@Math_Solutions #NCTMAnnual

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Noticing the Numbers

Students Using Computation Strategies Based on Reasoning

A division of Houghton Mifflin Harcourt

HMH

What do you notice? What do you wonder?

Photo courtesy of Genni Steele

Essential Questions

- What does it mean to be procedurally fluent?

- How do we move students toward making computational decisions based on number sense and reasoning?

When you hear the word…

efficiently

When you hear the word…

fluently

Fluency

"Being fluent means that students are able to choose flexibly among methods and strategies to solve contextual and mathematical problems, they understand and are able to explain their approaches, and they are able to produce accurate answers efficiently."

Principles to Actions, National Council of Teachers of Mathematics

Following a Procedure

$$
\begin{array}{r}
{\scriptstyle 1} \\
75 \\
\times\ 13 \\
\hline
225 \\
+850 \\
\hline
1075
\end{array}
$$

Fluency

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Building Fluency

Fluency builds from

- Initial exploration and discussion of number concepts
- To using informal reasoning strategies based on meanings and properties of the operations
- Through intentional practice that leads to the use of general methods as tools in solving problems

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Tell Me All You Can

Tell Me All You Can

$$48 \times 14$$

Tell Me All You Can

15 x 38

- The answer is going to be **about** ___ because _____.
- The answer is going to be **between** ____ and ____ because _____.
- The answer is going to be **less than** ____ because _____.

Reflect

- How does getting students to notice the numbers in Tell Me All You Can support fluency?
- What numbers and operations would you use with your own students?

