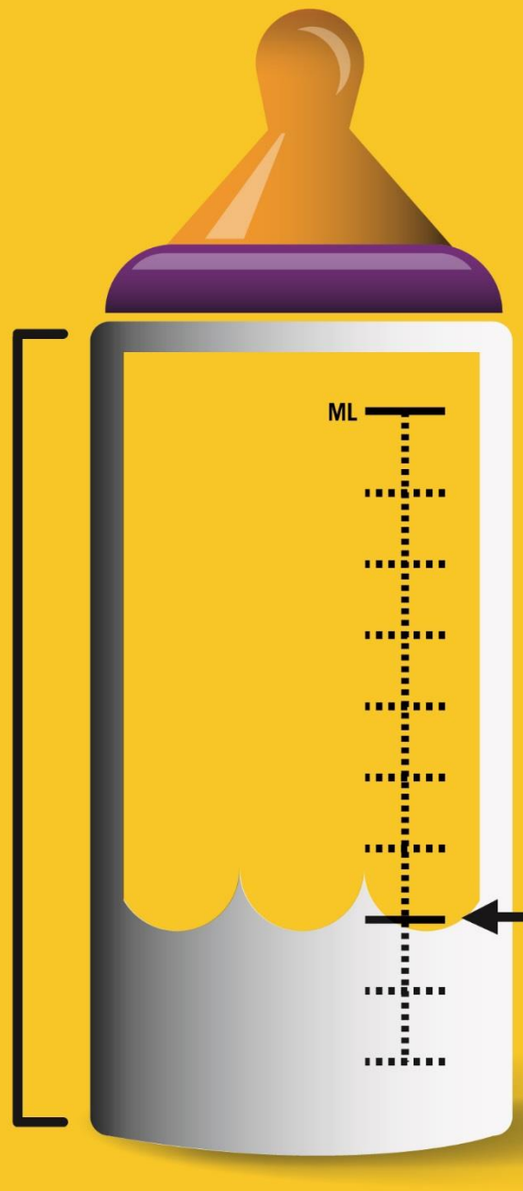
Hillsboro SD

ROBERT KAPLINSKY


@robertkaplinsky

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

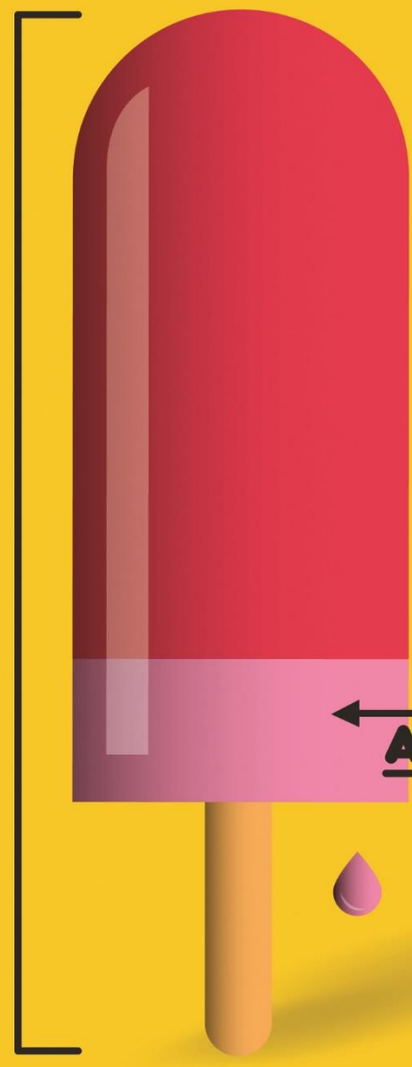
Ad Council

NHTSA www.nhtsa.gov

Child Car Safety

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

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:

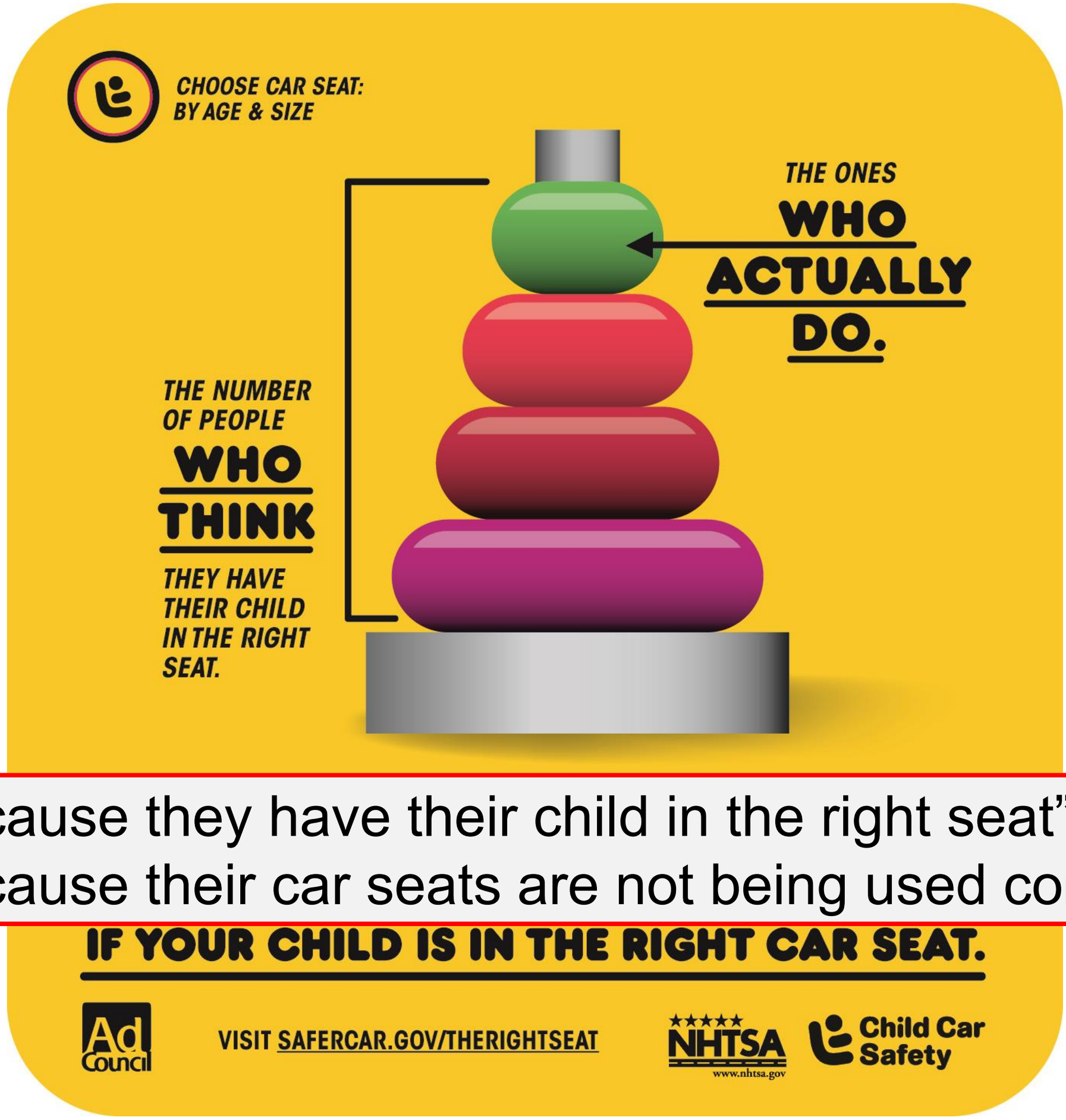
- Motor vehicle crashes are the leading cause of death for children age 1 through 12 years old.[1]

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.

