



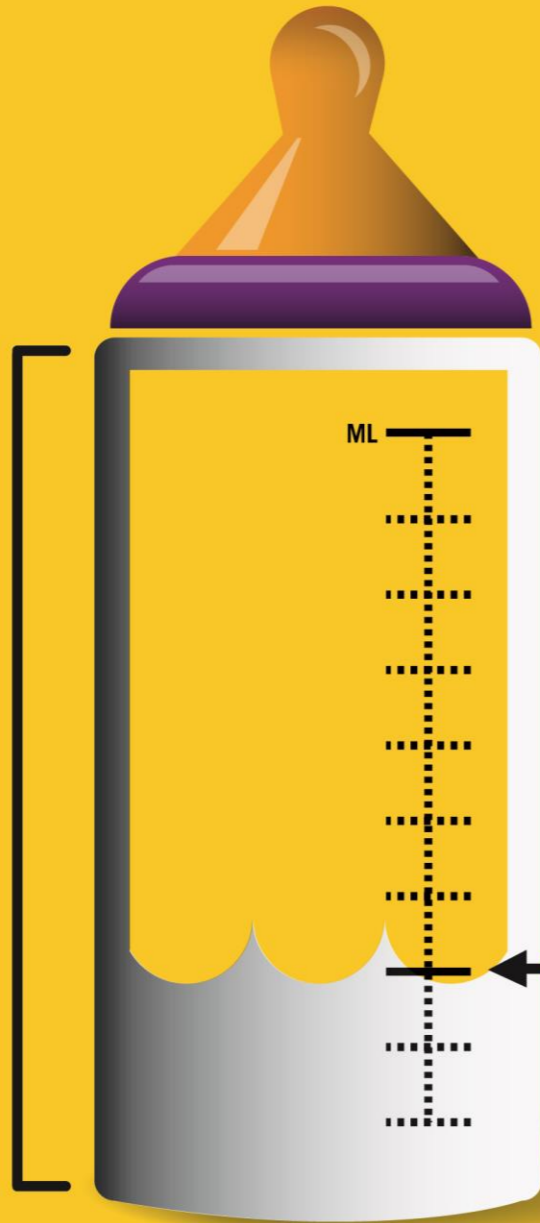
The Need for Reasoning and Sense Making

ROBERT KAPLINSKY

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.



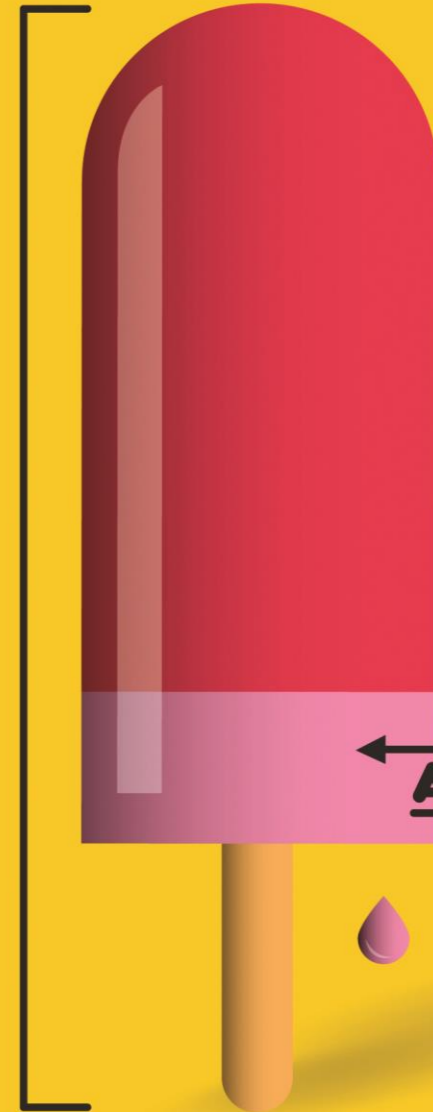
VISIT SAFERCAR.GOV/THERIGHTSEAT



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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 (125×5)
- 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.

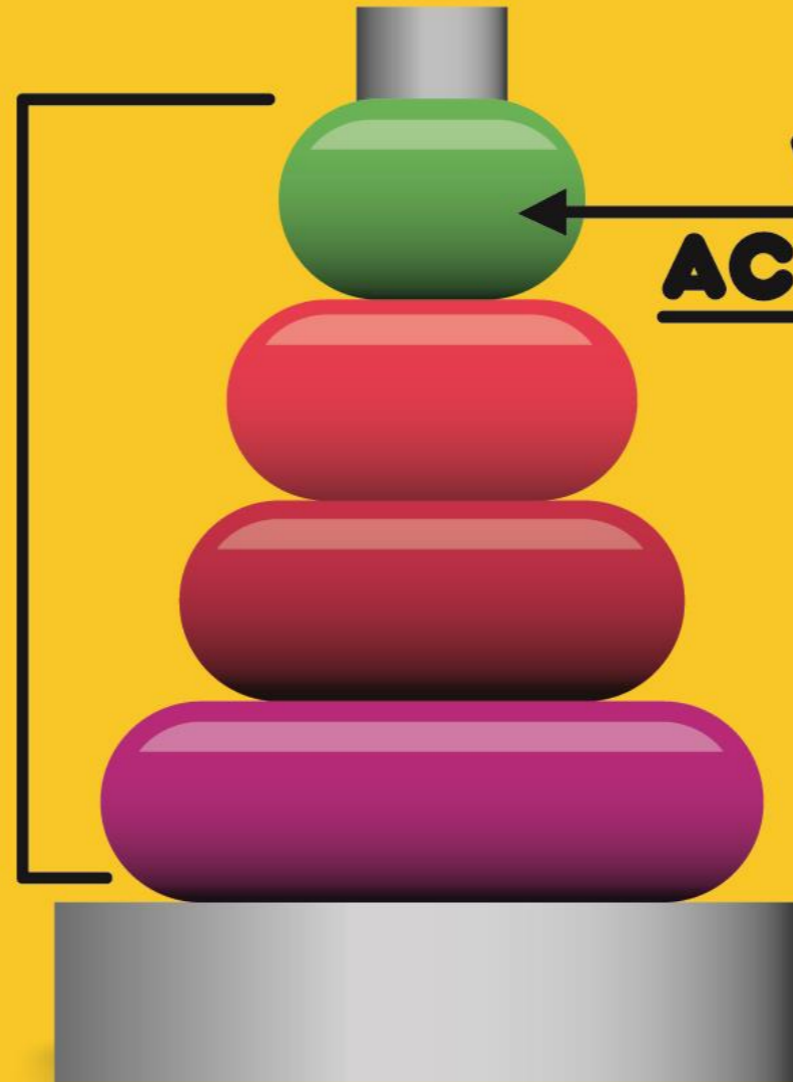
be reduced by about half if the correct child safety seats were always used.