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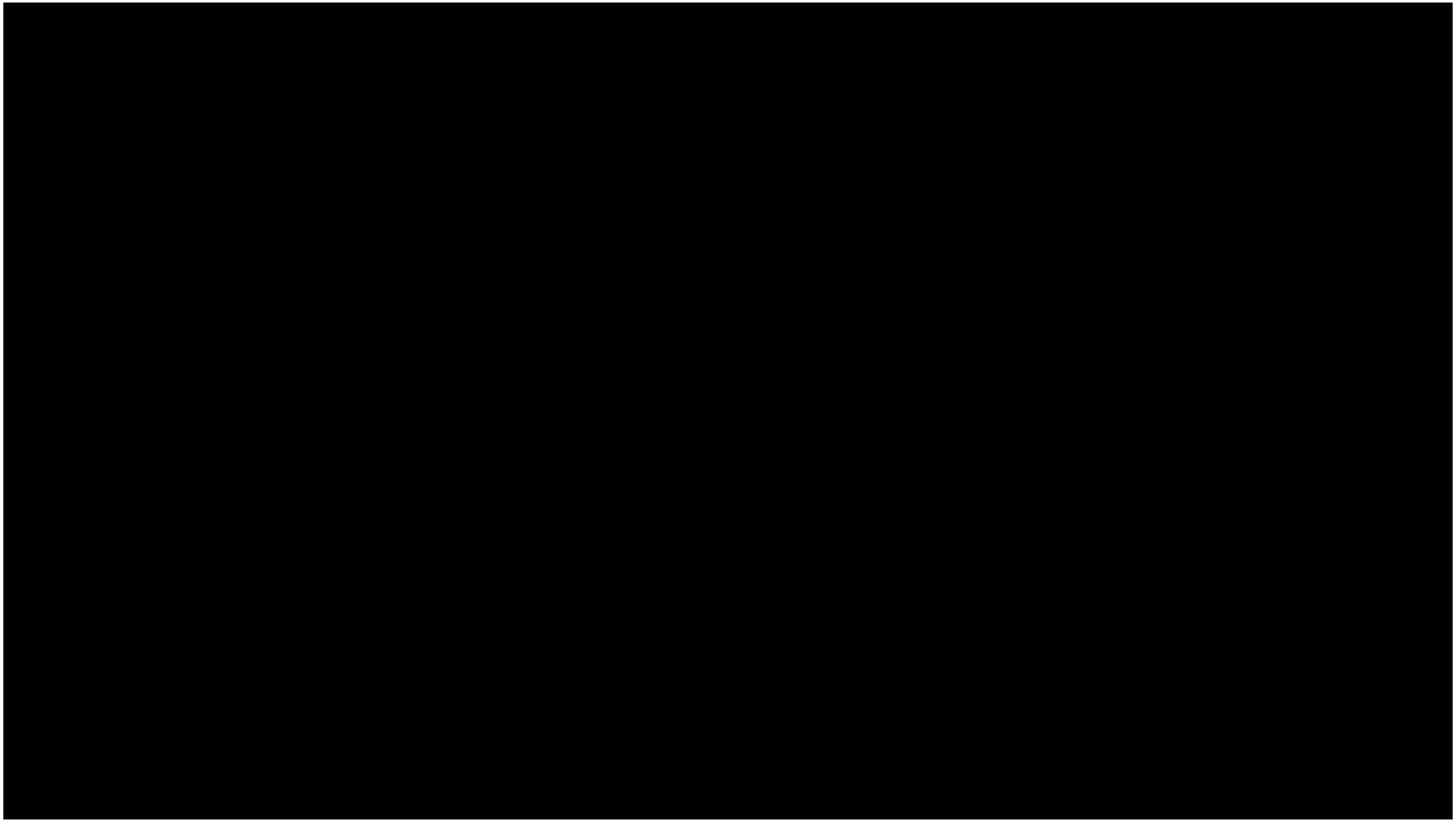
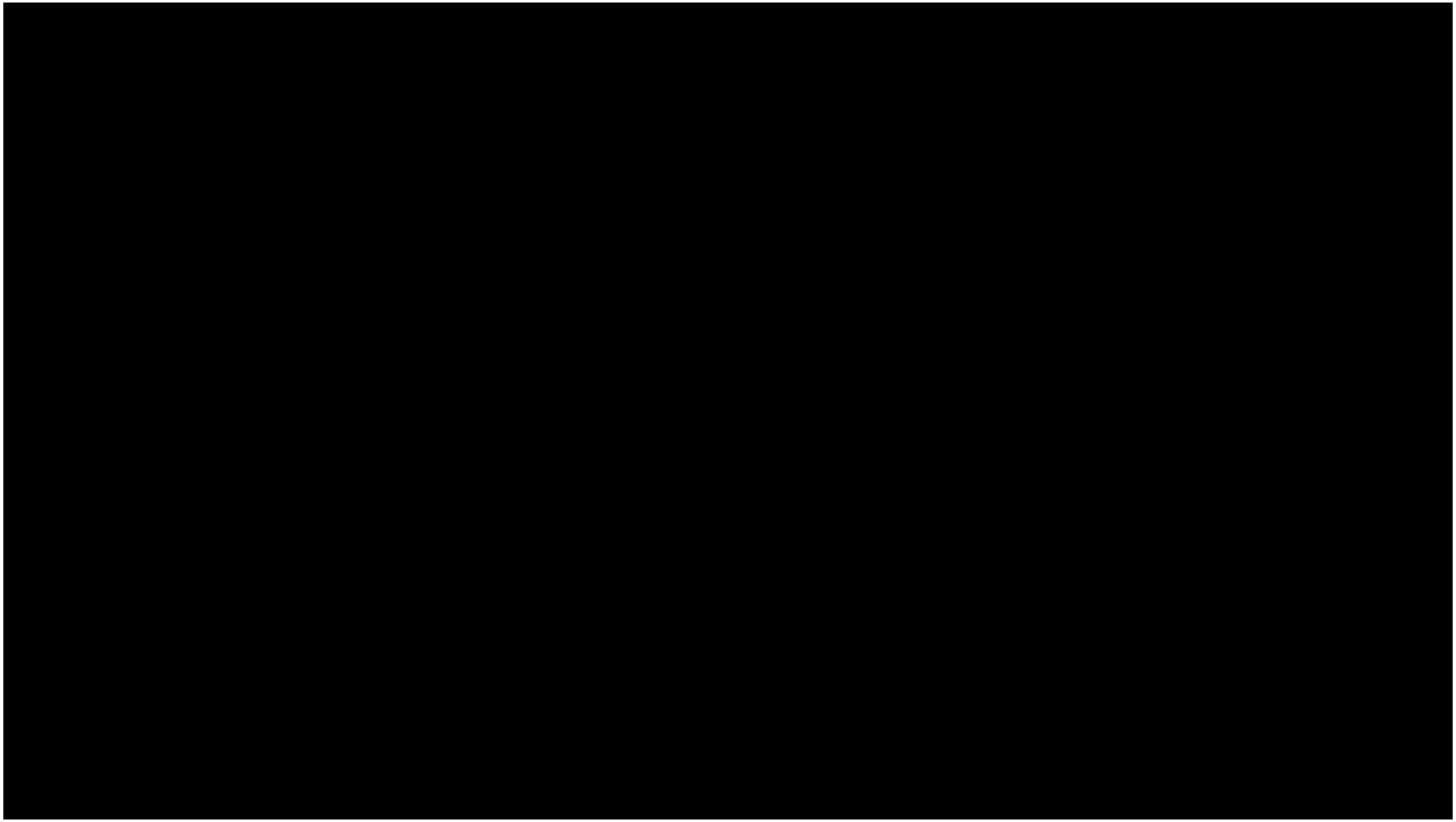
Solve using Mental Math

