Day 320 **B Tier 10-a-day: Model Solutions**

1 Continuing sequences

Here are the first four terms of a sequence.
5, 50, 500, 5000
(a) Write down the next two terms.
(b) Describe the rule for continuing the sequence.

Each term is 10 times the term before: 50 ÷ 5 = 10
5000 × 10 = 50000 and 50000 × 10 = 500000
Answer: (a) 50000, 500000 (b) Multiply by 10 each time

2 Proving a triangle is right-angled

A triangle has sides of length 26 mm, 15 mm and 20 mm.
Is the triangle right-angled?
You must show your working.

The longest side is 26. Check whether $a^2 + b^2 = c^2$
$15^2 + 20^2 = 225 + 400 = 625$
$26^2 = 676$
These are not equal, so the triangle is not right-angled
Answer: No, $15^2 + 20^2 = 625$ but $26^2 = 676$

3 Percentages of amounts

Work out
(a) 5% of £240
(b) 20% of 60

(a) 10% of £240 = £24
5% of £240 = £12
5% = £12 = £12
(b) 10% of 60 = 6
20% = 2 × 6 = 12
Answer: (a) £12 (b) 12

4 Currency conversion

£1 = 1.25 dollars
A holiday costs $187.50.
Work out the cost in pounds.

Divide by the rate: 187.5 ÷ 1.25
= £150
Answer: £150

5 Using a given calculation

Use the fact that 33 × 29 = 957
to work out
(a) 3.3 × 2900
(b) 9.57 ÷ 33

(a) 3.3 = 33 ÷ 10 and 2900 = 29 × 100
So the answer is 957 × 10 = 9570
(b) 9.57 = 957 ÷ 100 and 33 is unchanged
957 ÷ 33 = 29, so the answer is 29 ÷ 100 = 0.29
Answer: (a) 9570 (b) 0.29

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6 Enlargement

A rectangle is 8 m long and 4 m wide.
It is enlarged by scale factor 1.5.
(a) Write down the length and width of the enlarged rectangle.
(b) Work out the perimeter of the enlarged rectangle.

(a) 8 × 1.5 = 12 and 4 × 1.5 = 6
(b) Perimeter = 2 × (12 + 6) = 36
Answer: (a) 12 m by 6 m (b) 36 m

7 Equations with fractional answers

Solve 5x − 6 = 1
Give your answer as a fraction in its simplest form.

Add 6 to both sides: 5x = 7
Divide both sides by 5: $x = \frac{7}{5}$

Answer: x = $\frac{7}{5}$

8 Trigonometry: finding a side

Work out the length of y. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Label the sides: y is the hypotenuse and 13 cm is the adjacent
We use cos (adjacent and hypotenuse)
$\cos 48° = \frac{13}{y}$
$y = \frac{13}{\cos 48°} = 19.428...$
y = 19.4 cm (1 d.p.)
Answer: y = 19.4 cm

9 Average speed

A coach travels at 60 km/h for 1 hour and then at 36 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: 60 × 1 = 60 km and 36 × 1 = 36 km
Total distance = 96 km and total time = 2 hours
Average speed = 96 ÷ 2 = 48
Answer: 48 km/h

10 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at 40 ÷ 2 = 20: read across from 20 on the vertical axis to the curve, then down: 36
(b) Lower quartile at 10: 23. Upper quartile at 30: 48
IQR = 48 − 23 = 25
Answer: (a) 36 minutes (b) 25 minutes