

Algebra in everyday life: the twelve equations

Situation	Equation	Example
1. A sale with tax	$\text{Price} = P \times (1 - \text{discount}) \times (1 + \text{tax})$	\$80, 30% off, 8% tax: $80 \times 0.70 \times 1.08 = \$60.48$
2. Two phone plans	$20 + 0.05m = 35$	$m = 300$ minutes: below it A is cheaper, above it B
3. Scaling a recipe	$\text{flour} = 300 \times n/4$	For 7: 525 g
4. Fuel range	$\text{distance} = \text{km per litre} \times \text{litres}$	$14 \times 15 = 210$ km
5. Savings	$A = P(1 + r)^t$	\$1,000 at 4%: \$1,217 after 5 years, \$2,026 after 18
6. A loan	$I = Prt$	$\$5,000 \times 0.06 \times 3 = \$900$
7. A medicine dose	$\text{dose} = \text{mg per kg} \times \text{weight} \div \text{doses}$	$15 \times 24 \div 3 = 120$ mg
8. Splitting a bill	$\text{each} = \text{bill} \times (1 + \text{tip}) \div \text{people}$	$96 \times 1.18 \div 4 = \$28.32$
9. Temperature	$F = 1.8C + 32$; $C = (F - 32)/1.8$	$25^\circ\text{C} = 77^\circ\text{F}$; $100^\circ\text{F} = 37.8^\circ\text{C}$
10. When to leave	$t = d/s$	$180/80 = 2.25$ h = 2 h 15 min
11. Target heart rate	$0.70 \times (220 - \text{age})$	Age 15: 143.5 bpm
12. Paint or flooring	$\text{packs} = \text{area} \times 1.10 \div \text{pack size}$	$4.5 \times 3.6 \times 1.10 \div 2 = 8.91$, so 9 packs

Why the letter matters

One case can be worked with numbers; the letter gives every case (a spreadsheet formula), finds the turning point (set two rules equal), and lets you go backwards (rearrange: weight from dose, Celsius from Fahrenheit).

Twelve problems (grades 7 to 10)

1. A \$120 pair of shoes is 25% off, then 7% tax is added. Final price?
2. Gym A: \$30 a month plus \$2 a class. Gym B: \$50 a month, classes free. At how many classes a month do they cost the same?
3. A recipe for 6 uses 450 g of rice. How much for 10 people?
4. A car does 12 km per litre. How many litres for a 300 km trip? At \$1.50 a litre, what does the fuel cost?
5. \$2,000 is saved at 5% a year, compounded yearly. How much after 3 years? (to the nearest dollar)
6. A \$4,000 loan at 7% simple interest for 2 years. Total repaid?
7. A syrup is 10 mg per kg of body weight per day in two doses. A child weighs 32 kg. Each dose?
8. A \$75 bill, 20% tip, 3 people. Each pays?
9. Convert 30 °C to Fahrenheit, and 50 °F to Celsius.
10. A 225 km drive at an average of 90 km/h. How long? If you must arrive by 11:00, latest departure?
11. A 40-year-old trains at 65% of maximum heart rate (220 minus age). Target?
12. A room 5 m by 4 m needs flooring sold in 2.5 m² packs; allow 10% waste. How many packs?

Answers

1) $120 \times 0.75 \times 1.07 = \$96.30$ 2) $30 + 2c = 50$, $c = 10$ classes 3) 750 g 4) 25 litres; \$37.50 5) $2000 \times 1.05^3 = \$2,315$ 6) $I = 4000 \times 0.07 \times 2 = \$560$; \$4,560 7) $10 \times 32 \div 2 = 160$ mg 8) $75 \times 1.20 \div 3 = \$30$ 9) 86 °F; 10 °C 10) 2.5 h; 8:30 11) $0.65 \times 180 = 117$ bpm 12) $20 \times 1.10 \div 2.5 = 8.8$, so 9 packs

Write one of your own

The situation: _____

The rule with a letter: _____

A worked number: _____

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