Prime and Composite Numbers

Prime and Composite Numbers: Models and Computation

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QUICK REVIEW

A prime whole number has exactly two positive factors, 1 and itself; 13 has factors $1, 13$. A composite has more than two; $15 = 3 \times 5$ has factors $1, 3, 5, 15$. The number 1 is neither. The only even prime is 2.

Worked example

Classify 22 as prime, composite, or neither. Show its factor pairs.

1. The complete factor pairs are $1 \times 22 = 22$, $2 \times 11 = 22$.
2. The positive factors are $1, 2, 11, 22$, a total of 4; more than two means composite.
Answer: 22 is composite.

Practice Problems

Show your thinking.

1. Classify 17 as prime, composite, or neither. Show its factor pairs.

2. How many different rectangular arrays of 21 tiles are possible if rotations count as the same? Use this to classify 21.

3. Classify 1 as prime, composite, or neither. Show its factor pairs.

4. Can 29 tokens make equal groups with more than one token per group and more than one group? Explain with factors.

5. Classify 24 as prime, composite, or neither. Show its factor pairs.

6. A student calls 2 composite because it is odd. Correct the classification with factors.

7. Can 35 tokens make equal groups with more than one token per group and more than one group? Explain with factors.

8. A designer has 16 square tiles. List every whole-number rectangle size, ignoring rotations, and decide whether 16 is prime.

Answer Key

1. 17 is prime.
2. 1×21, 3×7; 21 is composite.
3. 1 is neither prime nor composite.
4. No; 29 is prime.
5. 24 is composite.
6. 2 is prime.
7. Yes; 35 is composite.
8. 1×16, 2×8, 4×4; 16 is composite.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The complete factor pairs are $1 \times 17 = 17$.

2. The positive factors are $1, 17$, a total of 2; exactly two factors means prime.

Problem 2

1. The complete factor pairs are $1 \times 21 = 21$, $3 \times 7 = 21$.

2. The positive factors are $1, 3, 7, 21$, a total of 4; more than two means composite.

Problem 3

1. The complete factor pairs are $1 \times 1 = 1$.

2. The positive factors are 1, a total of 1; one factor means neither.

Problem 4

1. The complete factor pairs are $1 \times 29 = 29$.

2. The positive factors are $1, 29$, a total of 2; exactly two factors means prime.

Problem 5

1. The complete factor pairs are $1 \times 24 = 24$, $2 \times 12 = 24$, $3 \times 8 = 24$, $4 \times 6 = 24$.

2. The positive factors are $1, 2, 3, 4, 6, 8, 12, 24$, a total of 8; more than two means composite.

Problem 6

1. The complete factor pairs are $1 \times 2 = 2$.

2. The positive factors are $1, 2$, a total of 2; exactly two factors means prime.

Problem 7

1. The complete factor pairs are $1 \times 35 = 35$, $5 \times 7 = 35$.

2. The positive factors are $1, 5, 7, 35$, a total of 4; more than two means composite.

Problem 8

1. The complete factor pairs are $1 \times 16 = 16$, $2 \times 8 = 16$, $4 \times 4 = 16$.

2. The positive factors are $1, 2, 4, 8, 16$, a total of 5; more than two means composite.

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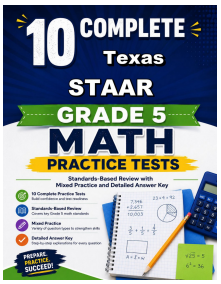

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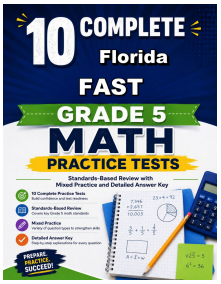

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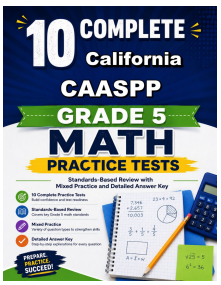

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