Day 4 **B Tier 10-a-day: Model Solutions**

1 Points on a line

Does the point (5, −8) lie on the line
$y = -3x + 7$?
You must show your working.

Put x = 5 into the equation: $y = -3 \times 5 + 7 = -8$
The y-coordinate of the point is −8, which is −8
Answer: Yes, when x = 5 the line has y = −8

2 Distance, speed and time

A tractor leaves at 8:15 am.
It travels 60 km at an average speed of 12 km/h.
At what time does it arrive?

Time = 60 ÷ 12 = 5 hours = 5 hours
8:15 am + 5 hours = 1:15 pm
Answer: 1:15 pm

3 Solving inequalities

Solve $\frac{p}{3} + 4 \geq 10$

Subtract 4 from both sides: $\frac{p}{3} \geq 6$

Multiply both sides by 3
Answer: $p \geq 18$

4 Ratio to fraction and percentage

The ratio of sweet to salted packets of crisps is 9 : 8.
What fraction of them are sweet?

Total parts = 9 + 8 = 17
sweet are 9 out of 17 parts
Answer: $\frac{9}{17}$

5 Wages and overtime

Sophie is paid £13 per hour for a 37 hour week. (Calculator)
Overtime is paid at double time.
In one week she works 5 hours of overtime.
Work out her total pay for that week.

Normal pay: 37 × £13 = £481
Overtime rate: £13 × 2 = £26 per hour
Overtime pay: 5 × £26 = £130
Total: £481 + £130 = £611
Answer: £611

6 Inverse proportion

6 machines take 10 hours to make a batch of parts.
All the machines work at the same rate.
How long would it take 10 machines?

The total work stays the same: 6 × 10 = 60 machines-hours
With 10 machines: 60 ÷ 10 = 6 hours
Answer: 6 hours

Day 4 **B Tier 10-a-day: Model Solutions**

7 Isosceles triangles and Pythagoras

Triangle PQR is isosceles with PQ = PR = 17 cm.
The base QR = 16 cm.
(a) Work out the perpendicular height of the triangle.
(b) Work out the area of the triangle.

(a) The height splits the base in half: 16 ÷ 2 = 8
$h^2 = 17^2 - 8^2 = 289 - 64 = 225$, so h = 15
(b) Area = ½ × 16 × 15 = 120
Answer: (a) 15 cm (b) 120 cm^2

8 Estimation

Estimate the value of

$$\frac{51.4}{0.167} + 4.15$$

Show your rounding to 1 significant figure.

Round each number to 1 significant figure: 51.4 → 50, 4.15 → 4, 0.167 → 0.2
Estimate = 50 ÷ 0.2 + 4 = 254
Answer: 254

9 Trigonometry: finding an angle

Calculate the size of angle x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

We know the opposite (8 m) and the adjacent (6 m), so use tan

$\tan x = \frac{8}{6}$

$x = \tan^{-1}(\frac{8}{6}) = 53.130...$

x = 53.1° (1 d.p.)
Answer: x = 53.1°

10 Bounds

The length of a rectangle is 27 cm and its width is 29 cm.
Both measurements are correct to the nearest cm.
Work out the lower bound for the area of the rectangle.

Lower bound of each side = value − 0.5: 26.5 cm and 28.5 cm
Area = 26.5 × 28.5 = 755.25 cm^2
Answer: 755.25 cm^2