Day 327 **B Tier 10-a-day: Model Solutions**

1 Time

A film starts at 6:45 pm.
It lasts 3 hours 35 minutes.
At what time does it finish? Give your answer using am or pm.

6:45 pm + 3 hours = 9:45 pm
9:45 pm + 35 minutes = 10:20 pm
Answer: 10:20 pm

2 Points on a line

Does the point (−1, −4) lie on the line
$y = 4x + 3$?
You must show your working.

Put $x = -1$ into the equation: $y = 4 \times (-1) + 3 = -1$
The y-coordinate of the point is −4, which is not −1
Answer: No, when $x = -1$ the line has $y = -1$

3 Metric units

(a) Change 3.7 m to cm.
(b) Change 1630 m to km.

(a) 1 m = 100 cm, so multiply by 100: $3.7 \times 100 = 370$
(b) 1 km = 1000 m, so divide by 1000: $1630 \div 1000 = 1.63$
Answer: (a) 370 cm (b) 1.63 km

4 Map scales

The scale of a map is 1 : 100,000.
Two towns are 12.5 cm apart on the map.
Work out the real distance between the towns.
Give your answer in kilometres.

12.5 × 100,000 = 1,250,000 cm
100 000 cm = 1 km, so divide by 100 000
= 12.5 km
Answer: 12.5 km

5 Bearings

The bearing of M from L is 196°.
Work out the bearing of L from M.

196 is more than 180, so subtract 180°
196 − 180 = 16
Answer: 016°

6 Difference of two squares

Factorise $9 - y^2$

$9 = 3^2$, so this is a difference of two squares
$3^2 - y^2 = (3 - y)(3 + y)$
Answer: $(3 - y)(3 + y)$

7 Area of a triangle using sine

In triangle XYZ, XY = 14 m, YZ = 8 m and angle XYZ = 35°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 14 × 8 × sin 35°
= 32.120...
= 32.1 m^2 (1 d.p.)
Answer: 32.1 m^2

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8 Stratified sampling

A stratified sample of 40 students is taken from the 1000 students in the table.
Work out how many students should be sampled from Year 9.

Sample fraction = 40 ÷ 1000
Year 9: 200 ÷ 1000 × 40 = 8
Answer: 8

9 Volume of cones and pyramids

A cone has base radius 3 cm and vertical height 3 cm.

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Work out the volume of the cone.
Give your answer in terms of π.

Volume = $\frac{1}{3} \times \pi \times 3^2 \times 3$

$= \frac{1}{3} \times \pi \times 9 \times 3 = 9\pi$

Answer: 9π cm^3

10 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at 40 ÷ 2 = 20: read across from 20 on the vertical axis to the curve, then down: 28
(b) Lower quartile at 10: 12.5. Upper quartile at 30: 60
IQR = 60 − 12.5 = 47.5
Answer: (a) 28 minutes (b) 47.5 minutes