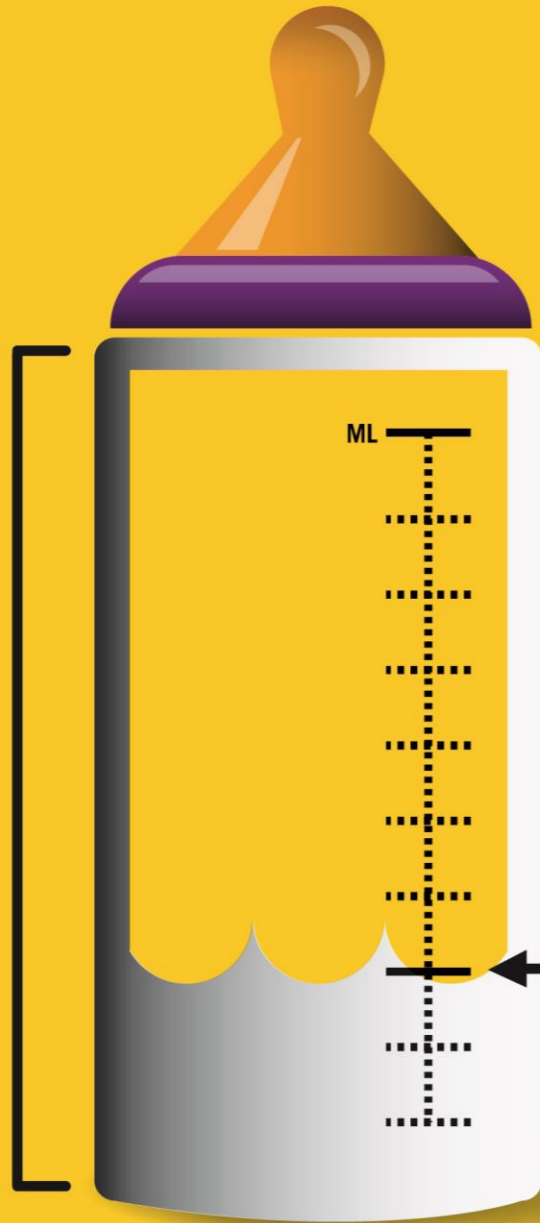# The Need for Reasoning and Sense Making

ROBERT KAPLINSKY

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

ML

THE ONES **WHO ACTUALLY DO.**

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

Ad Council

VISIT SAFERCAR.GOV/THERIGHTSEAT

NHTSA www.nhtsa.gov

Child Car Safety

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

THE ONES **WHO ACTUALLY DO.**

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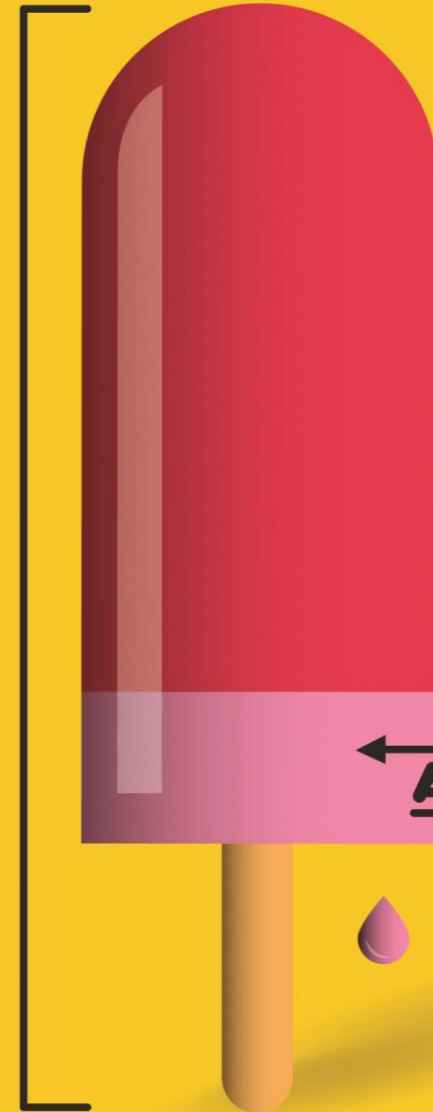## IF YOUR CHILD IS IN THE RIGHT CAR SEAT.

