Geometry: Proportion Properties (Ratio & Similarity)

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DIRECTIONS *Apply the named proportion property to complete or verify each statement. Show all work.*

1 Means-Extremes Property. Find x:

$$\frac{6}{4} = \frac{x}{5}$$

Answer: _____

2 Alternation Property. If the proportion holds, rewrite using alternation:

$$\frac{4}{4} = \frac{8}{8} \Rightarrow \frac{4}{8} = \text{---}$$

Answer: _____

3 Inverse Property. Write the inverse proportion:

$$\frac{7}{7} = \frac{28}{28} \Rightarrow \frac{7}{7} = \text{---}$$

Answer: _____

4 Addition Property (Componendo). Complete:

$$\frac{8}{4} = \frac{16}{8} \Rightarrow \frac{x}{4} = \frac{24}{8}$$

Answer: _____

5 Subtraction Property (Dividendo). Complete:

$$\frac{9}{2} = \frac{18}{4} \Rightarrow \frac{x}{2} = \frac{14}{4}$$

Answer: _____

6 Componendo-Dividendo. Verify the property:

$$\frac{7}{3} = \frac{21}{9} \Rightarrow \frac{10}{4} = \frac{30}{12}$$

Answer: _____

7 Extended ratio. Find all three parts:

$$\text{Parts in ratio } 4:2:1, \quad \text{Total} = 28$$

Answer: _____

8 Cross-Products. Solve for x:

$$\frac{3}{4} = \frac{x+6}{16}$$

Answer: _____

9 Proportion Property for similar figures. Find x:

$$\frac{4}{16} = \frac{5}{x}$$

Answer: _____

10 Name the proportion property shown:

$$\frac{2}{3} = \frac{6}{9} \Rightarrow \frac{5}{3} = \frac{15}{9}$$

Answer: _____

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Answer Key & Solutions

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TEACHER NOTES *Cover: Means-Extremes (cross products), Alternation, Inverse, Componendo (Addition), Dividendo (Subtraction), Componendo-Dividendo, and extended ratios.*

1 Means-Extremes Property. Find x:

$\frac{6}{4} = \frac{x}{5}$

= $x = \frac{15}{2}$

Cross multiply: 6x = 4×5 = 20, x = 20/6.

2 Alternation Property. If the proportion holds, rewrite using alternation:

$\frac{4}{4} = \frac{8}{8} \Rightarrow \frac{4}{8} = \text{---}$

= $\frac{4}{8}$

Alternation: swap means. 4/4 = 8/8 → 4/8 = 4/8.

3 Inverse Property. Write the inverse proportion:

$\frac{7}{7} = \frac{28}{28} \Rightarrow \frac{7}{7} = \text{---}$

= $\frac{28}{28}$

Inverse: flip both fractions. b/a = d/c → 7/7 = 28/28.

4 Addition Property (Componendo). Complete:

$\frac{8}{4} = \frac{16}{8} \Rightarrow \frac{x}{4} = \frac{24}{8}$

= $x = 12$

Componendo: add denominator to numerator. (a+b)/b = (c+d)/d → (8+4)/4 = (16+8)/8.

5 Subtraction Property (Dividendo). Complete:

$\frac{9}{2} = \frac{18}{4} \Rightarrow \frac{x}{2} = \frac{14}{4}$

= $x = 7$

Dividendo: subtract denominator from numerator. (a-b)/b = (c-d)/d → (9-2)/2 = (18-4)/4.

6 Componendo-Dividendo. Verify the property:

$\frac{7}{3} = \frac{21}{9} \Rightarrow \frac{10}{4} = \frac{30}{12}$

= True: $10 \cdot 12 = 30 \cdot 4 = 120$

Check: 10×12 = 120 and 30×4 = 120. Equal ✓

7 Extended ratio. Find all three parts:

Parts in ratio $4:2:1$, Total $= 28$

= 16, 8, 4

Unit = 28÷(4+2+1) = 4. Parts: 4×4=16, 2×4=8, 1×4=4.

8 Cross-Products. Solve for x:

$\frac{3}{4} = \frac{x+6}{16}$

= $x = 6$

Cross multiply: 4(x+6) = 3×16 = 48. So 4x = 48-24 = 24, x = 6.

9 Proportion Property for similar figures. Find x:

$\frac{4}{16} = \frac{5}{x}$

= $x = 20$

Scale factor = 4. Cross multiply: 4x = 5×16 = 80. x = 80÷4 = 20.

10 Name the proportion property shown:

$\frac{2}{3} = \frac{6}{9} \Rightarrow \frac{5}{3} = \frac{15}{9}$

= Componendo (Addition)

Add denominator to numerator on both sides.

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