MATHEMATICS · GRADES 7-9

Solving proportions

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you scale a recipe up for a crowd, work out the real distance from a map, or find a missing price, whenever two ratios have to stay equal. A proportion says the relationship between two things stays the same, even as the amounts change. Once you know three of the four numbers, the fourth follows from keeping that relationship fixed. Cooks, map readers, and shoppers use this whenever a small amount has to be scaled up fairly.



Rule

Solving proportions: in a proportion the cross products are equal.

Cross-multiply, then solve for the missing number.

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Worked examples

EXAMPLE 1

Q Solve the proportion $\frac{3}{4} = \frac{x}{12}$.

SOLUTION

This is a solve-for-x question, so start with the one rule to remember: cross-multiply, then divide.

Cross-multiplying gives $3 \times 12 = 4 \times x$, which is $36 = 4x$. Divide both sides by 4 to get x on its own.

So $x = 9$. Check it: $\frac{9}{12}$ simplifies to $\frac{3}{4}$, so it is right.

EXAMPLE 2

Q On a map, 1 cm stands for 20 km. Two towns are 3.5 cm apart on the map. How far apart are they in real life?

SOLUTION

This is a map-scale question, and a map scale is a proportion: the map distance and the real distance are always in the same ratio.

Set it up: $\frac{1\text{ cm}}{20\text{ km}} = \frac{3.5\text{ cm}}{x\text{ km}}$. Cross-multiply: $1 \times x = 20 \times 3.5$, so $x = 70$.

So the towns are 70 km apart in real life.

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Practice questions

1 Solve $\frac{2}{3} = \frac{x}{9}$

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2 Solve $\frac{5}{x} = \frac{10}{6}$

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3 Solve $\frac{x}{8} = \frac{3}{4}$

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4 Is $\frac{2}{3} = \frac{7}{12}$ a true proportion?

- A Yes
- B No

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5 Is $\frac{4}{9} = \frac{12}{27}$ a true proportion?

- A Yes
- B No

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6 A recipe uses 2 cups of flour for 3 cups of milk. How much flour do you need for 9 cups of milk?

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7 **A car travels 150 miles on 5 gallons of gas. How far will it travel on 8 gallons?**

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8 **Five apples cost $3. How much do 20 apples cost?**

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9 **A map scale is 1 inch to 10 miles. How many miles is 4 inches on the map?**

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10 If 13 dog bones cost $1.97, what will 7 dog bones cost? Round to the nearest cent.

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ANSWER KEY

1. 6

2. 3

3. 6

4. No

5. Yes

6. 6 cups

7. 240 miles

8. $12

9. 40 miles

10. $1.06

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