Day 86 **B Tier 10-a-day: Model Solutions**

1 Forming equations

I think of a number.
I add 9 and then multiply the result by 3.
The answer is 66.
Work out my number.

Let the number be n: 3(n + 9) = 66
Divide by 3: n + 9 = 22
Subtract 9
Answer: 13

2 Probabilities adding to 1

The table shows the probabilities of a spinner landing on each colour.
(a) Work out the value of x.
(b) The spinner is used 50 times. How many times would you expect A?

(a) Probabilities add up to 1
0.1 + 0.25 + 0.3 + x = 1
x = 1 − 0.65 = 0.35
(b) 0.1 × 50 = 5
Answer: (a) 0.35 (b) 5

3 Transformations of a point

(a) The point P(4, −6) is enlarged with scale factor 2 and centre the origin. Write down the coordinates of the image.
(b) The point P(4, −6) is rotated 90° clockwise about the origin. Write down the coordinates of the image.

(a) Multiply each coordinate by 2: (8, −12)
(b) A 90° clockwise turn takes (x, y) to (y, −x): (−6, −4)
Answer: (a) (8, −12) (b) (−6, −4)

4 Multiplying and dividing fractions

Work out
(a) $\frac{4}{9} \times \frac{3}{10}$
(b) $\frac{1}{2} \div \frac{3}{4}$
Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{12}{90} = \frac{2}{15}$
(b) Turn the second fraction upside down and multiply: $\frac{1}{2} \times \frac{4}{3} = \frac{4}{6} = \frac{2}{3}$
Answer: (a) $\frac{2}{15}$ (b) $\frac{2}{3}$

5 Perimeter expressions

A rectangle has length (2x + 7) cm and width (4x + 2) cm.
Write down an expression, in terms of x, for the perimeter of the rectangle.
Give your answer in its simplest form.

Perimeter = 2 × length + 2 × width
2(2x + 7) + 2(4x + 2) = 4x + 14 + 8x + 4
= 12x + 18
Answer: 12x + 18 cm

6 Exchange rates

The exchange rate is £1 = €1.15. (Calculator)
(a) Change £500 to euros.
(b) Change €80.5 to pounds (£).

(a) Multiply by 1.15: 500 × 1.15 = €575
(b) Divide by 1.15: 80.5 ÷ 1.15 = £70
Answer: (a) €575 (b) £70

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7 Combined mean

In a test, the mean mark of 10 boys is 80.
The mean mark of 5 girls is 56.
Work out the mean mark of all 15 students.

Total for boys = 10 × 80 = 800
Total for girls = 5 × 56 = 280
Overall mean = (800 + 280) ÷ 15 = 1080 ÷ 15 = 72
Answer: 72

8 Volume of a prism

The diagram shows a prism.
Its cross-section is a right-angled triangle.
Work out the volume of the prism.
The diagram is not drawn accurately.

Area of cross-section = ½ × 11 × 8 = 44
Volume of prism = area of cross-section × length
44 × 11 = 484
Answer: 484 m^3

9 Simultaneous equations

Solve the simultaneous equations
$2x - 4y = -16$
$2x + 2y = 14$

Multiply the second equation by 2: $4x + 4y = 28$
The y terms have opposite signs, so add the equations: $6x = 12$
$x = 2$
Substitute $x = 2$ into the first equation: $-4y = -16 - 4 = -20$
$y = 5$
Answer: x = 2, y = 5

10 Tree diagrams

A bag contains 7 red counters and 7 blue counters.
Liam takes one at random and does not replace it, then takes a second.
Work out the probability that the two are different colours.

P(red then blue) = $\frac{7}{26}$

P(blue then red) = $\frac{7}{26}$

Add: $\frac{7}{26} + \frac{7}{26} = \frac{7}{13}$

Answer: $\frac{7}{13}$