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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?

What buer to ladoclt when students make
a lot of problems?

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.

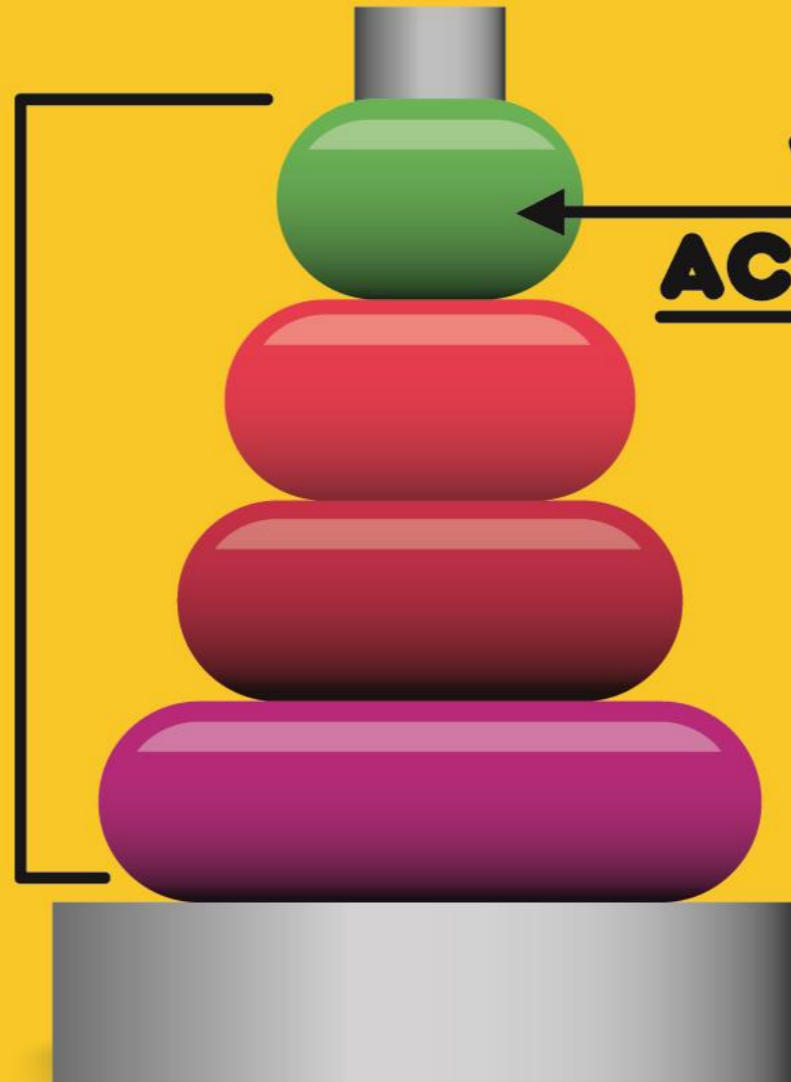be reduced by about half if the correct child safety seats were always used.

[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"

WHAT IS THE PURPOSE OF A K-12 EDUCATION?

