Properties of Operations

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

You may switch multiplication factors: $3 \times 4 = 4 \times 3 = 12$ (commutative). You may regroup three factors: $(2 \times 3) \times 4 = 2 \times (3 \times 4) = 24$ (associative). You may split a factor: $3 \times 7 = 3 \times 5 + 3 \times 2 = 21$ (distributive). Division does not allow switching the two numbers.

Worked example

Use $6 = 4 + 2$ to find 3×6. Show two smaller products.

1. $3 \times 4 = 12$ and $3 \times 2 = 6$.

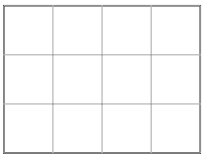
2. Add the parts: $12 + 6 = 18$, so $3 \times (4 + 2) = 18$.

Answer: 18.

Practice Problems

Show your thinking.

1. Use a turned array to complete $3 \times 4 = 4 \times \square$. Find both products.



2. Use $7 = 5 + 2$ to find 4×7. Show two smaller products.

3. Compute $(2 \times 2) \times 3$ and $2 \times (2 \times 3)$. What changes?

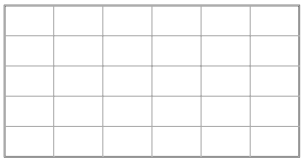
4. Ben says division can switch order: $20 \div 5 = 5 \div 20$. Test his claim.

5. Complete $6 \times 5 = 6 \times 2 + 6 \times \square$. Find the total.

6. Each of 3 tables needs 6 red cups and 2 blue cups. Find all cups using two products.

7. Compute $(4 \times 2) \times 2$ and $4 \times (2 \times 2)$. What changes?

8. Use a turned array to complete $5 \times 6 = 6 \times \square$. Find both products.



Answer Key

1. $\square = 3$; both products are 12.
2. 28.
3. Both are 12; only the grouping changes.
4. False; $20 \div 5 = 4$, but 5 cannot make even 1 group of 20.
5. $\square = 3$; total 30.
6. 24 cups.
7. Both are 16; only the grouping changes.
8. $\square = 5$; both products are 30.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The array has 3 rows of 4: $3 \times 4 = 12$.
2. Turning it gives 4 rows of 3: $4 \times 3 = 12$.

Problem 2

1. $4 \times 5 = 20$ and $4 \times 2 = 8$.
2. Add the parts: $20 + 8 = 28$, so $4 \times (5 + 2) = 28$.

Problem 3

1. Left grouping: $(2 \times 2) \times 3 = 4 \times 3 = 12$.
2. Right grouping: $2 \times (2 \times 3) = 2 \times 6 = 12$; the factors stay in the same order.

Problem 4

1. $20 \div 5 = 4$ because $5 \times 4 = 20$.
2. $5 < 20$, so sharing only 5 objects among 20 people cannot give 4 whole objects each.

Problem 5

1. The split factors must add to 5: $5 - (2) = 3$.
2. $6 \times 2 + 6 \times 3 = 12 + 18 = 30$.

Problem 6

1. Red cups: $3 \times 6 = 18$. Blue cups: $3 \times 2 = 6$.
2. Total: $18 + 6 = 24$ cups, the same as 3×8.

Problem 7

1. Left grouping: $(4 \times 2) \times 2 = 8 \times 2 = 16$.
2. Right grouping: $4 \times (2 \times 2) = 4 \times 4 = 16$; the factors stay in the same order.

Problem 8

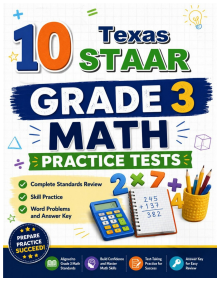
1. The array has 5 rows of 6: $5 \times 6 = 30$.
2. Turning it gives 6 rows of 5: $6 \times 5 = 30$.

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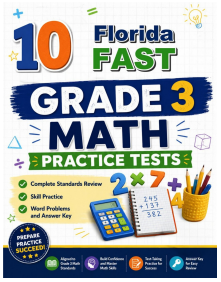
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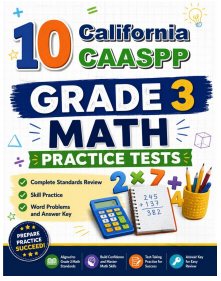
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