Day 222 **B Tier 10-a-day: Model Solutions**

1 Substitution into formulae

Here is a formula.

$A = 3a^2$

Work out the value of A when a = 5

$A = 3 \times 5^2 = 3 \times 25$

$A = 75$

Answer: A = 75

2 Exchange rates

The exchange rate is £1 = $1.3. (Calculator)

(a) Change £250 to dollars.

(b) Change $234 to pounds (£).

(a) Multiply by 1.3: 250 × 1.3 = $325

(b) Divide by 1.3: 234 ÷ 1.3 = £180

Answer: (a) $325 (b) £180

3 Relative frequency

A spinner has coloured sections. It is spun 100 times and lands on blue 55 times.

What is the relative frequency of blue?

Give your answer as a decimal.

55 ÷ 100 = 0.55

Answer: 0.55

4 Scale drawings and maps

On a map, 1 cm represents 20 km.

Two towns are 12 cm apart on the map.

(a) Work out the real distance between the towns.

(b) Write the scale of the map in the form 1 : n.

(a) 12 × 20 = 240 km

(b) 20 km = 2 000 000 cm

So 1 cm on the map is 2 000 000 cm in real life

Answer: (a) 240 km (b) 1 : 2 000 000

5 Combining ratios

In a bag of counters, the ratio of black to blue is 5 : 2.

The ratio of blue to green is 8 : 7.

Write down the ratio black : blue : green.

Make the blue part the same in both ratios: lowest common multiple of 2 and 8 is 8

black : blue = 20 : 8

blue : green = 8 : 7

black : blue : green = 20 : 8 : 7

Answer: 20 : 8 : 7

6 Equation of a straight line graph

The diagram shows a straight line.

(a) Work out the gradient of the line.

(b) Find the equation of the line.

(a) The line crosses the y-axis at −2. Pick two points on the line and work out change in y divided by change in x

Gradient = 2

(b) The equation is y = mx + c with m = 2 and c = −2

Answer: (a) 2 (b) $y = 2x - 2$

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7 Angles in triangles

Triangle XYZ is isosceles with XY = XZ.
Angle XYZ = 48°.
Work out the size of angle YXZ.

Angle XZY is also 48° because the base angles are equal
48 + 48 = 96
180 − 96 = 84
Answer: 84°

8 Factorising quadratics

Factorise $x^2 + 4x - 5$

Find two numbers that multiply to give −5 and add to give 4
The numbers are −1 and 5
Answer: (x − 1)(x + 5)

9 Error intervals

The length of a pencil is 14.3 cm, correct to 1 decimal place.
Write down the error interval for the length.
Use the letter L.

The rounding unit is 0.1, so half of it is 0.05
Lower bound = 14.3 − 0.05 = 14.25
Upper bound = 14.3 + 0.05 = 14.35
Answer: $14.25 \leq L < 14.35$

10 Growth in standard form

There are 3.7×10^5 fish in a lake.
The number doubles every day.
How many are there after 4 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^4 = 16$
$3.7 \times 10^5 \times 16 = 59.2 \times 10^5$
In standard form: 5.92×10^6
Answer: 5.92×10^6