Day 34 **B Tier 10-a-day: Model Solutions**

1 Interior angles of regular polygons

A regular decagon has 10 sides.
(a) Work out the size of one exterior angle.
(b) Work out the size of one interior angle.

(a) Exterior angles add up to 360°, so 360 ÷ 10 = 36°
(b) Interior angle = 180 − 36 = 144°
Answer: (a) 36° (b) 144°

2 Stem and leaf diagrams

The stem and leaf diagram shows 13 values.
(a) Find the median.
(b) Work out the range.

(a) 13 values, so the median is the 7th value
Reading in order: 10, 11, 16, 21, 22, 23, 26, 30, 31, 34, 37, 38, 39
Median = 26
(b) Range = 39 − 10 = 29
Answer: (a) 26 (b) 29

3 Equation of a line

Line L has equation $y = 5x + 3$
Line M is parallel to line L and passes through the point (2, 8).
Find the equation of line M.

Parallel lines have the same gradient, so line M is $y = 5x + c$
Substitute $x = 2$ and $y = 8$: $8 = 5 \times 2 + c$
$c = 8 - 10 = -2$
Answer: $y = 5x - 2$

4 Direct proportion

y is directly proportional to x.
When x = 10, y = 40.
Find the value of y when x = 5.

$y = kx$
$40 = k \times 10$, so $k = 40 \div 10 = 4$
$y = 4 \times 5 = 20$
Answer: $y = 20$

5 Surface area of cuboids

A cube has side length 6 cm.
Work out the total surface area of the cube.

A cube has 6 identical square faces
Area of one face = $6 \times 6 = 36$
$6 \times 36 = 216$
Answer: 216 cm^2

6 Standard form calculations

A spacecraft travels at 3×10^4 km per hour.
It travels for 4.6×10^4 hours at this speed.
Work out how far it travels.
Give your answer in standard form.

Distance = speed × time
$(3 \times 10^4) \times (4.6 \times 10^4) = 13.8 \times 10^8$
In standard form: 1.38×10^9
Answer: 1.38×10^9 km

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7 Area of shaded regions

The diagram shows two circles with the same centre.
The radius of the larger circle is 14 m.
The radius of the smaller circle is 2 m.
Work out the area of the shaded region.
Give your answer in terms of π.
The diagram is not drawn accurately.

Area of large circle = $\pi \times 14^2 = 196\pi$
Area of small circle = $\pi \times 2^2 = 4\pi$
$196\pi - 4\pi = 192\pi$
Answer: 192π m^2

8 Simultaneous equations

Solve the simultaneous equations
$3x - 2y = -7$
$x + y = 1$

Multiply the second equation by 2: $2x + 2y = 2$
The y terms have opposite signs, so add the equations: $5x = -5$
$x = -1$
Substitute $x = -1$ into the first equation: $-2y = -7 - (-3) = -4$
$y = 2$
Answer: $x = -1$, $y = 2$

9 Reverse percentages

The price of a meal including VAT at 20% is £180. (Calculator)
Work out the price of the meal before VAT was added.

The price including VAT is 100% + 20% = 120% of the price before VAT.
120% = £180, so 1% = £180 ÷ 120 = £1.50
100% = £1.50 × 100 = £150
Answer: £150

10 Bounds

The length of a rectangle is 27 cm and its width is 15 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: 27.5 cm and 15.5 cm
Perimeter = 2 × (27.5 + 15.5) = 86 cm
Answer: 86 cm