Equations in context: quantities, rates and conditions

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Worked example 1

Two groups collected 32 cards in total. The larger group collected 8 more than the smaller. Let x be the smaller group’s number. Find both numbers.

Guided attempt 2

A walker moves at 60 m/min. A runner starts from the same point 2 minutes later at 80 m/min in the same direction. Speeds stay constant. Let x be the runner’s time until catching up. Find x.

1. Walker: time ____ min; distance ____ m.
2. Runner: time ____ min; distance ____ m.
3. Equal-distance equation: ____.

Prerequisite 3

One worker completes 1/6 of a job each hour and another completes 1/3. Find their combined hourly rate.

$$\frac{1}{6}+\frac{1}{3}$$

Prerequisite 4

Profit is 20% of a 50-dollar cost. Find the profit, not the selling price.

$$\frac{20}{100}\times 50$$

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Independent practice 5

Notebooks cost 4 dollars each, plus a single 3-dollar packing fee. The total is 27 dollars. Let x be the number of notebooks. Find x.

Independent practice 6

Two workers would finish the same job alone in 4 hours and 6 hours. They work together at constant independent rates. Let x be their time together. Find x.

Independent practice 7

A product sells for 60 dollars at a profit of 20% of its cost. Let the cost be x dollars. Find x.

Independent practice 8

The ratio of boys to girls is 2:3 and there are 35 pupils. Let x be the number of boys. Find x and check both counts.

Exit question 9

An item marked at 80 dollars is sold at 25% off. That selling price is 20% above cost. Let cost be x dollars. Find x and identify both percentage bases.

Exit question 10

The first 20 units cost 2 dollars each; additional units cost 3 dollars each. A bill is 49 dollars. Let x be total units used. Choose the correct branch, solve and check its condition.