Day 121 **B Tier 10-a-day: Model Solutions**

1 Probability of not happening

The probability that a bus is late is 60%.
Work out the probability that a bus is not late.

Probabilities add up to 100%
100% − 60% = 40%
Answer: 40%

2 Multiplying and dividing

Work out
(a) 570 × 9
(b) 945 ÷ 15

(a) 500 × 9 = 4500 and 70 × 9 = 630, so the total is 5130
(b) 15 × 60 = 900 and 945 − 900 = 45, then 45 ÷ 15 = 3, so 60 + 3 = 63
Answer: (a) 5130 (b) 63

3 Map scales

The scale of a map is 1 : 25,000.
Two villages are 2.75 km apart.
How far apart are they on the map?
Give your answer in centimetres.

2.75 km = 275,000 cm
Divide by 25,000: 275,000 ÷ 25,000 = 11
Answer: 11 cm

4 Gradient and intercept

A straight line has equation $y = -3x - 7$
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, 3).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, −3
It crosses the y-axis at 3, so c = 3
Answer: (a) −3 (b) y = −3x + 3

5 Midpoint and length of a line

A is the point (−2, −2) and B is the point (−8, −3). (Calculator)
(a) Work out the coordinates of the midpoint of AB.
(b) Work out the length of AB. Give your answer correct to 1 decimal place.

(a) Midpoint = (−10 ÷ 2, −5 ÷ 2) = (−5, −2.5)
(b) Horizontal distance = 6, vertical distance = 1
$AB^2 = 6^2 + 1^2 = 36 + 1 = 37$
$AB = \sqrt{37} = 6.083...$
Answer: (a) (−5, −2.5) (b) 6.1

6 Distance-time graphs

The graph shows Jack's journey.
(a) How far did Jack travel in the first 60 minutes?
(b) Work out Jack's speed in the last 60 minutes. Give your answer in km/h.

(a) Read from the graph at 60 minutes: 8 km
(b) In the last section the distance changes by 8 km in 60 minutes
8 ÷ 1 = 8 km/h
Answer: (a) 8 km (b) 8 km/h

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7 Repeated percentage change

The price of a laptop is £80.
The price is first reduced by 30%, then the new price is increased by 10%.
(a) Work out the final price.
(b) Work out the overall percentage decrease in the price.

(a) Multipliers: 0.7 and 1.1
80 × 0.7 × 1.1 = £61.60
(b) Overall multiplier = 0.77
Overall decrease = 23%
Answer: (a) £61.60 (b) 23% decrease

8 Area of a triangle using sine

In triangle ABC, AB = 17 m, BC = 8 m and angle ABC = 30°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 17 × 8 × sin 30°
= 34.000...
= 34.0 m^2 (1 d.p.)
Answer: 34.0 m^2

9 Simultaneous equations problem

A cafe sells cakes and drinks. All cakes cost the same and all drinks cost the same.
1 cake and 1 drink cost £5.
2 cakes and 1 drink cost £7.
Work out the cost of one cake and the cost of one drink.

Let a = cost of one cake and b = cost of one drink
1a + 1b = 5 and 2a + 1b = 7
Subtract: 1a = 7 − 5 = 2, so a = 2
Substitute: 1 × 2 + 1b = 5, so 1b = 3 and b = 3
Answer: One cake costs £2 and one drink costs £3

10 Harder linear equations

Solve 22 − 5x = 2x − 13

Add 5x to both sides: 22 = 7x − 13
Add 13 to both sides: 35 = 7x
Divide both sides by 7
Answer: x = 5