Day 83 **B Tier 10-a-day: Model Solutions**

1 Unitary method

6 notebooks cost £4.50.
(a) Work out the cost of 7 notebooks.
(b) How many notebooks can be bought for £6?

(a) 1 notebook costs £4.50 ÷ 6 = 75p
7 × 75p = £5.25
(b) £6 ÷ 75p = 8
Answer: (a) £5.25 (b) 8

2 Angles in triangles

The angles in a triangle are x°, 3x° and (x + 5)°.
(a) Work out the value of x.
(b) Work out the size of the largest angle.

(a) x + 3x + x + 5 = 180
5x + 5 = 180
5x = 175, so x = 35
(b) The angles are 35°, 105° and 40°
Answer: (a) x = 35 (b) 105°

3 Solving inequalities

Solve $4x - 11 < -31$

Add 11 to both sides: $4x < -20$
Divide both sides by 4 (a positive number, so the inequality sign stays the same)
Answer: $x < -5$

4 Perimeter and area of compound shapes

The diagram shows the shape of a classroom floor.
All the corners are right angles. All lengths are in cm.
(a) Calculate the perimeter.
(b) Calculate the area.

(a) Missing lengths: 11 − 8 = 3 and 10 − 6 = 4
Perimeter = 11 + 6 + 3 + 4 + 8 + 10 = 42
(b) Split into two rectangles: 11 × 6 = 66 and 8 × 4 = 32
66 + 32 = 98
Answer: (a) 42 cm (b) 98 cm^2

5 Powers and roots

Work out
(a) $9^2 + 4^3$
(b) $\sqrt{100} - 4^2$

(a) $9^2 = 81$ and $4^3 = 64$, so 81 + 64 = 145
(b) $\sqrt{100} = 10$ and $4^2 = 16$, so 10 − 16 = −6
Answer: (a) 145 (b) −6

6 Direct proportion

y is directly proportional to x.
When x = 12, y = 72.
Find the value of y when x = 11.

y = kx
72 = k × 12, so k = 72 ÷ 12 = 6
y = 6 × 11 = 66
Answer: y = 66

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7 Radius from area or circumference

The circumference of a circle is 15 m. (Calculator)
Work out the diameter of the circle.
Give your answer correct to 1 decimal place.

Circumference = π × diameter
Diameter = 15 ÷ π = 4.775...
= 4.8 m (1 d.p.)
Answer: 4.8 m

8 Simultaneous equations

Solve the simultaneous equations
$3x + y = -4$
$x - 2y = 1$

Multiply the first equation by 2: $6x + 2y = -8$
The y terms have opposite signs, so add the equations: $7x = -7$
$x = -1$
Substitute $x = -1$ into the first equation: $y = -4 - (-3) = -1$
$y = -1$
Answer: $x = -1$, $y = -1$

9 Bounds

The length of a rectangle is 27 cm and its width is 8 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 7.5 cm
Area = 26.5 × 7.5 = 198.75 cm^2
Answer: 198.75 cm^2

10 Estimation

Estimate the value of

$$\frac{72.5}{1.68} + 32.8$$

Show your rounding to 1 significant figure.

Round each number to 1 significant figure: 72.5 → 70, 32.8 → 30, 1.68 → 2
Estimate = 70 ÷ 2 + 30 = 65
Answer: 65