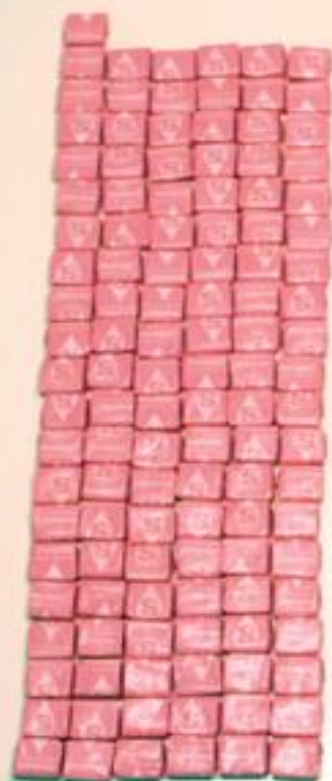


red





159  
(28%)



123  
(21%)



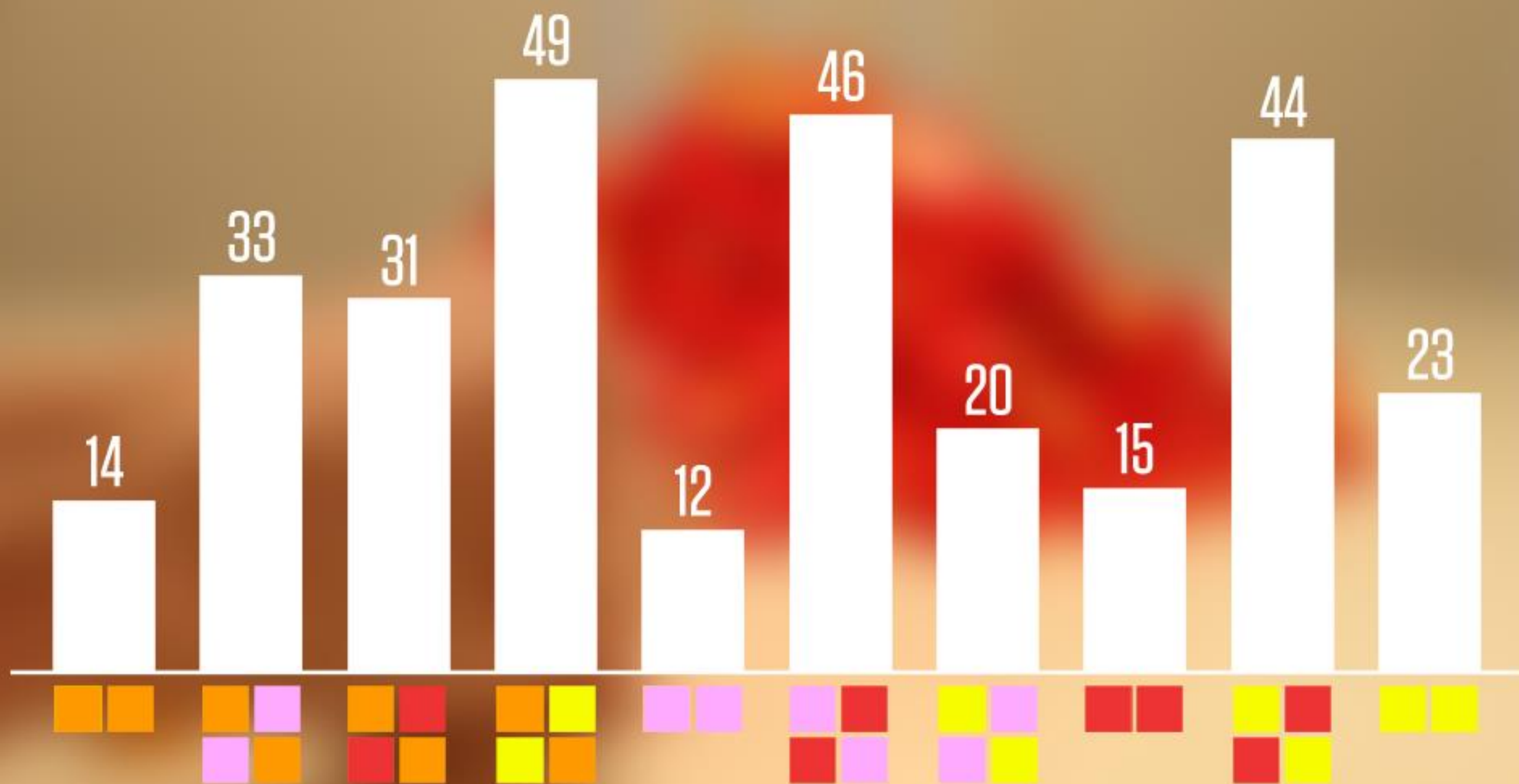
141  
(25%)



151  
(26%)







# Upcoming Units Form

- This form will help us prepare for our August training dates.
- What units are you interested in planning around?
- What resources are you hoping to have?
  - Higher DOK problems?
  - Application problems?



## ***JOURNAL***

- *Write a journal entry to reflect on what we have accomplished today.*



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