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

WHAT IS THE PURPOSE OF A K-12 EDUCATION?
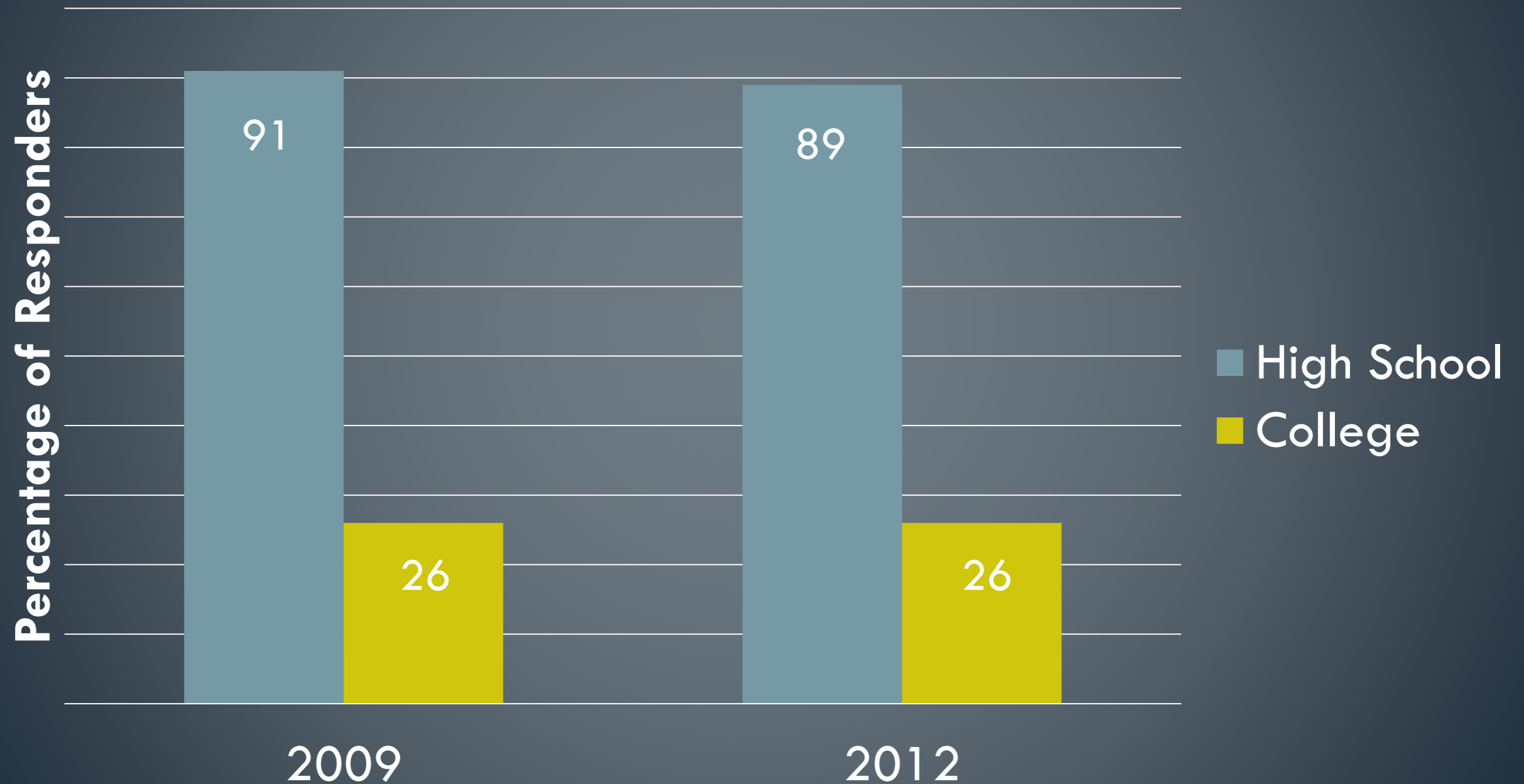
- College readiness
- Career readiness
  - Association of American Colleges and Universities survey
  - Survey over 300 employers with at least 25 employees and many new hires.

