Day 306 **B Tier 10-a-day: Model Solutions**

1 Bar charts

The bar chart shows some information.
(a) Write down the mode.
(b) What fraction of the total is Thu? Give your answer in its simplest form.

(a) The tallest bar is Thu
(b) Total = 5 + 5 + 15 + 20 + 10 = 55
Thu = 20, so the fraction is 20 out of 55

Answer: (a) Thu (b) $\frac{4}{11}$

2 Percentages of amounts

Work out
(a) 30% of £140
(b) 5% of 180

(a) 10% of £140 = £14
30% = 3 × £14 = £42
(b) 10% of 180 = 18
5% of 180 = 9
5% = 9 = 9
Answer: (a) £42 (b) 9

3 Cost formulae

A gym charges a joining fee of £7 and £3 for each month of membership.
(a) Work out the total cost for 6 months.
(b) The total cost is £28. Work out the number of months.

(a) 3 × 6 = 18, then 7 + 18 = 25
(b) Take off the fixed charge: 28 − 7 = 21
Divide by the cost for each: 21 ÷ 3 = 7
Answer: (a) £25 (b) 7

4 Decimal calculations

Work out
(a) 0.7 ÷ 0.2
(b) 35 ÷ 0.5

(a) Multiply both numbers by 10: 7 ÷ 2
7 ÷ 2 = 3.5
(b) Dividing by 0.5 is the same as multiplying by 2: 35 × 2 = 70
Answer: (a) 3.5 (b) 70

5 Distance, speed and time

A lorry travels 75 km at an average speed of 60 km/h.
How long does the journey take?
Give your answer in hours and minutes.

Time = distance ÷ speed
75 ÷ 60 = 1.25 hours
1.25 hours = 1 hour 15 minutes
Answer: 1 hour 15 minutes

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6 Volume of a cylinder

A water tank has radius 8 m and height 15 m. (Calculator)
Work out its volume.
Give your answer correct to 1 decimal place.

Volume = π × radius^2 × height
π × 8^2 × 15 = 3015.929...
= 3015.9 m^3 (1 d.p.)
Answer: 3015.9 m^3

7 Density

A bar of lead has a density of 11.3 g/cm^3 and a volume of 30 cm^3.
Work out its mass.

Mass = density × volume
11.3 × 30 = 339
Answer: 339 g

8 Simultaneous equations problem

A theme park sells adult tickets and child tickets.
1 adult ticket and 3 child tickets cost £42.
3 adult tickets and 3 child tickets cost £60.
Work out the cost of one adult ticket and the cost of one child ticket.

Let a = cost of one adult ticket and b = cost of one child ticket
1a + 3b = 42 and 3a + 3b = 60
Subtract: 2a = 60 − 42 = 18, so a = 9
Substitute: 1 × 9 + 3b = 42, so 3b = 33 and b = 11
Answer: One adult ticket costs £9 and one child ticket costs £11

9 Trigonometry: finding a side

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

Label the sides: y is the hypotenuse and 5 cm is the adjacent
We use cos (adjacent and hypotenuse)

$\cos 63° = \frac{5}{y}$

$y = \frac{5}{\cos 63°} = 11.013...$

y = 11.0 cm (1 d.p.)
Answer: y = 11.0 cm

10 Bounds

The length of a rectangle is 25 cm and its width is 8 cm.
Both measurements are correct to the nearest cm.
Work out the upper bound for the perimeter of the rectangle.

Upper bound of each side = value + 0.5: 25.5 cm and 8.5 cm
Perimeter = 2 × (25.5 + 8.5) = 68 cm
Answer: 68 cm