---

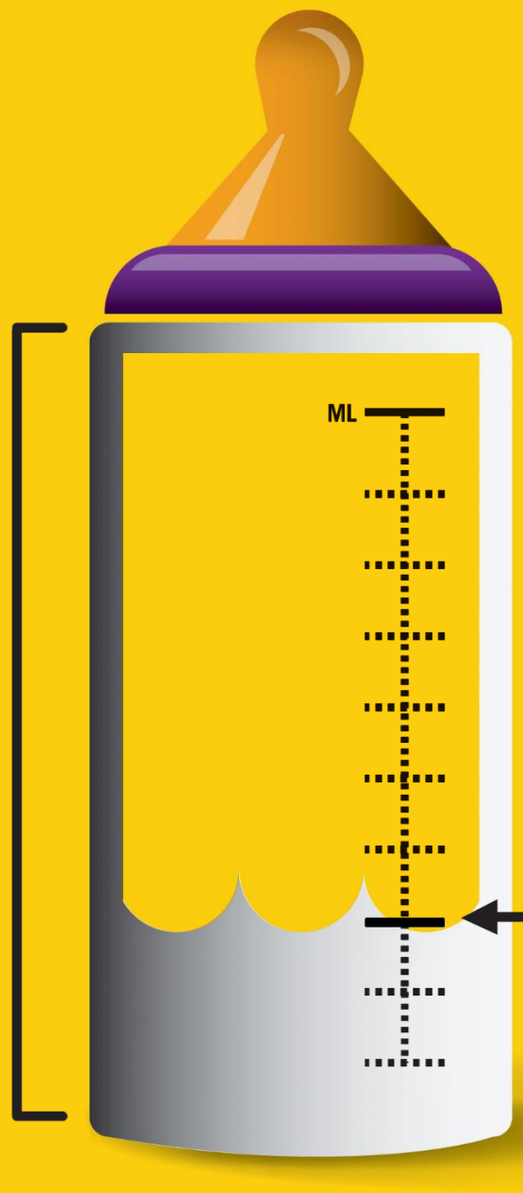
[1] Source: Based on the latest mortality data currently available from the CDC's National Center for Health Statistics.



- “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.



THE ONES **WHO ACTUALLY DO.**

KNOW FOR SURE

IF YOUR CHILD IS IN THE RIGHT CAR SEAT.

VISIT SAFERCAR.GOV/THERIGHTSEAT

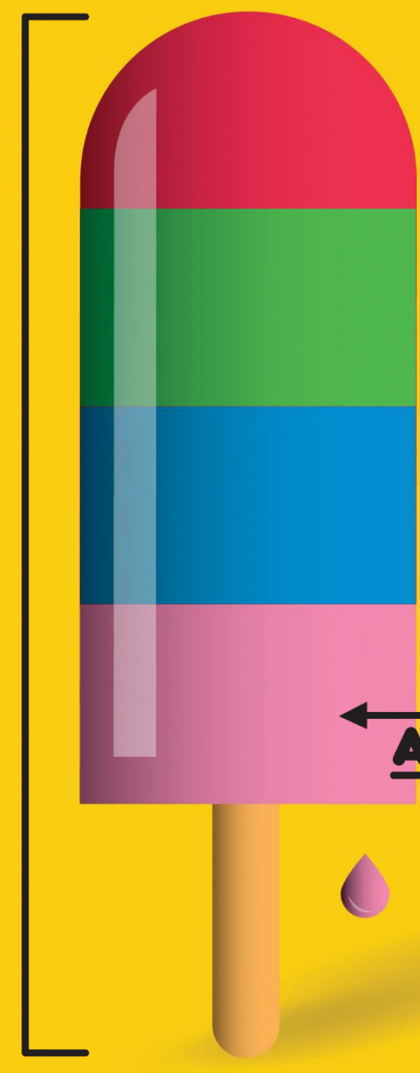
Ad Council

NHTSA www.nhtsa.gov

Child Car Safety

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

Ad Council

NHTSA www.nhtsa.gov

Child Car Safety

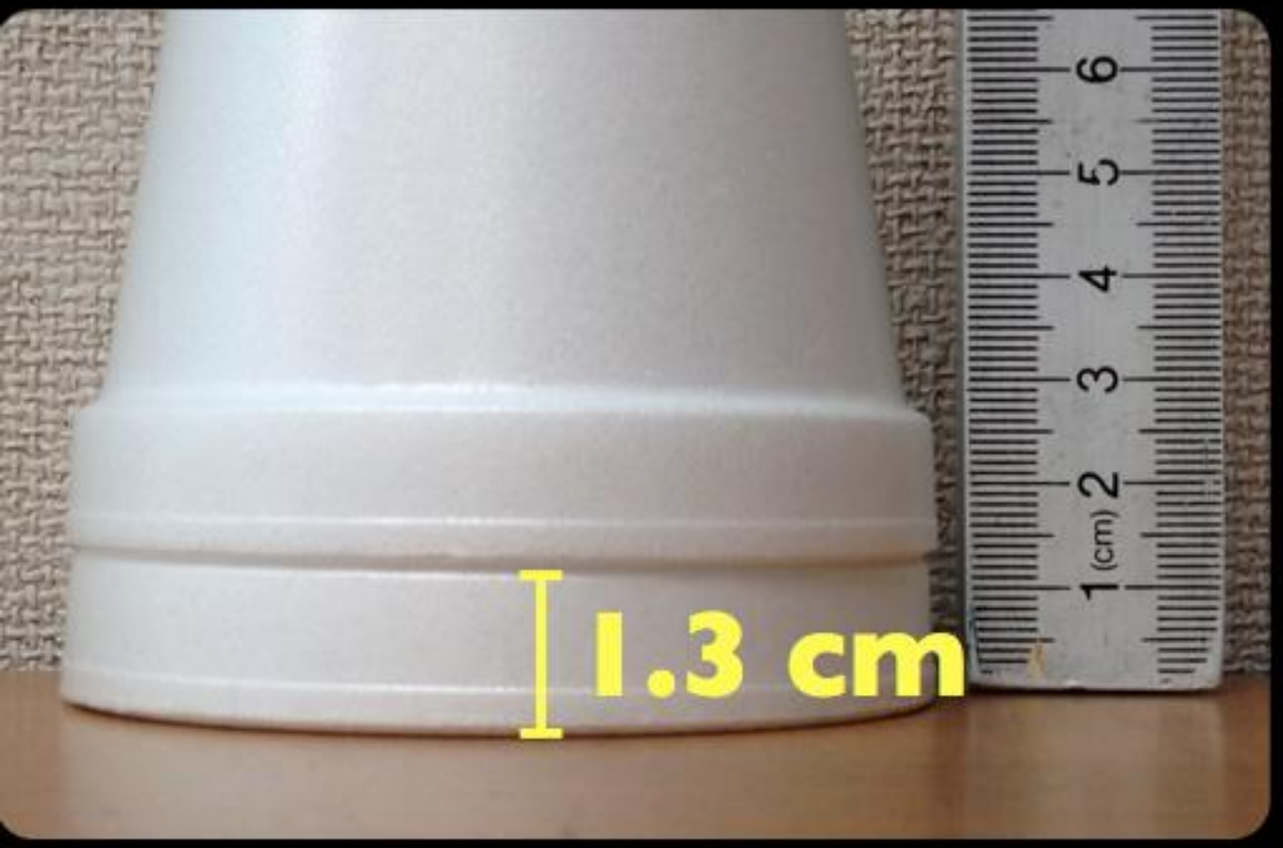
MODULE PERFORMANCE TASK

How Many Stacked Cups Do You Need?

You want to stack paper, plastic, or foam cups one inside the next so that the height of the stack is equal to your math teacher's height. How can you determine the number of cups you would need?