99 + 17

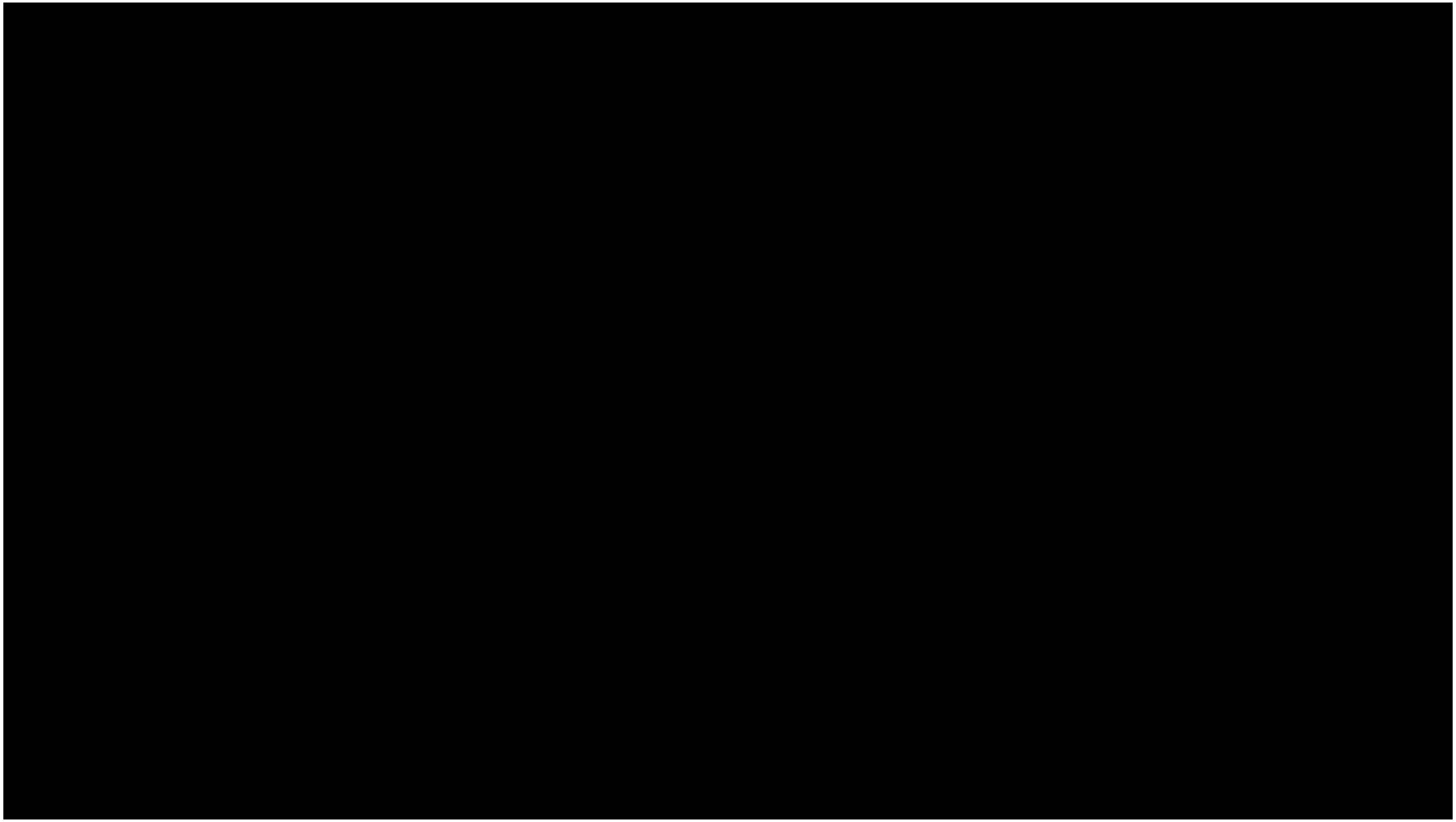
Dina



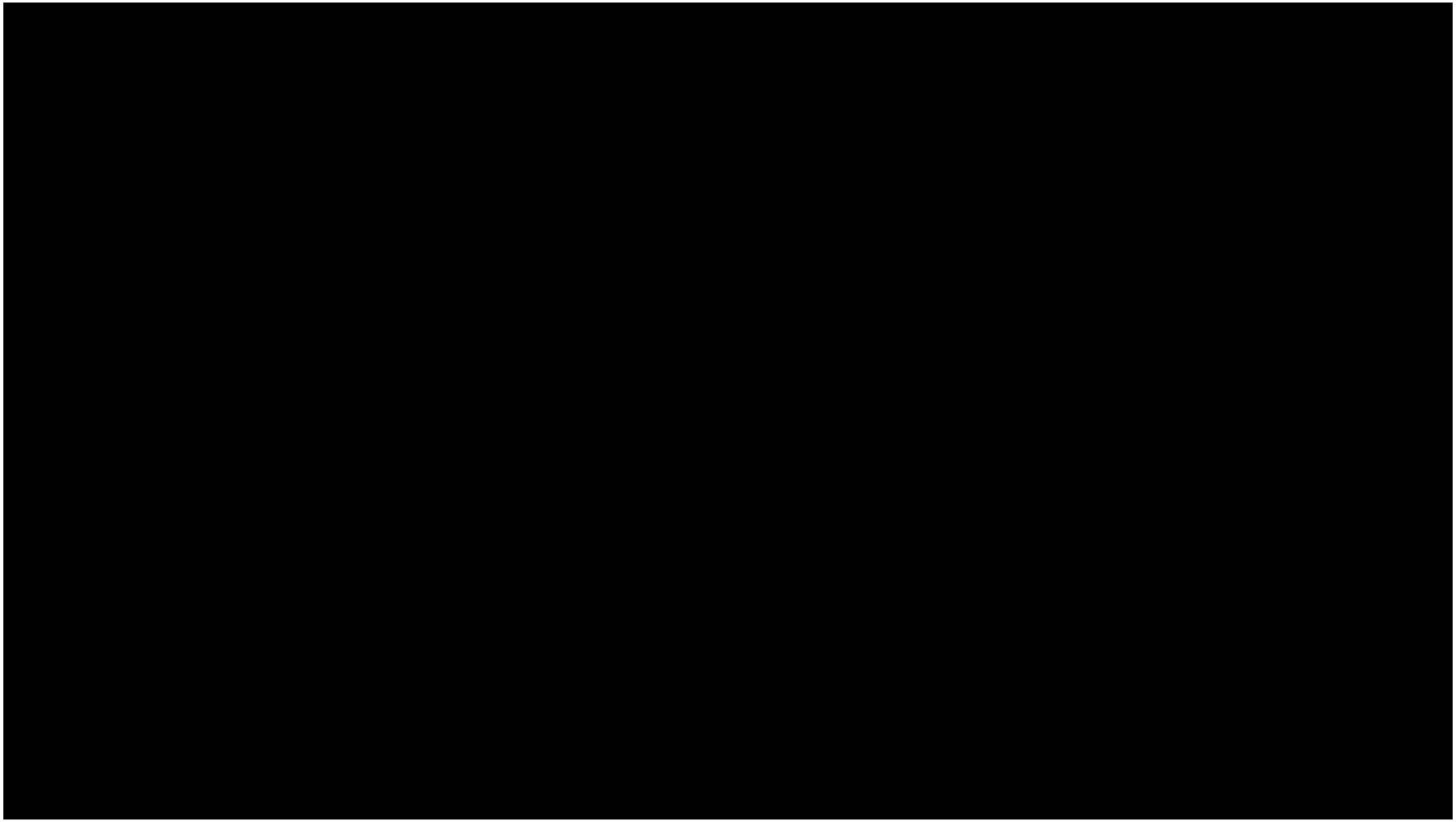
Manuel



Alberto



Amir



Reflect

- How does having students compare strategies support fluency?
- How would you implement this practice with your students?

Building Fluency

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Solidifying Knowledge

"In moving to fluency, students also need opportunities to rehearse or practice strategies and procedures to solidify their knowledge."

Principles to Actions, National Council of Teachers of Mathematics

Decimal Explorations

- Choose any 5 counting numbers and multiply each by .9 and record results

  What do you notice?
- Multiply the same 5 numbers by 1.5

  What do you notice?
- Multiply the numbers by 1.1

  What do you notice?
- Multiply the numbers by decimal numbers of your choice

  What do you notice?

Transforming Practice Problems

Traditional Practice

Find the Product.

28
X 3

56
X 6

71
X 5

69
X 8

36
X 4

Transformed Practice

Solve the problems that would result in an answer greater than 300.

