

Multiplication Models and Strategies

Professor Peabody is covering the floor of his hallway with square tiles that are 1 foot on each side. The hallway is 32 feet long and 4 feet wide.

32
4 $32 \times 4 = ?$

- Estimate the number of tiles that are in the hallway.
- Work with a partner to find out how many tiles Professor Peabody will need to cover his hallway.

Sharing Solution Strategies

Jason and Richard sketched rectangles to help them solve 32×4 .

32 is an even number so I broke it in half. $16 \times 4 + 16 \times 4$. To find 16×4 , I doubled 16 two times: $16 + 16 = 32$ and $32 + 32 = 64$. To find $16 \times 4 + 16 \times 4$, I added $64 + 64 = 128$.

16 16
4 $16 \times 4 = 64$ $16 \times 4 = 64$
 $32 \times 4 = 16 \times 4 + 16 \times 4$

I broke 32 into tens and ones. $30 + 2$. To solve $30 \times 4 + 2 \times 4$, first I skip counted by 30s: 30, 60, 90, 120. 4×2 is 8. $120 + 8 = 128$.

30 2
4 $30 \times 4 = 120$ $2 \times 4 = 8$
 $32 \times 4 = 30 \times 4 + 2 \times 4$

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Discuss

Mara's Way

Mara recorded her work like this:

$$\begin{array}{r} 32 \\ \times 4 \\ \hline 120 \\ + 8 \\ \hline 128 \end{array}$$

32 = 30 + 2 step 1
120 ← 30 × 4 step 2
+ 8 ← 2 × 4 step 3
128 answer

I broke 32 into tens and ones like Richard did. I solved $30 \times 4 + 2 \times 4$.

3. How is Mara's way like using the break-apart method with a rectangle?

Richard said, "Let me try to solve 26×3 your way."

$$\begin{array}{r} 26 \\ \times 3 \\ \hline 18 \\ + 60 \\ \hline 78 \end{array}$$

26 = 20 + 6
18 ← 6 × 3
+ 60 ← 20 × 3

$6 \times 3 + 20 \times 3$
 6×3
+
 20×3
bits
skinnies

4. Is Richard's answer reasonable? How do you know?

Jason recorded his work for 26×3 like this:

$$\begin{array}{r} 20 \\ \times 3 \\ \hline 60 \\ + \\ 6 \\ \times 3 \\ \hline 18 \\ \hline 78 \end{array}$$

5. A. How is Jason's way like Richard's way?
B. How is it different?

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Questions 1–5

- * Estimates will vary. Possible estimate: $30 \times 4 = 120$
- * 128 tiles
- * Possible response: Both methods break a product into simpler products. Then you add the partial products. It is like breaking a 32×4 rectangle into a 30×4 rectangle and a 2×4 rectangle. When Mara multiplies the 4 by the tens in 32, that matches the large 4×30 rectangle. When Mara multiplies the 4 by the ones in 32, that matches the small 4×2 rectangle.
- Richard's answer is reasonable. 26 is close to 25. $25 \times 3 = 75$, and 78 is close to that.
- A.* Possible response: Jason breaks the 26 into tens and ones, $20 + 6$, like Richard does. Then he records partial products like Richard does. He multiplies the tens times 3, 20×3 , and records 60. He multiplies the ones times 3, 6×3 , and records 18. They both add the partial products, $60 + 18$, to get the same product, 78.
- B.* Possible response: It looks different. Richard's problem is recorded in a vertical fashion. Jason's problems are written side by side. Jason multiplied 20×3 first. Richard multiplied 6×3 first.

