Day 108 **B Tier 10-a-day: Model Solutions**

1 Solving equations

Solve $x + 9 = 19$

Subtract 9 from both sides

Answer: $x = 10$

2 Time

(a) Write 9:15 pm using the 24-hour clock.
(b) Write 20:40 using am or pm.

(a) Add 12 to the hour: 9 + 12 = 21, so 21:15
(b) 20 − 12 = 8, so 8:40 pm

Answer: (a) 21:15 (b) 8:40 pm

3 Changing the subject

Make n the subject of the formula
$T = 3(n - k)$

Divide both sides by 3: $\frac{T}{3} = n - k$

Add k to both sides

Answer: $n = \frac{T}{3} + k$

4 Relative frequency

A coin is thrown 100 times.
It lands on heads 60 times.
(a) Work out the relative frequency of heads.
(b) Is the coin fair? Give a reason.

(a) 60 ÷ 100 = 0.6
(b) A fair coin should give about 0.5
0.6 is not close to 0.5

Answer: (a) 0.6 (b) Probably not fair, relative frequency not close to 0.5

5 Volume of a prism

Here is a prism.
Its cross-section is a right-angled triangle.
Find the volume of this prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 9 × 4 = 18
Volume of prism = area of cross-section × length
18 × 7 = 126

Answer: 126 cm^3

6 Pressure

A block causes a pressure of 8 N/m^2 on the floor.
The area in contact with the floor is 2 m^2.
Work out the force exerted on the floor.

Force = pressure × area
8 × 2 = 16

Answer: 16 N

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7 Compound shapes with semicircles

A window is made from a rectangle and a semicircle. (Calculator)
The rectangle is 4 m wide and 3 m high.
The diameter of the semicircle is 4 m.
(a) Work out the area of the shape.
(b) Work out the perimeter of the shape.
Give each answer correct to 1 decimal place.

(a) Rectangle: $4 \times 3 = 12$
Semicircle: $\frac{1}{2} \times \pi \times 2^2 = 6.283...$
Total = 18.3 m^2
(b) Curved edge: $\frac{1}{2} \times \pi \times 4 = 6.283...$
Straight edges: $4 + 3 + 3 = 10$
Total = 16.3 m
Answer: (a) 18.3 m^2 (b) 16.3 m

8 Fraction problems

A paddling pool is $\frac{1}{4}$ full.
65 litres of water are added.
The paddling pool is now $\frac{1}{2}$ full.
Work out the capacity of the paddling pool.

Fraction added = $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$
$\frac{1}{4}$ of the capacity = 65 litres
Whole capacity = $65 \times 4 = 260$ litres
Answer: 260 litres

9 Average speed

A coach travels at 80 km/h for 1.5 hours and then at 90 km/h for 1.5 hours.
Work out its average speed for the whole journey.

Distance: $80 \times 1.5 = 120$ km and $90 \times 1.5 = 135$ km
Total distance = 255 km and total time = 3 hours
Average speed = $255 \div 3 = 85$
Answer: 85 km/h

10 Reverse percentages

Priya's rent goes up by 12%. (Calculator)
The new rent is £280 a month.
Work out the rent before the increase.

The new rent is 100% + 12% = 112% of the old rent.
112% = £280, so 1% = £280 ÷ 112 = £2.50
100% = £2.50 × 100 = £250
Answer: £250