Day 22 **B Tier 10-a-day: Model Solutions**

1 Inequalities on a number line

Write down the inequality shown on the number line. Use x for the variable.

The circle at 4 is open, so 4 is not included
The line goes to the left, so x is less than 4
Answer: $x < 4$

2 Types of number

Here is a list of numbers.
58, 93, 53, 64, 32, 28, 77, 22
From the list, write down
(a) a prime number
(b) a cube number

(a) 53 has exactly two factors, 1 and itself
(b) 64 (4 × 4 × 4) is a whole number multiplied by itself twice
Answer: (a) 53 (b) 64

3 Missing value from a mean

The mean of 5 numbers is 25.
Four of the numbers are 20, 30, 24, 26.
Work out the fifth number.

Total = 5 × 25 = 125
Given total = 100
Fifth = 125 − 100 = 25
Answer: 25

4 Compound areas

Two rectangles are joined to make a shape.
The first is 10 cm by 5 cm.
The second is 5 cm by 14 cm.
Work out the total area of the shape.

First rectangle: 10 × 5 = 50
Second rectangle: 5 × 14 = 70
50 + 70 = 120
Answer: 120 cm^2

5 Solving inequalities

Solve $5p + 4 < 49$

Subtract 4 from both sides: $5p < 45$
Divide both sides by 5 (a positive number, so the inequality sign stays the same)
Answer: $p < 9$

6 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of A after a reflection in the line y = 1.
(b) Write down the coordinates of the image of C after a reflection in the line x = 1.

(a) A is at (4, 3). Reflect in the line y = 1: (4, −1)
(b) C is at (4, 1). Reflect in the line x = 1: (−2, 1)
Answer: (a) (4, −1) (b) (−2, 1)

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7 Fractions and decimals

(a) Write $\frac{14}{25}$ as a decimal.

(b) Write $\frac{5}{6}$ as a recurring decimal.

For part (b), write down the first 8 decimal places and say which digits repeat.

(a) 14 ÷ 25 = 0.56
(b) 5 ÷ 6: use short division, adding zeros
5 ÷ 6 = 0.83333333...
The digit 3 repeats
Answer: (a) 0.56 (b) 0.83333333... (3 repeats)

8 Trial and improvement

The equation $x^3 + 3x = 87$ has a solution between 4 and 5. (Calculator)
Use trial and improvement to find this solution.
Give your answer correct to 1 decimal place.

x = 4.5: $4.5^3 + 3 \times 4.5 = 104.625$ (too big)
x = 4.2: $4.2^3 + 3 \times 4.2 = 86.688$ (too small)
x = 4.3: $4.3^3 + 3 \times 4.3 = 92.407$ (too big)
x = 4.25: value = 89.516 (too big), so the solution is below 4.25
So x = 4.2 to 1 decimal place
Answer: x = 4.2

9 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 40%. (Calculator)
Two weeks later it is reduced by a further 20% of the new price.
The final price is £24.
Work out the original price of the sofa.

Multipliers: 0.6 and 0.8
Overall multiplier = 0.6 × 0.8 = 0.48
Original price = £24 ÷ 0.48 = £50
Answer: £50

10 Tree diagrams

A bag contains 3 red counters and 6 blue counters.
Kira takes one at random and does not replace it, then takes a second.
Work out the probability that both are red.

P(first red) = $\frac{1}{3}$

P(second red) = $\frac{1}{4}$

P(both red) = $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

Answer: $\frac{1}{12}$