Start by listing in the space the questions you will need to answer in order to tackle the problem. Then use your own paper to complete the task. Be sure to write down all your data and assumptions. Then use graphs, numbers, words, or algebra to explain how you reached your conclusion.

Source: Andrew Stadel – estimation180.com



Source: Andrew Stadel – estimation180.com

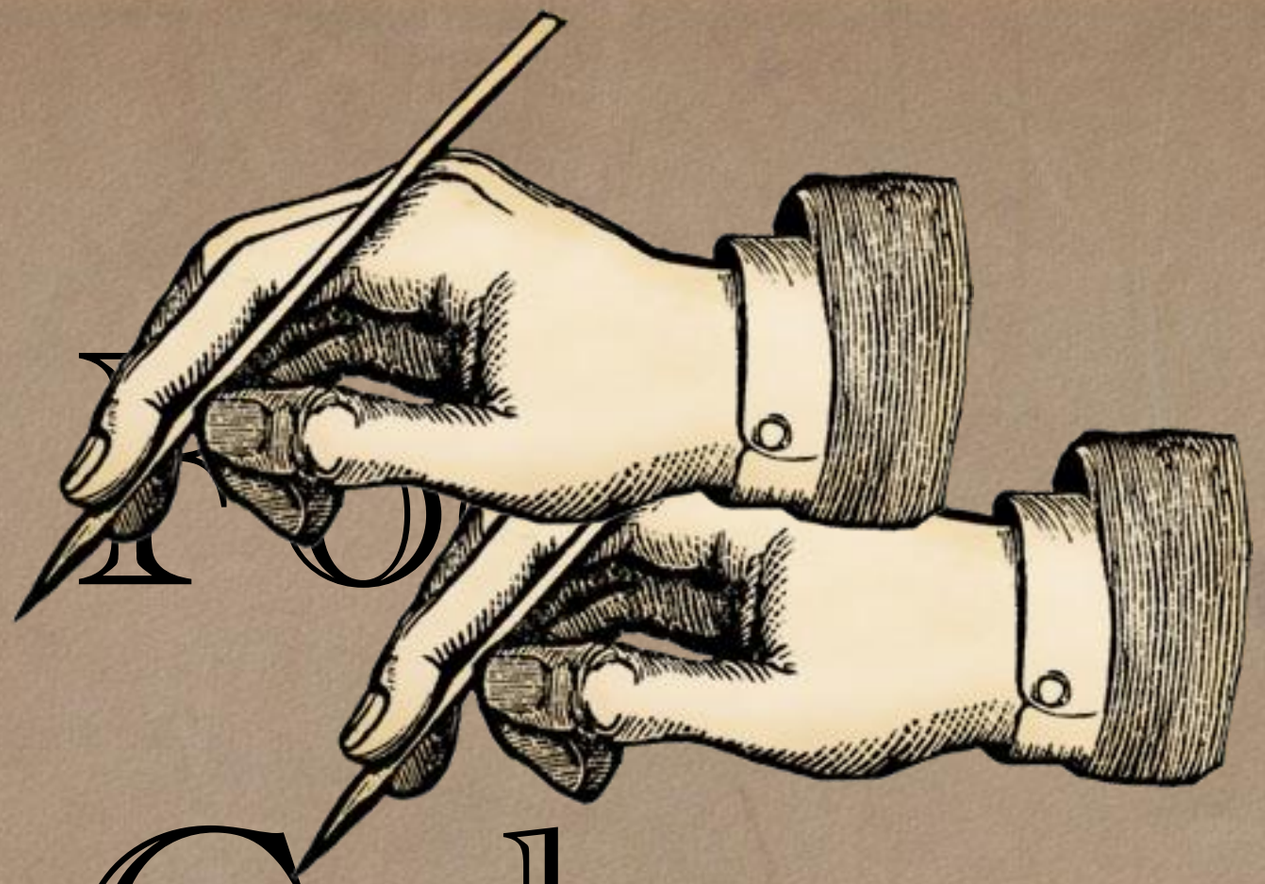
211.8 cm

Source:
Andrew Stadel
estimation180.com

CUPS: 0

Source: Andrew Stadel – estimation180.com

- Focus
- Coherence
- Rigor

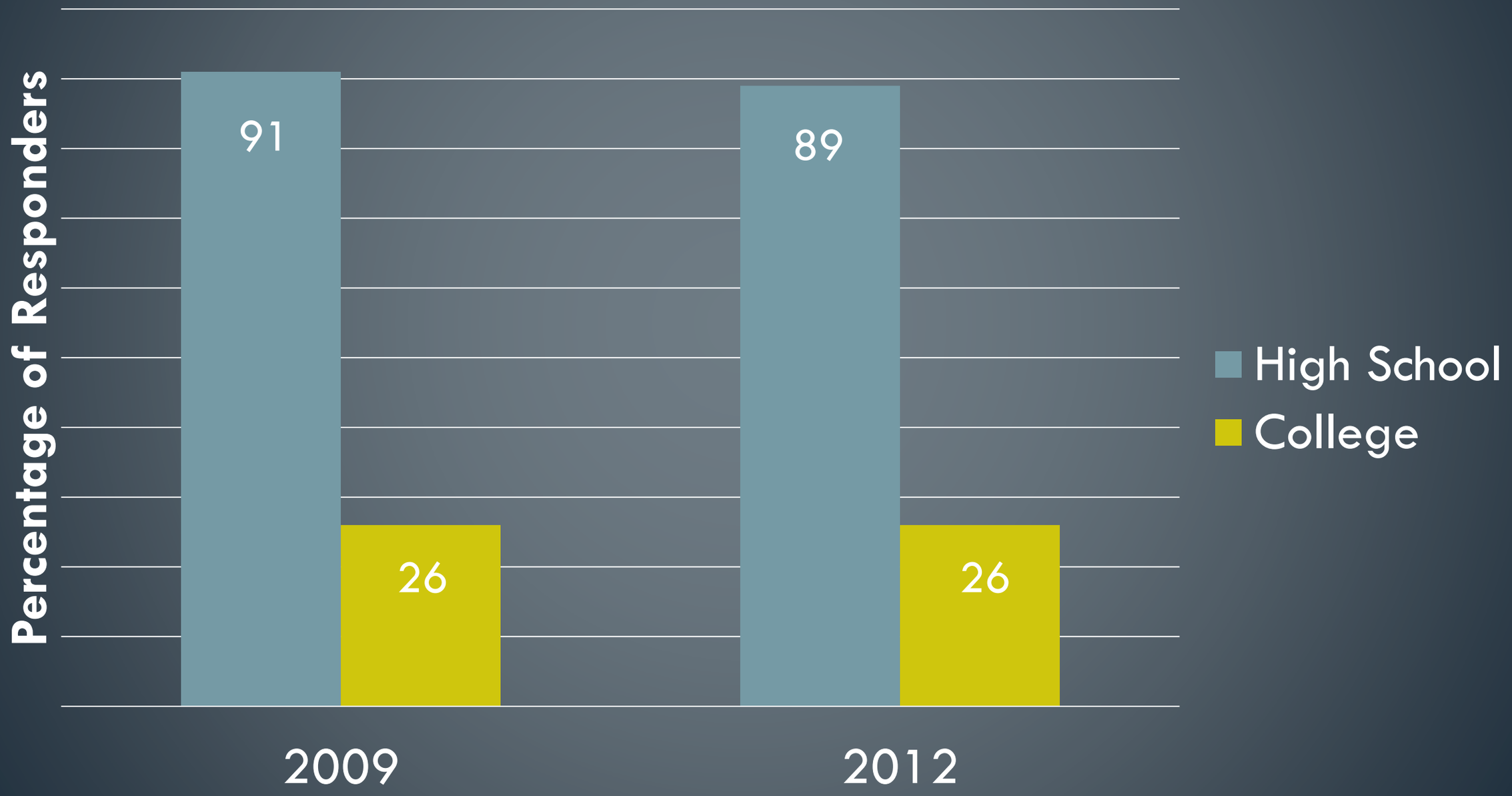


Cups	Height
1	9.2 cm
2	10.5 cm
3	11.8 cm
4	13.1 cm

WHAT IS THE PURPOSE OF A K-12 EDUCATION?