28
X 3

56
X 6

71
X 5

69
X 8

36
X 4

Principles to Actions

Build procedural fluency from conceptual understanding **Teacher and student actions**	
What are *teachers* doing?	**What are *students* doing?**

Intentional practice that leads to the use of general methods as tools in solving problems

- Thinking about our own methods and how they connect to methods used by others

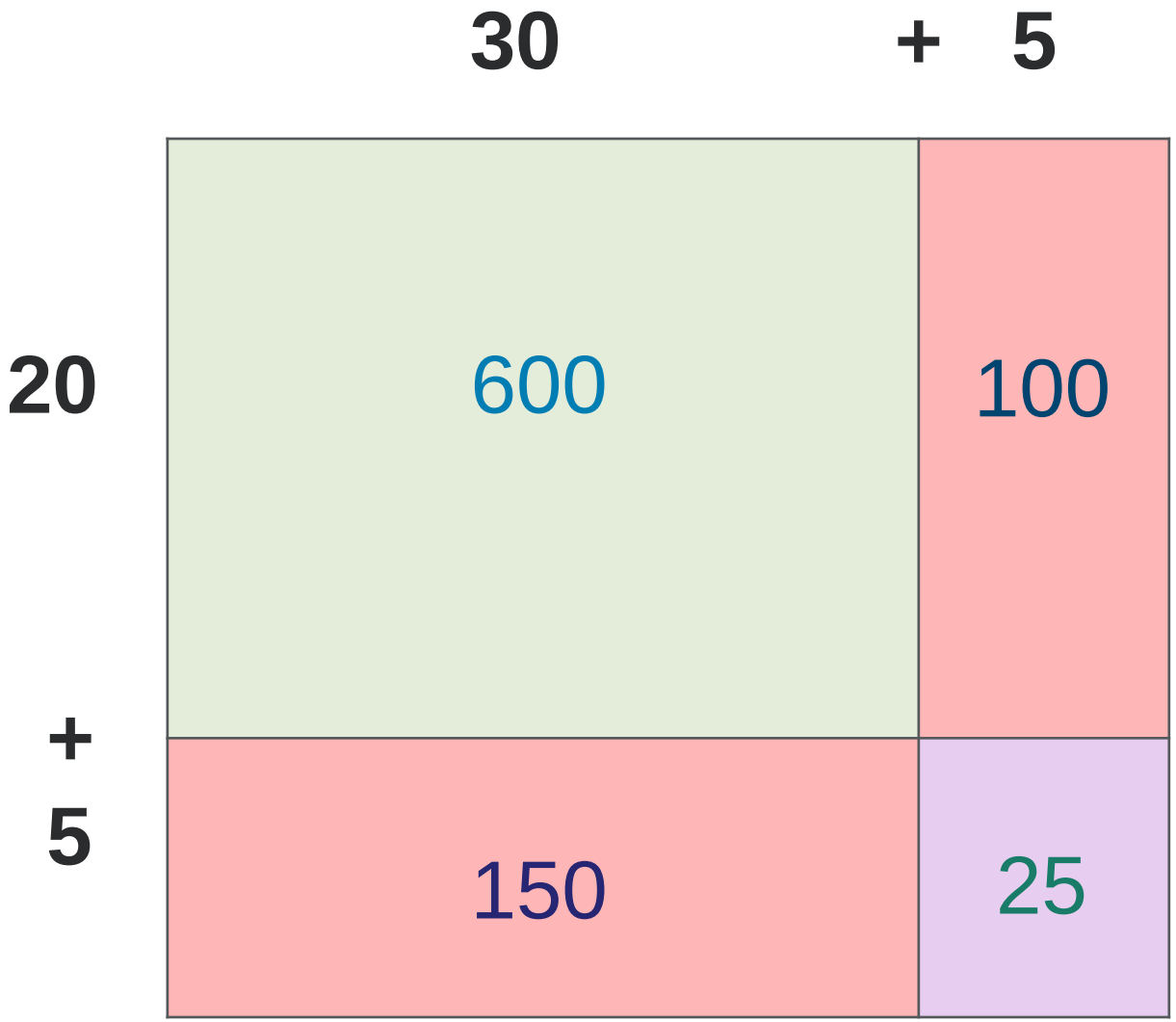
- Generalizability

Generalizability

Which student is using a method that would work for any two whole numbers?

Student A	Student B	Student C
35 x25 125 +75 875	35 x25 175 +700 875	35 x25 25 150 100 +600 875

Using Visual Models



35
x 25
25
150
100
+ 600
875

Reflect

- How do you currently provide practice for students? What new ideas do you have for providing practice?

Principles to Actions

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Essential Questions

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Thank You!

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