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



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- “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



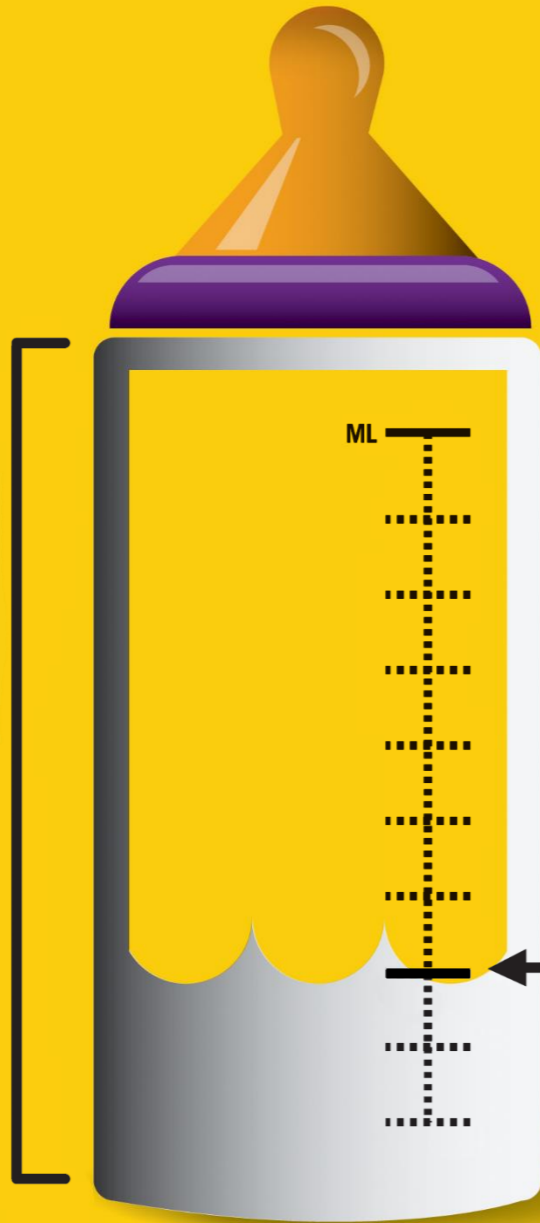
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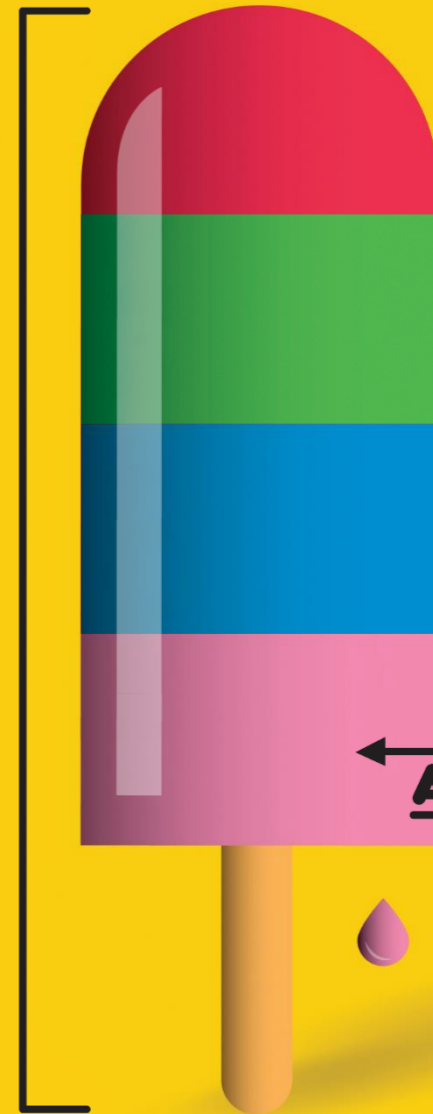
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New Student Expectations

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.

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.

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

SCIENCE

- 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.

- S1. Ask questions & define Problems.
- S3. Plan & carry out Investigations.
- S4. Analyze & interpret data.
- S6. Construct explanations & design solutions.
- S8. Obtain, evaluate & communicate Information.
- 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?





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

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

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

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

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

$\frac{1}{4}$





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.

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