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

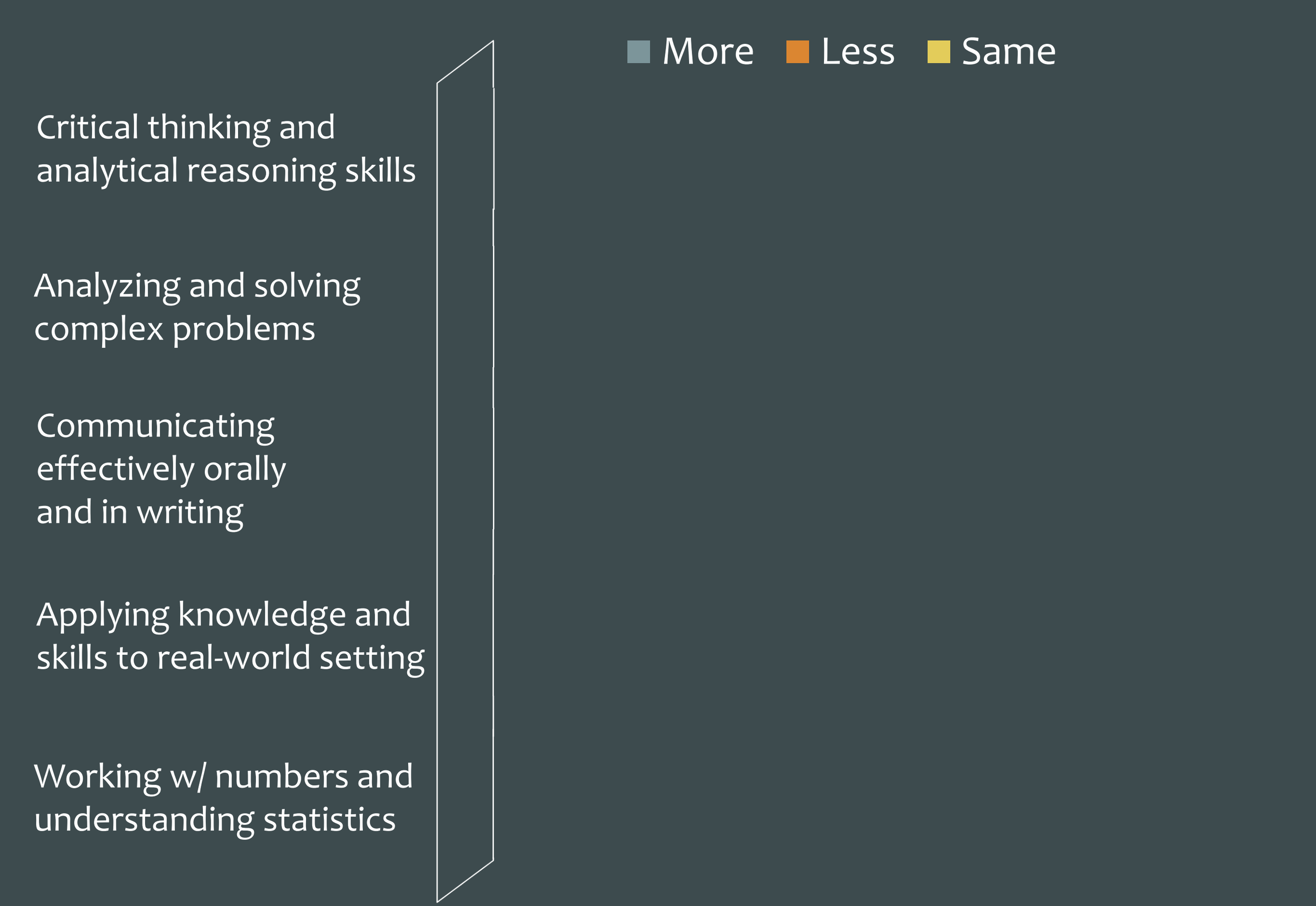
"Well" or "Very Well" Prepared for College



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

New Student Expectations

ELA, Social Studies, and Tech Subjects

1. Demonstrate independence.
2. Build strong content knowledge.
3. Respond to the varying demands of audience, task, purpose, and discipline.
4. Comprehend as well as critique.
5. Value evidence.
6. Use technology and digital media strategically and capably.
7. Understand other perspectives and cultures.

Science

1. Ask questions (for science) and defining problems (for engineering).
2. Develop and use models.
3. Plan and carry out investigations.
4. Analyze and interpret data.
5. Use mathematics and computational thinking.
6. Construct explanations (for science) and design solutions (for engineering).
7. Engage in argument from evidence.
8. Obtain, evaluate, and communicate information.

Mathematics

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Sources: CCSS ELA student portraits, NGSS practices, CCSS mathematics practice

MATH

M1. Make sense of problems & persevere in solving them.

M2. Reason abstractly & quantitatively.

M7. Look for & make use of structure.

M8. Look for & express regularity in repeated reasoning.

SCIENCE

S1. Ask questions & define Problems.
S3. Plan & carry out Investigations.
S4. Analyze & interpret data.
S6. Construct explanations & design solutions.

S2. Develop and use models.
S5. Use mathematics & computational thinking.
M4. Model with mathematics.
M6. Attend to precision.

E2. Build a strong base of knowledge through content rich texts.
E5. Read, write, and speak grounded in evidence.
M3 and E4. Construct viable arguments & critique reasoning of others.
S7. Engage in argument from evidence.

S8. Obtain, evaluate & communicate Information.

E6. Use technology & digital media strategically & capably
M5. Use appropriate tools strategically

E3. Obtain, synthesize, and report findings clearly and effectively in response to task and purpose.

E1. Demonstrate independence in reading complex texts, and writing and speaking about them.
E7. Come to understand other perspectives & cultures through reading, listening, and collaborations.

