



+Big Idea #1

Multiplicative thinking extends through place value, percentages, scale, proportions, rate, ratio, arrays, division, fractions, decimals, etc.

What to look for, what might be evidence of understanding?

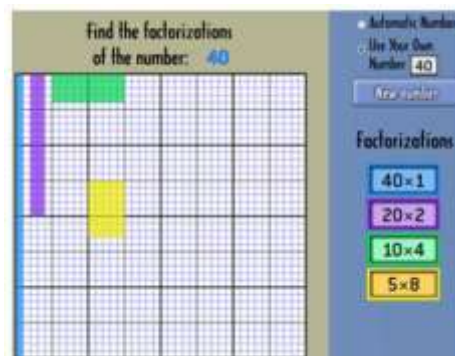
- Students understand place of a number, but not necessarily the value of the number. For example, in 324, the 2 is in the tens place. If you ask a student how many 10's are in 324, the correct answer is 32 tens.

+Big Idea #2

Multiplication can often be solved using repeated addition

What to look for, what might be evidence of understanding?

- Students see 3×4 as 3 groups of four and that this is different than 4 groups of three.
- Students can explain why 3×4 is equal to 4×3 .
- Students can also provide situations showing 3×4 and 4×3 are different. For example, 3 dogs with four legs is not the same as 4 dogs with three legs.
- Students see 40 as:
 - 1 forty
 - 2 twenties
 - 4 tens
 - 5 eights
 - 8 fives
 - 10 fours
 - 20 two
 - 40 ones



Warning

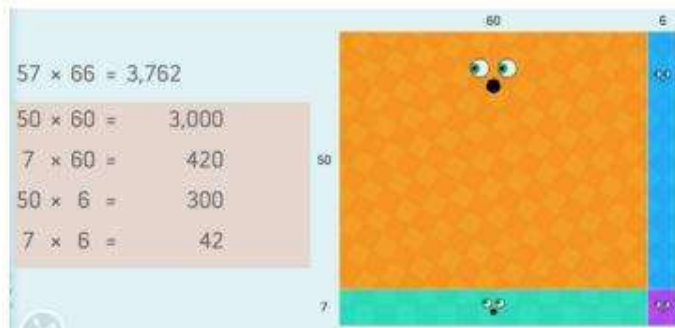
Multiplication cannot always be solved using repeated addition. For example, 2.5×3.8 and $\frac{1}{2} \times \frac{3}{4}$ can not be interpreted as repeated addition. However, this concept comes later in grades 7 and up.

+Big Idea #3

The distributive property is a powerful strategy for mental math.

What to look for, what might be evidence of understanding?

- Students decompose numbers in an advantageous manner such as:
 - $28 \times 30 = (20 \times 30) + (8 \times 30)$ or $(30 \times 30) - (2 \times 30)$
 - $12 \times 45 = (10 + 2) \times (40 + 5) = (10 \times 40) + (10 \times 5) + (2 \times 40) + (2 \times 5)$
 - 57×66



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- Evidence from top-end students.
 - $57 \times 66 = (60 - 3) \times (70 - 4)$

[Watch a useful video](#)* on distributive property.

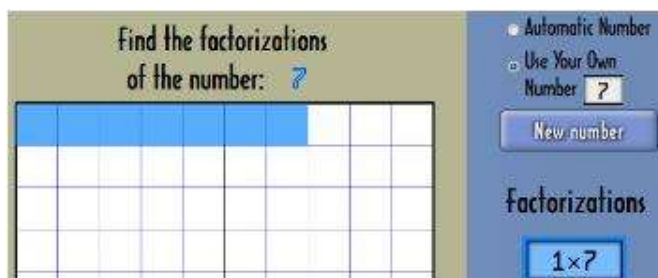
*Please note that you can demonstrate the distributive property in the same manner as shown on the video using Lego blocks.

+Big Idea #4

Multiplication and division by 1 and 0 have special properties.

What to look for, what might be evidence of understanding?

- When asked to build the area model for 7×1 , student would build a line of 7.



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- When asked to build the area model for 7×0 , student should say that this is not possible.

+Big Idea #5

Multiplication and division are inverse operations.

What to look for, what might be evidence of understanding?

- Given a pair of factors, students can
 - create the 4 multiplication and division statements that result. For example, 3 and 4: $3 \times 4 = 12$; $4 \times 3 = 12$; $12 \div 4 = 3$; $12 \div 3 = 4$
- Students understand that commutative property only applies to multiplication but not to division. Example: $3 \times 4 = 4 \times 3$ but $12 \div 4 \neq 4 \div 12$

Possible Resources

“Assessing Multiplicative Thinking Using Rich Tasks” – Dianne Siemon and Margarita Breed Contains several tasks you could use to check student understanding.

<http://www.aare.edu.au/data/publications/2006/sie06375.pdf>

“Scaffolding Numeracy in the Middle Years” – Australian Research Council Linkage Project Contains Assessment materials, learning plans, and authentic tasks.

<http://www.education.vic.gov.au/school/teachers/teachingresources/discipline/maths/assessment/pages/scaffoldnum.aspx>

