

Challenge

Mental Math

You can use this math trick to multiply two-digit numbers mentally. Break apart one factor and multiply to find each product. Then add.

Here is how you can use mental multiplication to find 23×35 .

First, break apart the first factor so that one part is a multiple of 10.

$$23 \times 35 = (20 \times 35) + (\text{_____} \times 35)$$

Then multiply to find each product.

Finally, add the products.

$$20 \times 35 = \text{_____} \quad \text{_____} + \text{_____} = \text{_____}$$

$$\text{_____} \times 35 = \text{_____}$$

$$23 \times 35 = \text{_____}$$

1. Suppose the order of the factors was changed to 35×23 . Would it be easier or harder to multiply mentally? Try it.

2. **Analyze** Is there a different way you could have found the product of 23×35 ? Explain.

Multiply mentally.

3. 21×45

4. 12×13

5. 34×25

6. 11×34

7. **Extend It** Make up two multiplication problems with two-digit factors. Use each of these four digits exactly once: 1, 3, 2, 5. One problem should be easy to solve mentally, and one should be more difficult. Solve your problems. Explain why one is more difficult to solve mentally than the other.

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You can use this math trick to multiply two-digit numbers mentally. Break apart one factor and multiply to find each product. Then add.

Here is how you can use mental multiplication to find 23×35 .

First, break apart the first factor so that one part is a multiple of 10.

$$23 \times 35 = (20 \times 35) + (\underline{\quad 3 \quad} \times 35)$$

Then multiply to find each product.

$$20 \times 35 = \underline{\quad 700 \quad}$$

$$\underline{\quad 3 \quad} \times 35 = \underline{\quad 105 \quad}$$

Finally, add the products.

$$\underline{\quad 700 \quad} + \underline{\quad 105 \quad} = \underline{\quad 805 \quad}$$

$$23 \times 35 = \underline{\quad 805 \quad}$$

1. Suppose the order of the factors was changed to 35×23 . Would it be easier or harder to multiply mentally? Try it.

Sample answer: It would be harder because when you break apart the first factor, you get $(30 \times 23) + (5 \times 23)$ which is not easy to multiply mentally.

2. **Analyze** Is there a different way you could have found the product of 23×35 ? Explain.

Answers will vary. Students may mention breaking apart differently, using physical models, or applying multiplication algorithms.

Multiply mentally.

3. 21×45	4. 12×13	5. 34×25	6. 11×34
$(20 \times 45) +$	$(10 \times 13) +$	$(30 \times 25) +$	$(10 \times 34) +$
$(1 \times 45) = 945$	$(2 \times 13) = 156$	$(4 \times 25) = 850$	$(1 \times 34) = 374$

7. **Extend It** Make up two multiplication problems with two-digit factors. Use each of these four digits exactly once: 1, 3, 2, 5. One problem should be easy to solve mentally, and one should be more difficult. Solve your problems. Explain why one is more difficult to solve mentally than the other.

Check students' work.