ELA

Sources: CCSS ELA student portraits, NGSS practices, CCSS mathematics practice

Adapted from work of Tina Cheuk, Stanford University

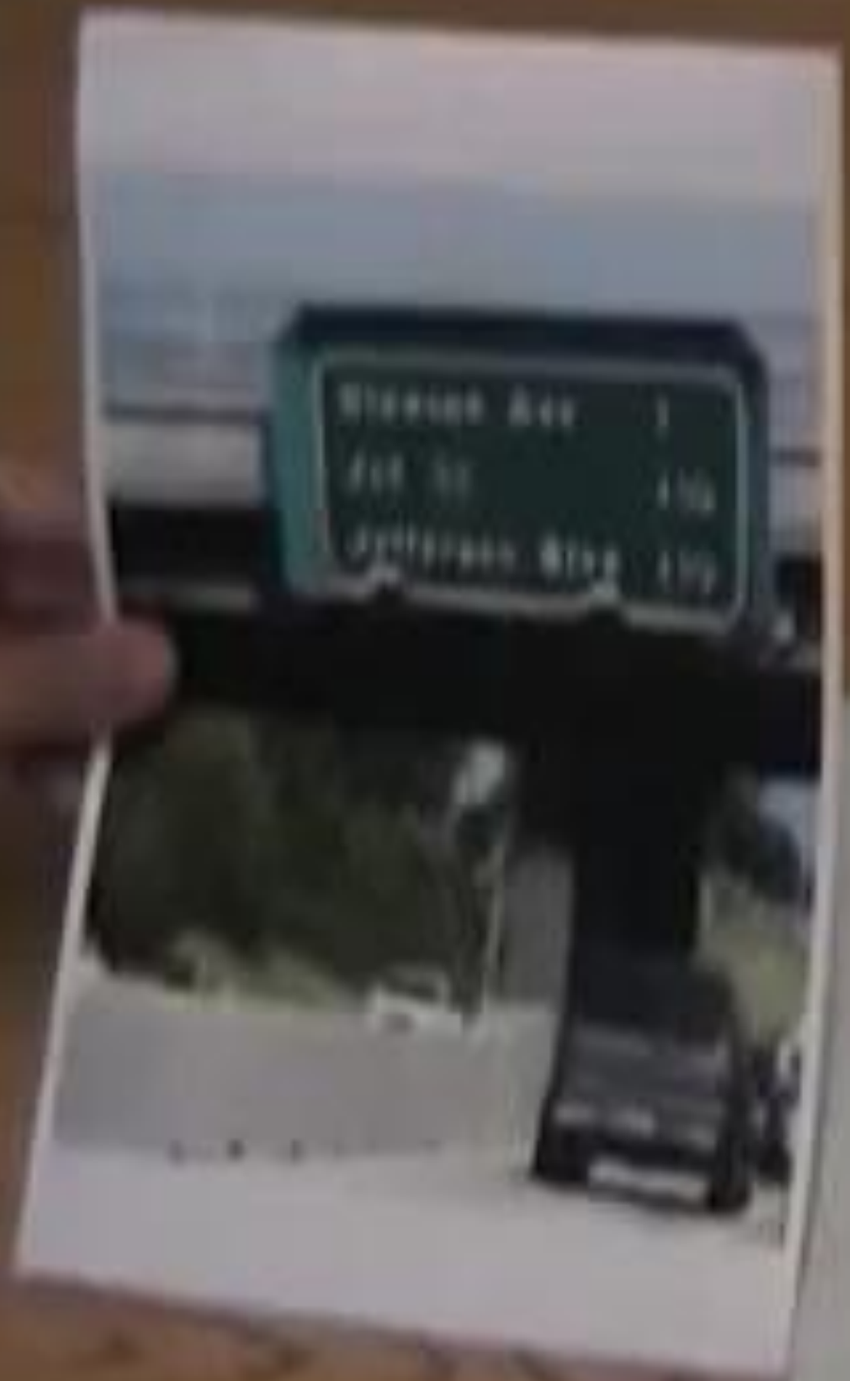
WHAT DOES IT LOOK LIKE…

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

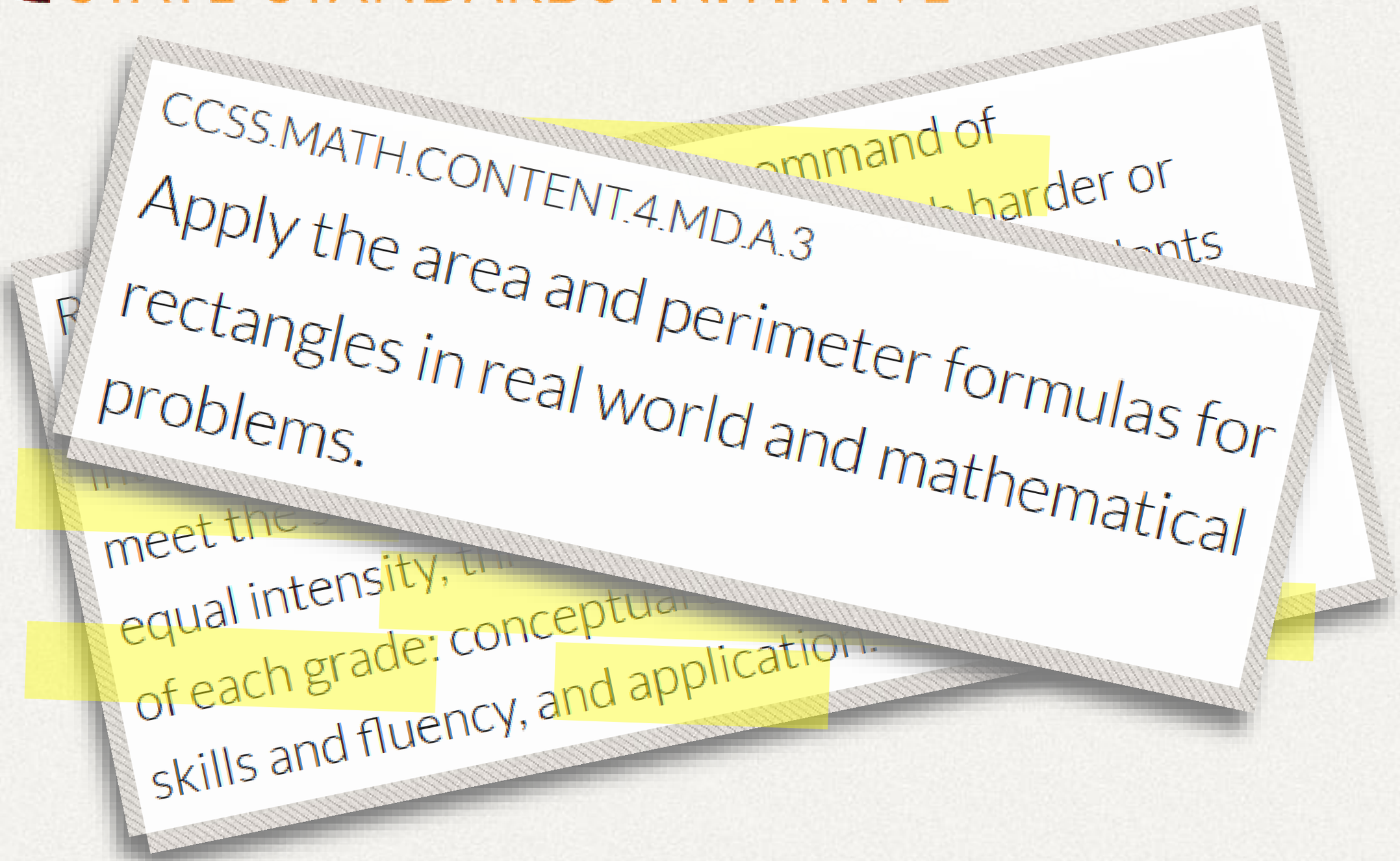
How far apart are the exits on this freeway: Jct 90 and Jefferson Blvd?