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

WHAT DOES IT LOOK LIKE…

- when students **can** work with numbers but **cannot**:
  - critically think
  - analyze and solve complex problems
  - applying knowledge and skills to real-world settings

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

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

$$1\frac{1}{2} - 1\frac{1}{4}$$
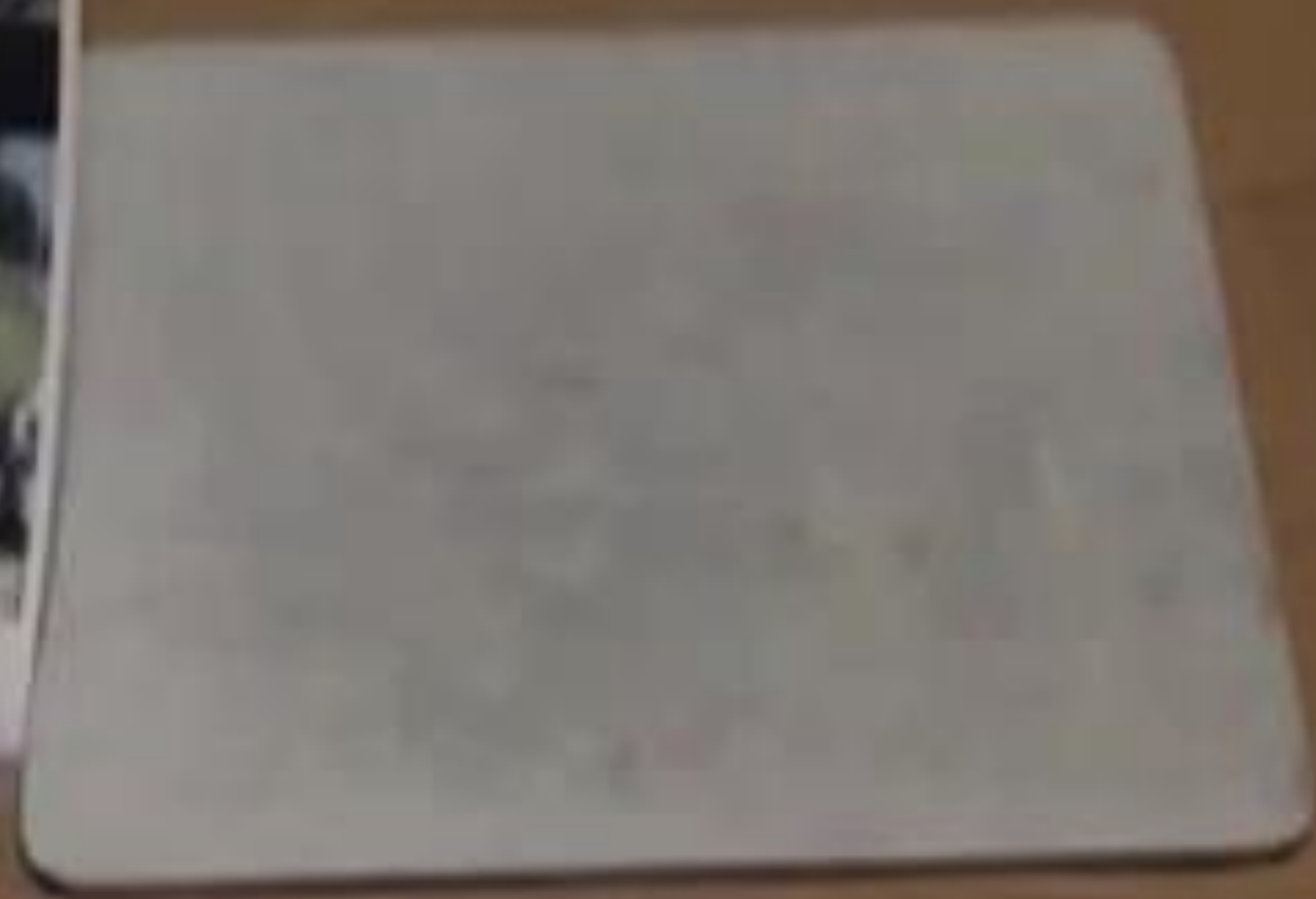
Assessing Deeper Understanding

