Day 23 **B Tier 10-a-day: Model Solutions**

1 Equation of a line

Line L has equation $y = -4x + 6$
Line M is parallel to line L and passes through the point (3, 2).
Find the equation of line M.

Parallel lines have the same gradient, so line M is $y = -4x + c$
Substitute $x = 3$ and $y = 2$: $2 = -4 \times 3 + c$
$c = 2 - (-12) = 14$
Answer: $y = -4x + 14$

2 Speed

A runner travels 4 km in 30 minutes.
Work out its average speed in km per hour.

Speed = distance ÷ time
Time = 0.5 hours
4 ÷ 0.5 = 8
Answer: 8 km per hour

3 Using a given calculation

Use the fact that $31 \times 36 = 1116$
to work out
(a) 310×3600
(b) $1116 \div 3.1$

(a) $310 = 31 \times 10$ and $3600 = 36 \times 100$
So the answer is $1116 \times 1000 = 1{,}116{,}000$
(b) 1116 is unchanged and $3.1 = 31 \div 10$
$1116 \div 31 = 36$, so the answer is $36 \times 10 = 360$
Answer: (a) 1,116,000 (b) 360

4 Distance, speed and time

A lorry travels at a constant speed of 60 km/h for 10 minutes.
How far does it travel?

10 minutes = $\frac{1}{6}$ hour

Distance = speed × time = $60 \times \frac{1}{6} = 10$

Answer: 10 km

5 Percentage change

Chloe bought a bike for £500 and sold it for £800.
Work out the percentage profit.

Profit = selling price − cost = £300

Percentage profit = $\frac{£300}{£500} \times 100 = 60\%$

Answer: 60% profit

6 Circle theorems

A, B, C and D are points on a circle.
Angle ACB = 33°.
Work out the size of angle ADB, marked y.
Give a reason for your answer.
The diagram is not drawn accurately.

Angles in the same segment are equal
$y = 33°$
Answer: $y = 33°$

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7 Changing the subject

Make l the subject of the formula

P = 2l + 2w

Subtract 2w from both sides: P − 2w = 2l

Divide both sides by 2

Answer: $\mathbf{l = \frac{P - 2w}{2}}$

8 Venn diagram problems

27 households were asked.

18 of them have a cat and 7 of them have a dog.

2 of them did both.

(a) How many did neither?

(b) One is chosen at random. Find the probability that they have a cat but do not have a dog.

(a) Union = 18 + 7 − 2 = 23

Neither = 27 − 23 = 4

(b) Only have a cat = 18 − 2 = 16

P = 16 out of 27

Answer: (a) 4 (b) $\mathbf{\frac{16}{27}}$

9 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 25 m and 9 m.

Each sloping side is 10 m long.

(a) Work out the perpendicular height of the trapezium.

(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is 25 − 9 = 16, so each end sticks out 8

$h^2 = 10^2 - 8^2 = 100 - 64 = 36$, so h = 6

(b) Area = ½ × (25 + 9) × 6 = 102

Answer: (a) 6 m (b) 102 m^2

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 20%. (Calculator)

Two weeks later it is reduced by a further 10% of the new price.

The final price is £72.

Work out the original price of the sofa.

Multipliers: 0.8 and 0.9

Overall multiplier = 0.8 × 0.9 = 0.72

Original price = £72 ÷ 0.72 = £100

Answer: £100