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

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



COMMON CORE
STATE STANDARDS INITIATIVE



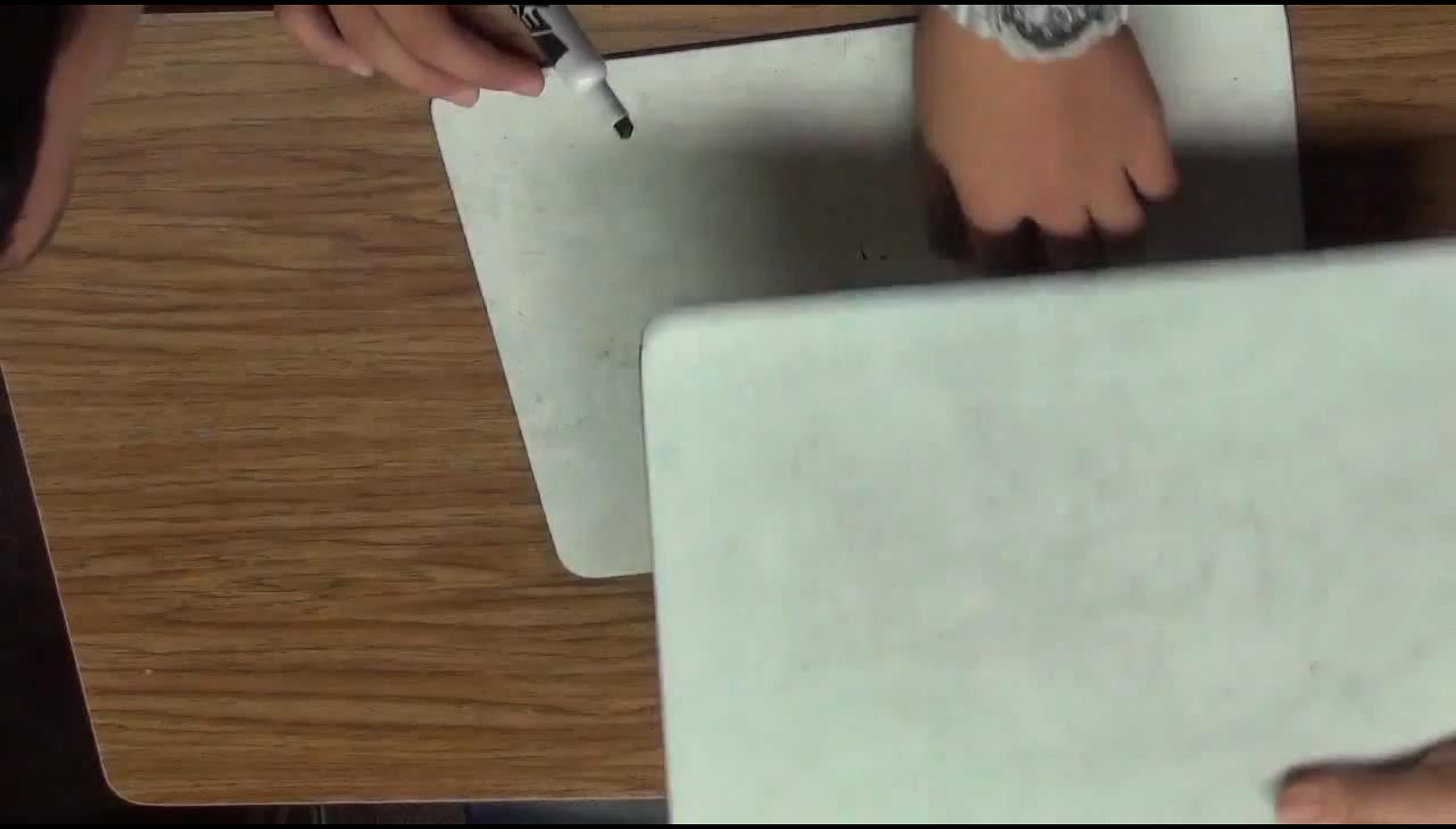
Source: http://www.corestandards.org/other-resources/key-shifts-in-mathematics/

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

Components of Rigor

- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding

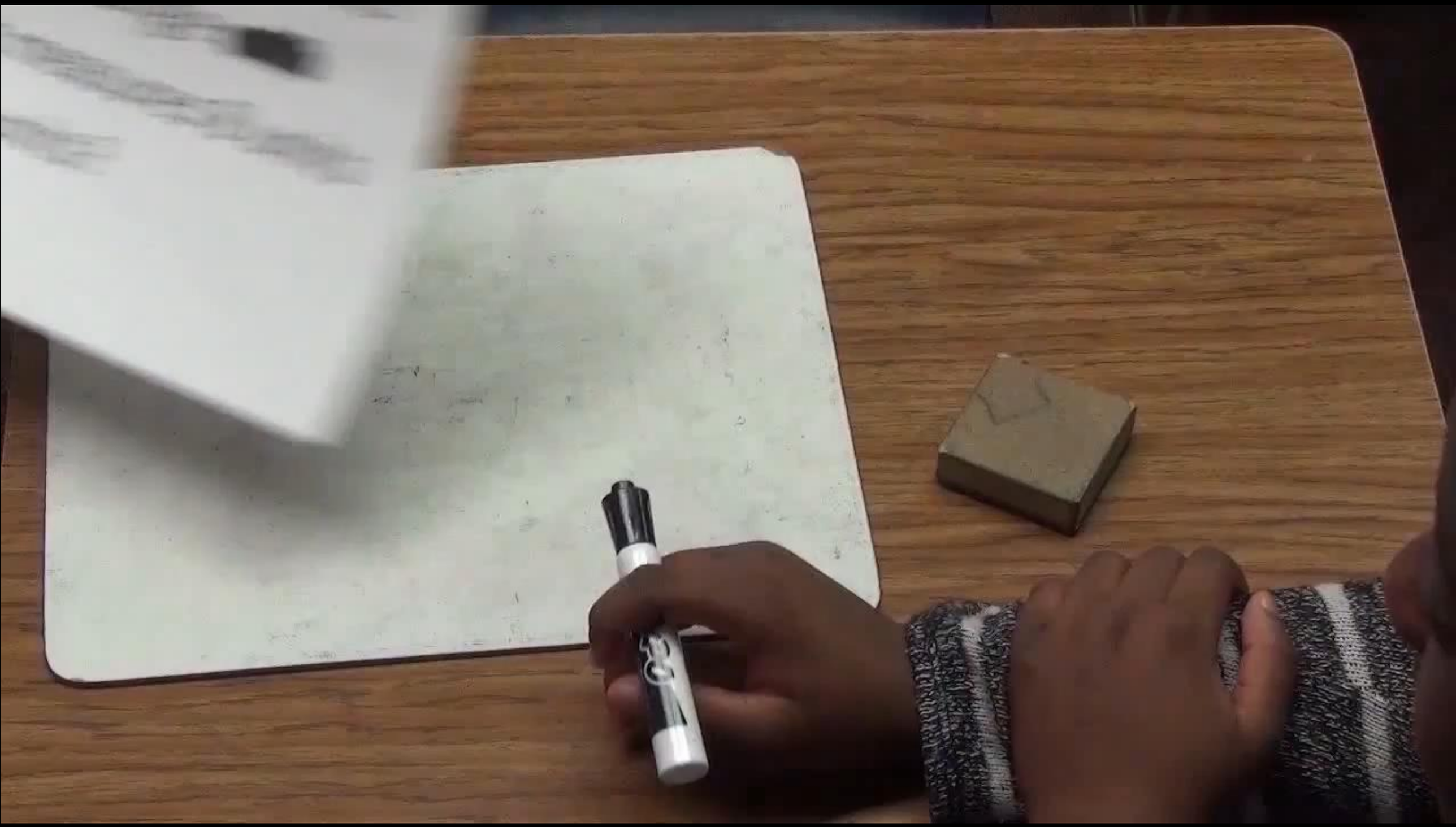
List the dimensions of a rectangle with a perimeter of 24 units.



Components of Rigor

- ☒ Procedural Skill and Fluency
- ☒ Conceptual Understanding

WHY?