Make the smallest difference by filling in the boxes using the numbers 1-9 no more than one time each.
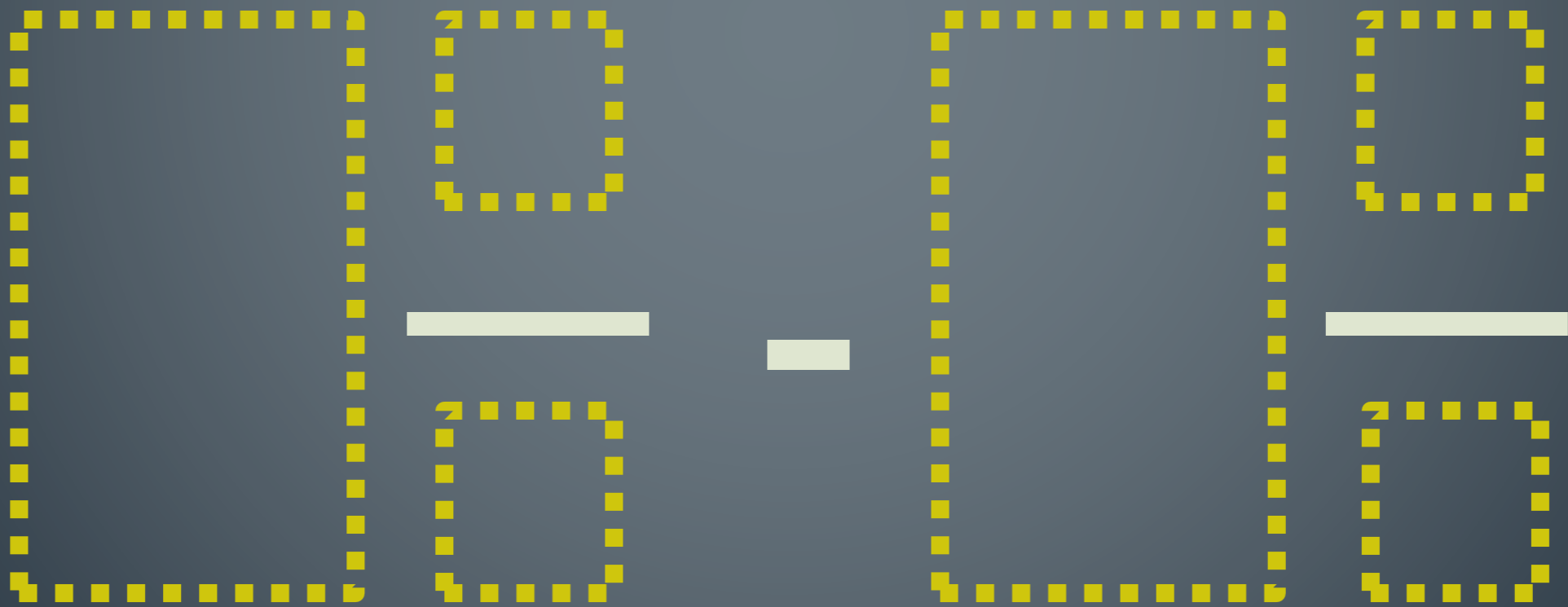
Open Middle Problems

- 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

What Can We Learn From This?

▶ Simply emphasizing rote knowledge and skills is not enough.

▶ Instruction needs to be balanced with opportunities for reasoning and sense making.

▶ Challenging students to articulate their understandings is the key to discovering the misconceptions.

Robert
KAPLINSKY
Glenrock Consulting

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How Many Sheets Do You Need To Break Out Of Prison?
Operations with rational numbers

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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

All	2nd	3rd	4th	5th	6th	7th	8th	Algebra	Functions	Geometry	Modeling	Numb & Quant	Stats & Prob

How Can We Water All Of The Grass?

How Much Money IS That?!

