Day 32 **B Tier 10-a-day: Model Solutions**

1 Probability of not happening

The probability that Dev wins a game of chess is 0.95.
Work out the probability that Dev does not win a game of chess.

Probabilities add up to 1
$1 - 0.95 = 0.05$
Answer: 0.05

2 Time

(a) Write 7:05 pm using the 24-hour clock.
(b) Write 17:05 using am or pm.

(a) Add 12 to the hour: 7 + 12 = 19, so 19:05
(b) $17 - 12 = 5$, so 5:05 pm
Answer: (a) 19:05 (b) 5:05 pm

3 Best buys

Juice is sold in two sizes.
Small: 400 ml for £2.32
Large: 600 ml for £3.24
Which size is better value for money?
You must show your working.

Compare the cost of 1200 ml of each
Large: 2 × £3.24 = £6.48
Small: 3 × £2.32 = £6.96
The large is cheaper for the same amount
Answer: The large size

4 Perimeter with algebra

An isosceles triangle has two equal sides of length (x + 2) cm and a third side of length (x − 2) cm.
The perimeter of the triangle is 17 cm.
Work out the value of x.

$2(x + 2) + (x - 2) = 17$
$3x + 2 = 17$
$3x = 15$
$x = 5$
Answer: x = 5

5 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
8.2×10^0, 550,000, 6.5×10^{-5}, 8600

Write each in standard form: 8.2×10^0, 5.5×10^5, 6.5×10^{-5}, 8.6×10^3
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 6.5×10^{-5}, 8.2×10^0, 8600, 550,000
Answer: 6.5×10^{-5}, 8.2×10^0, 8600, 550,000

6 Volume of a prism

The diagram shows a prism.
Its cross-section is an isosceles triangle.
Calculate the volume of the prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 12 × 10 = 60
Volume of prism = area of cross-section × length
60 × 11 = 660
Answer: 660 cm^3

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7 Harder linear equations

Solve $20 - 3x = 4x - 8$

Add 3x to both sides: $20 = 7x - 8$
Add 8 to both sides: $28 = 7x$
Divide both sides by 7
Answer: x = 4

8 Isosceles triangles and Pythagoras

Triangle ABC is isosceles with AB = AC = 5 cm.
The base BC = 6 cm.
(a) Work out the perpendicular height of the triangle.
(b) Work out the area of the triangle.

(a) The height splits the base in half: $6 \div 2 = 3$
$h^2 = 5^2 - 3^2 = 25 - 9 = 16$, so h = 4
(b) Area = $\frac{1}{2} \times 6 \times 4 = 12$
Answer: (a) 4 cm (b) 12 cm^2

9 Missing value from a mean

After 5 tests, Tara's mean mark is 58.
After her next test, her mean mark is 60.
What mark did she get in her next test?

Total after 5 tests = $5 \times 58 = 290$
Total after 6 tests = $6 \times 60 = 360$
Next mark = $360 - 290 = 70$
Answer: 70

10 Simultaneous equations

Solve the simultaneous equations
$4x + 2y = 12$
$3x - 4y = 20$

Multiply the first equation by 2: $8x + 4y = 24$
The y terms have opposite signs, so add the equations: $11x = 44$
$x = 4$
Substitute x = 4 into the first equation: $2y = 12 - 16 = -4$
$y = -2$
Answer: x = 4, y = −2