Components of Rigor

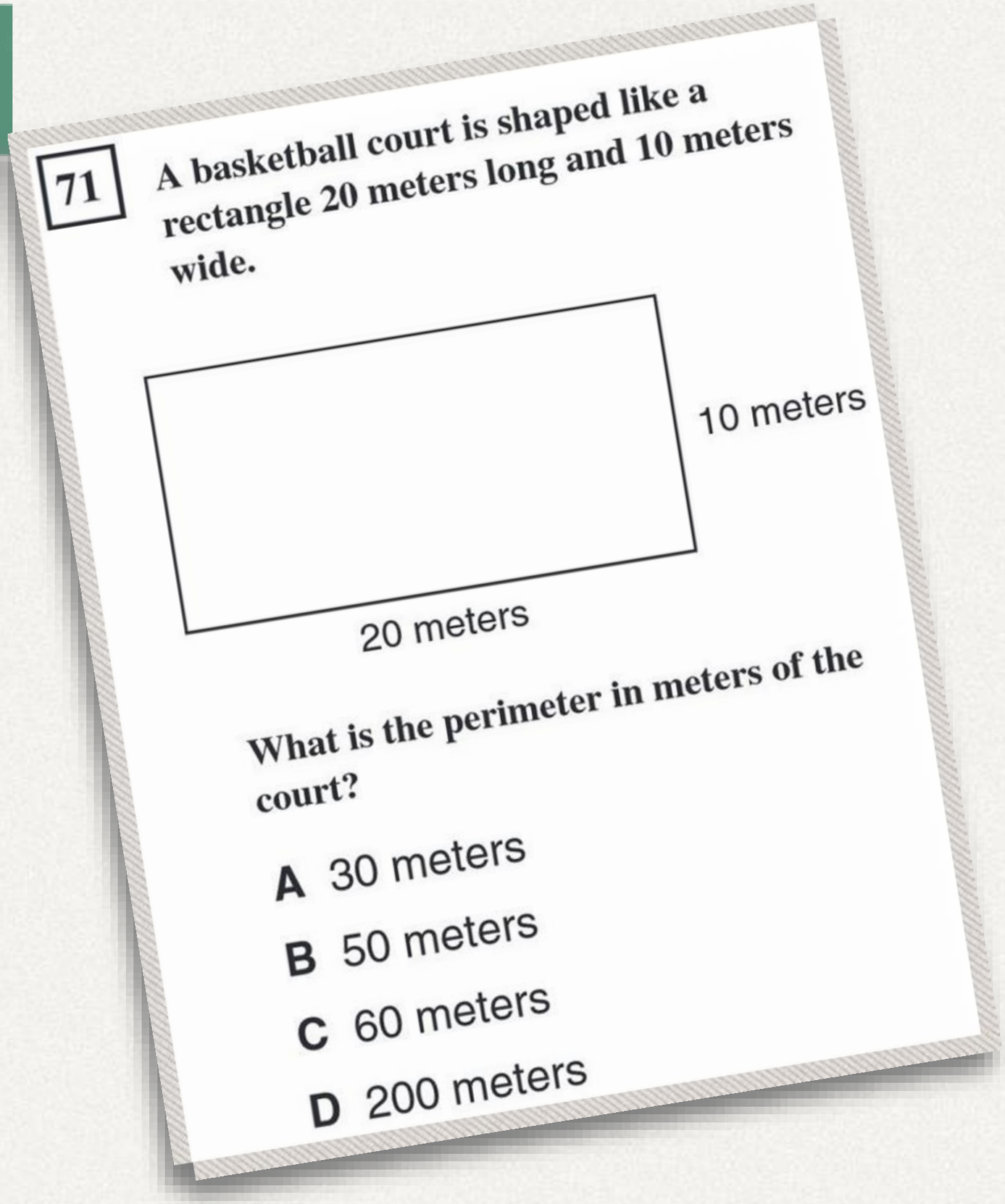
- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding

List the

of a rectangle with a perimeter of 24 units.

Components of Rigor

- ☒ Procedural Skill and Fluency
- ☒ Conceptual Understanding


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

10 meters

20 meters

What is the perimeter in meters of the court?