Task Name	Concept / Skill	Standard 1	Standard 2	Standard 3	Standard 4	Sta
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	G-N
How Much Money IS That?!	Volume of rectangular prism	5.MD.3	5.MD.4	5.MD.5	5.MD.5b	5.M
How Much Money Should Dr. Evil Demand?	Exponential Growth	N-RN.2	A-SSE.1	A-SSE.3c	A-SSE.4	A-R
How Tall Is Mini-Me?	Scale and Dividing Decimals	5.NF.5	5.NF.5a	5.NF.5b	6.NS.3	
How Did They Make Ms. Pac-Man?	Transformations (Rotations, Reflections, and Translations)	8.G.1	8.G.2	8.G.3	8.G.4	G-S
Which Ticket Option Is The Best Deal?	Unit Rates and Ratios	6.RP.2	6.RP.3	6.RP.3a	6.RP.3b	
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	4.N
Do We Have Enough Paint?	Area	3.MD.5	3.MD.6	3.MD.7		
How Many Stars Are There In The Universe?	Scientific Notation	8.EE.3	8.EE.4			
What Rides Can You Go On?	Inequalities and Measurement	2.MD.1	6.NS.7a	6.NS.7b		
Do You Have Enough Money?	Money	2.MD.8				
Which Bed Bath & Beyond Coupon Should You Use?	Percent Discount	7.RP.3				
Is Gas Cheaper With Cash Or Credit Card?	Percent Discount	7.RP.3				
Where's The Nearest Toys R Us?	Pythagorean Theorem (Distance in coordinate system)	8.G.8	G-SRT.8	G-GPE.7		
How Sharp Is The iPhone 5's Retina Display?	Pythagorean Theorem (Length of a side)	8.G.7	G-SRT.8	G-GPE.7		
When Should She Take Her Medicine?	Operations with Time Intervals	4.MD.2				
How Big Are Sunspots?	Converting Units, Proportions, and Scientific Notation	5.MD.1	7.RP.2	7.G.4	8.EE.4	G-M
What Michael's Coupon Should I Use?	Percent Discount	7.RP.3	A-CED.3			
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	F-E
How Big Is The 2010 Guatemalan Sinkhole?	Volume of Cylinder	5.MD.3	5.MD.4	5.MD.5	8.G.9	G-C
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	A-C
How Many Royal Flushes Will You Get?	Probability	7.SP.5	7.SP.6	7.SP.7	S-MD.5	S-M
How Much Does The Paint On A Space Shuttle Weigh?	Surface Area	6.G.4	7.G.6	8.G.7	G-MG.1	G-M
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	F-L
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	
How Many Laps Is A 5k Race?	Perimeter	4.MD.3				
Which Toilet Uses Less Water?	Systems of Equations/Inequalities	8.EE.8c	A-CED.3	A-REI.11	F-BF.1	
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	
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	6.R
How Big Is The World's Largest Deliverable Pizza?	Area of Square	3.MD.5	3.MD.6	3.MD.7	4.NBT.3	4.M
How Many Sheets Do You Need To Break Out Of Prison?	Integer Operations	5.NBT.6				
Do Hybrid Cars Pay For Themselves?	Systems of Equations or Rates	6.RP.2	6.RP.3	8.EE.8c	A-CED.3	F-E
How Many Hot Dogs Did They Eat?!	Linear and Quadratic Functions	8.F.3	8.F.4	F-BF.1	F-BF.2	F-IF
How Much Purple Ribbon Will You Need?	Perimeter & Circumference	3.MD.8	4.MD.3	7.G.4		
Are We There Yet?	Adding Times	3.MD.1	4.MD.2			
Which Chinese Food Coupon Should I Use?	Percent Discount	7.RP.3				
How Big Is The Vehicle That Uses Those Tires?	Ratio and Proportions	7.RP.2				
Where Would The Angry Birds Have Landed?	Create Equation From Quadratic Graph	A-CED.1	F-BF.1	F-IF.4	F-IF.7a	F-L
How Many Movies Can You See In One Day?	Adding Times	3.MD.1	4.MD.2			
Which Carrots Should You Buy?	Unit Rates	6.RP.1	6.RP.2	6.RP.3		
How Fast Can You Throw A Baseball?	Converting Units and Unit Rates	5.MD.1	6.RP.2			

Contact

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