Day 289 **B Tier 10-a-day: Model Solutions**

1 Simplifying ratios

Write the ratio £20 : 750p in its simplest form.

Change to pence: £20 = 2000p
2000 : 750
Divide both by 250 to get 8 : 3
Answer: 8 : 3

2 Expanding and simplifying

Expand and simplify $5(x - 2) + 2(x + 4)$

Expand each bracket: $5x - 10 + 2x + 8$
Collect like terms: $7x - 2$
Answer: $7x - 2$

3 Time

A football match starts at 3:45 pm.
It lasts 1 hour 50 minutes.
At what time does it finish? Give your answer using am or pm.

3:45 pm + 1 hour = 4:45 pm
4:45 pm + 50 minutes = 5:35 pm
Answer: 5:35 pm

4 Equations with unknowns on both sides

Solve $3n + 6 = n + 20$

Subtract 1n from both sides: $2n + 6 = 20$
Subtract 6 from both sides: $2n = 14$
Divide both sides by 2
Answer: $n = 7$

5 Sample space of two dice

Two fair dice, numbered 1 to 4 and 1 to 4, are rolled.
Work out the probability that the difference between the two scores is 2.

There are $4 \times 4 = 16$ equally likely outcomes
Pairs with difference 2: 4 outcomes
P = 4 out of 16
Answer: $\frac{1}{4}$

6 Where a line crosses the axes

A straight line has equation $y = -5x + 20$
(a) Write down the coordinates of the point where the line crosses the y-axis.
(b) Work out the coordinates of the point where the line crosses the x-axis.

(a) When $x = 0$, $y = 20$
(b) The line crosses the x-axis when $y = 0$: $-5x + 20 = 0$
$-5x = -20$
$x = 4$
Answer: (a) (0, 20) (b) (4, 0)

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7 Repeated percentage change

The price of a laptop is £250.
The price is first increased by 10%, then the new price is increased by 30%.
(a) Work out the final price.
(b) Work out the overall percentage increase in the price.

(a) Multipliers: 1.1 and 1.3
250 × 1.1 × 1.3 = £357.50
(b) Overall multiplier = 1.43
Overall increase = 43%
Answer: (a) £357.50 (b) 43% increase

8 Radius from area or circumference

The circumference of a circle is 6π cm.
Work out the radius of the circle.

Circumference = 2πr, so 2r = 6
r = 6 ÷ 2 = 3
Answer: 3 cm

9 Speed unit conversion

A motorbike travels at 81 km/h.
Work out its speed in metres per second.

81 km = 81,000 m
1 hour = 3600 seconds
81,000 ÷ 3600 = 22.5 m/s
Answer: 22.5 m/s

10 Angles in parallel lines

In the diagram, PQ is parallel to RS.
(a) Work out the size of angle r.
(b) Give a reason for your answer.
The diagram is not drawn accurately.

Angle r and the 110° angle are corresponding angles (F shape)
r = 110°
Corresponding angles are equal
Answer: (a) r = 110° (b) Corresponding angles are equal