A 30 meters

B 50 meters

C 60 meters

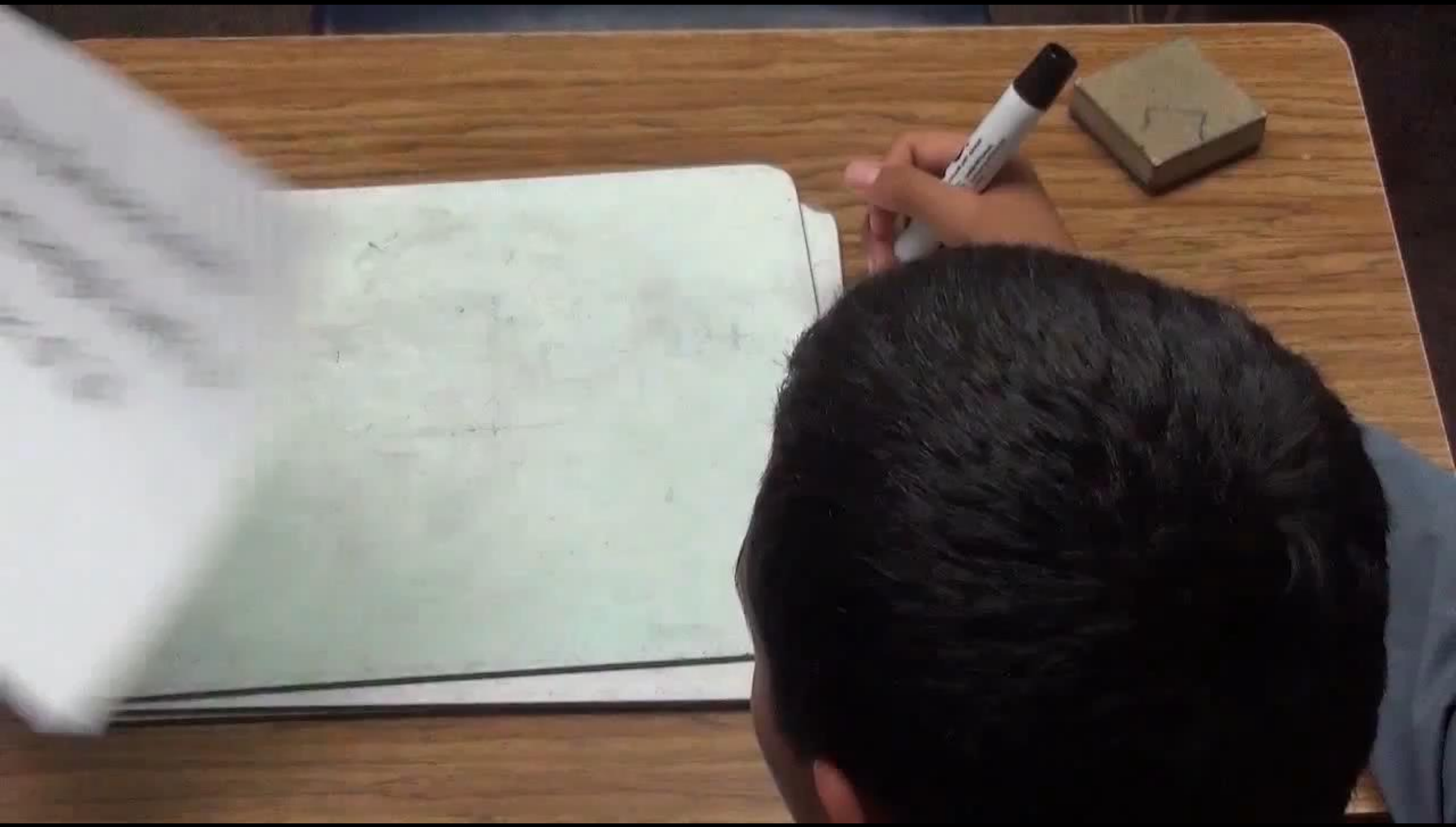
D 200 meters

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

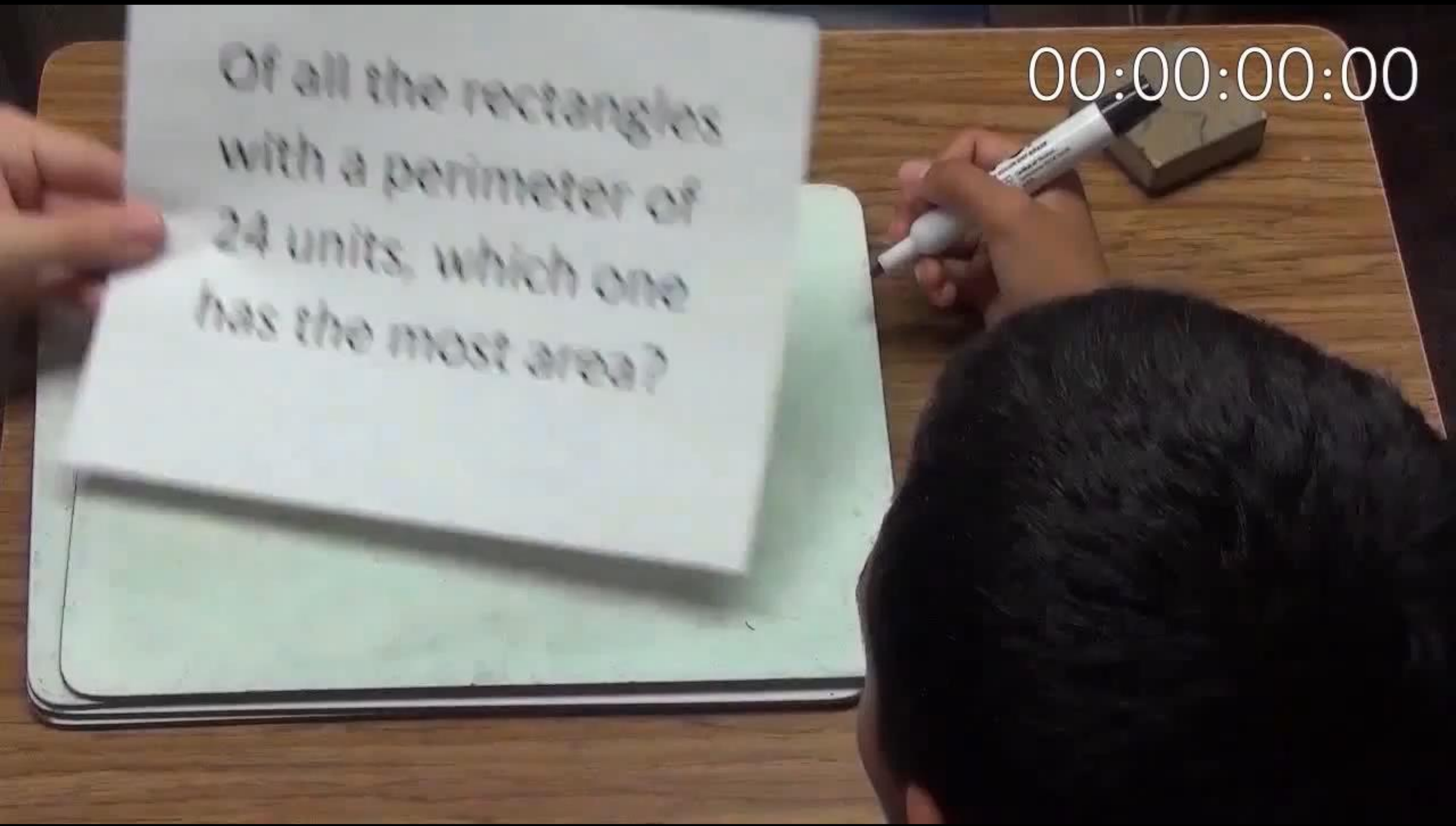
- ☑ Procedural Skill and Fluency
- ☑ Conceptual Understanding



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

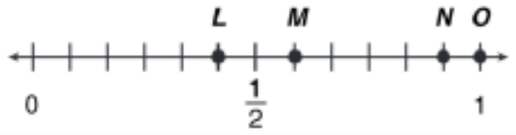
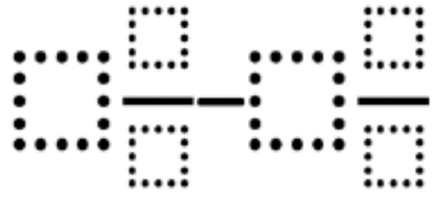
Defining the Problem

- 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.

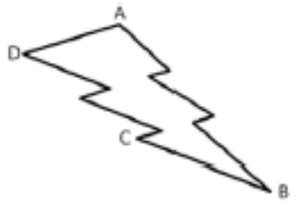
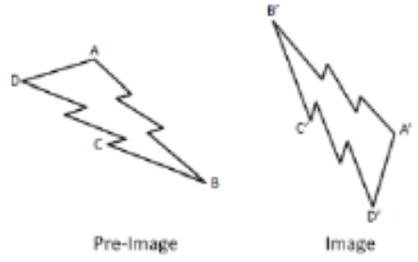
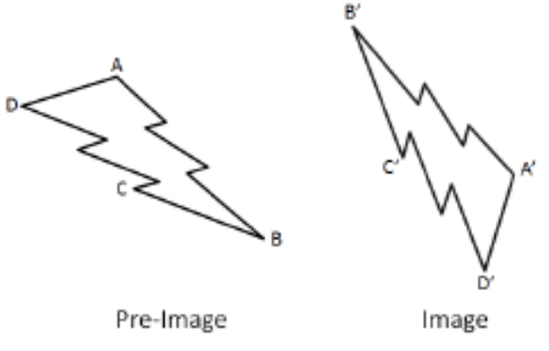
Addressing the Problem

- First, we must have a clear understanding about why these problems are different from one another.
- Next, we need to practice implementing these problems such that all students are engaged in a problem that is at the right challenge level for them.
- Last, we need sources that can provide us with a variety of 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 5 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'. 	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. $y = -\square(x-\square)^2 + \square$

DOK Level Differences

- **Level 1: Recall & Reproduction**
  - Often a trivial application of facts.
  - 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.

Probability

What is the probability of rolling a sum of 5 using two 6-sided dice?

Probability

What value(s) have a $\frac{1}{12}$ probability of being rolled as the sum of two 6-sided dice?

Author: Daniel Luevanos

Probability

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.

Authors: Audrey Mendivil, Daniel Luevanos, and Robert Kaplinsky

DOK FAQ

- *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?*
- *How can I share DOK 2 and DOK 3 problems I've made?*

Open Middle

Challenging math problems worth solving

NEW OPEN M

Exponents a[illegible] Operations

February 10, 2015 Leave

Directions: Find 3 positive i[illegible]t add up to 10. Place each number into one of the blanks to find the largest possible result. Source: Zack[illegible]ller (@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

Download the Open Middle Worksheet:
Version 1.1

SUBSCRIBE

Receive emails every time a new problem is published.

Enter your e-mail address

Subscribe

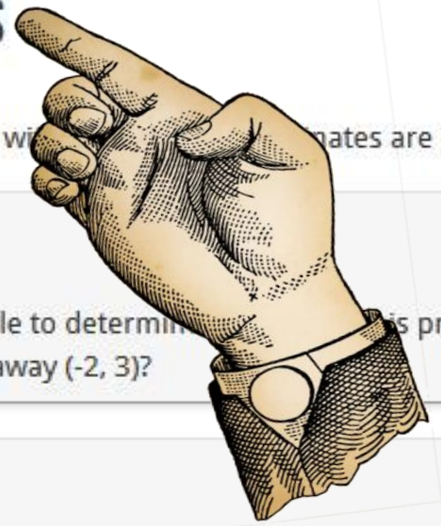
COMMON CORE STATE STANDARDS

- 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)

COMMON CORE
STATE STANDARDS INITIATIVE

Rigor refers to deep, authentic command of mathematical concepts, not making math harder or introducing topics at earlier grades. To help students meet the standards, educators will need to pursue, with equal intensity, three aspects of rigor in the major work of each grade: conceptual understanding, procedural skills and fluency, and application.

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

Contact

Robert Kaplinsky

robert@robertkaplinsky.com

robertkaplinsky.com

@robertkaplinsky

robertkaplinsky.com/hillsboro