Day 328 **B Tier 10-a-day: Model Solutions**

1 Median and range

Here are the number of books read by some students.
69, 69, 47, 43, 41, 53, 44
(a) Find the median.
(b) Work out the range.

(a) Put in order: 41, 43, 44, 47, 53, 69, 69
The middle value is number 4: 47
(b) Range = largest − smallest = 69 − 41 = 28
Answer: (a) 47 (b) 28

2 Time

(a) Write 2:25 pm using the 24-hour clock.
(b) Write 19:50 using am or pm.

(a) Add 12 to the hour: 2 + 12 = 14, so 14:25
(b) 19 − 12 = 7, so 7:50 pm
Answer: (a) 14:25 (b) 7:50 pm

3 Perimeter and area of compound shapes

The diagram shows the shape of a playground.
All the corners are right angles. All lengths are in cm.
(a) Work out the perimeter.
(b) Work out the area.

(a) Missing lengths: 14 − 9 = 5 and 15 − 5 = 10
Perimeter = 14 + 5 + 5 + 10 + 9 + 15 = 58
(b) Split into two rectangles: 14 × 5 = 70 and 9 × 10 = 90
70 + 90 = 160
Answer: (a) 58 cm (b) 160 cm^2

4 Laws of indices

Simplify fully
(a) $(3y^2)^3$
(b) $16y^8 \div 4y^5$

(a) $3^3 = 27$ and the powers multiply: 2 × 3 = 6
(b) Divide the numbers: 16 ÷ 4 = 4. Subtract the powers: 8 − 5 = 3
Answer: (a) $27y^6$ (b) $4y^3$

5 Percentage increase and decrease

A train ticket costs £250. The price goes up by 12%.
(a) Work out the new price.
(b) A car is worth £2500. Its value goes down by 10% in a year. Work out its new value.

(a) The multiplier is 1.12, so new price = £250 × 1.12 = £280
(b) The multiplier is 0.9, so new value = £2500 × 0.9 = £2250
Answer: (a) £280 (b) £2250

6 Reading pie charts

The pie chart shows the favourite choices of 360 people.
The angle for Tennis is not shown.
Work out how many people chose Tennis.

Angle for Tennis = 360° − (90° + 40° + 110°) = 360° − 240° = 120°
120 ÷ 360 × 360 = 120
Answer: 120

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7 Equations with fractional answers

Solve 5x + 4 = 6

Give your answer as a fraction in its simplest form.

Subtract 4 from both sides: 5x = 2

Divide both sides by 5: $x = \frac{2}{5}$

Answer: $x = \frac{2}{5}$

8 Circle theorems

A, B, C and D are points on a circle.

Angle ADC = 99°.

Work out the size of angle ABC, marked y.

Give a reason for your answer.

The diagram is not drawn accurately.

ABCD is a cyclic quadrilateral

Opposite angles of a cyclic quadrilateral add up to 180°

y = 180 − 99 = 81°

Answer: y = 81°

9 Average speed

A cyclist travels at 30 km/h for 1.5 hours and then at 72 km/h for 1.5 hours.

Work out its average speed for the whole journey.

Distance: 30 × 1.5 = 45 km and 72 × 1.5 = 108 km

Total distance = 153 km and total time = 3 hours

Average speed = 153 ÷ 3 = 51

Answer: 51 km/h

10 Fraction problems

A fuel tank is $\frac{3}{4}$ full.

5 litres of fuel are added.

The fuel tank is now $\frac{4}{5}$ full.

Work out the capacity of the fuel tank.

Fraction added = $\frac{4}{5} - \frac{3}{4} = \frac{1}{20}$

$\frac{1}{20}$ of the capacity = 5 litres

Whole capacity = 5 × 20 = 100 litres

Answer: 100 litres