Day 147 **B Tier 10-a-day: Model Solutions**

1 Ordering fractions

Write these in order of size.
Start with the smallest.

0.8, $\frac{11}{20}$, 0.64, 0.5

Write each as a decimal:

0.8 = 0.8, $\frac{11}{20}$ = 0.55, 0.64 = 0.64, 0.5 = 0.5

Order: 0.5, $\frac{11}{20}$, 0.64, 0.8

Answer: 0.5, $\frac{11}{20}$, 0.64, 0.8

2 Symmetry

What is the order of rotational symmetry of a regular pentagon?

A regular pentagon looks the same 5 times in a full turn, so the order of rotational symmetry is 5
Answer: 5

3 Multiplying and dividing fractions

Work out

(a) $\frac{3}{10} \times \frac{9}{10}$

(b) $\frac{4}{5} \div \frac{2}{3}$

Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{27}{100}$

(b) Turn the second fraction upside down and multiply: $\frac{4}{5} \times \frac{3}{2} = \frac{12}{10} = 1\frac{1}{5}$

Answer: (a) $\frac{27}{100}$ (b) $1\frac{1}{5}$

4 Angles in quadrilaterals

ABCD is a rhombus.
Angle DAB = 42°.
(a) Write down the size of angle BCD.
(b) Work out the size of angle ABC.

(a) Opposite angles are equal, so angle BCD = 42°
(b) Angles next to each other add up to 180°
180 − 42 = 138
Answer: (a) 42° (b) 138°

5 Function notation

$g(x) = 2x^2 - 2$
(a) Work out g(3)
(b) Work out g(−2)

(a) $g(3) = 2 \times 3^2 - 2 = 16$
(b) $g(-2) = 2 \times (-2)^2 - 2 = 6$
Answer: (a) 16 (b) 6

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6 Compound shapes with semicircles

A stage is made from a rectangle and a semicircle. (Calculator)
The rectangle is 4 m wide and 7 m high.
The diameter of the semicircle is 4 m.
(a) Work out the area of the shape.
(b) Work out the perimeter of the shape.
Give each answer correct to 1 decimal place.

(a) Rectangle: $4 \times 7 = 28$
Semicircle: $\frac{1}{2} \times \pi \times 2^2 = 6.283...$
Total = 34.3 m^2
(b) Curved edge: $\frac{1}{2} \times \pi \times 4 = 6.283...$
Straight edges: $4 + 7 + 7 = 18$
Total = 24.3 m
Answer: (a) 34.3 m^2 (b) 24.3 m

7 Combined mean

In a test, the mean mark of 15 Class A is 44.
The mean mark of 10 Class B is 69.
Work out the mean mark of all 25 students.

Total for Class A = $15 \times 44 = 660$
Total for Class B = $10 \times 69 = 690$
Overall mean = $(660 + 690) \div 25 = 1350 \div 25 = 54$
Answer: 54

8 Solving quadratic equations

Solve $x^2 + 3x = 0$

Factorise: $x(x + 3) = 0$
Either $x = 0$ or $x + 3 = 0$
Answer: $x = -3$ or $x = 0$

9 Ratio with a difference

Nia and Femi share some money in the ratio 3 : 2.
Nia gets £3 more than Femi.
How much money does Femi get?

Difference in parts: $3 - 2 = 1$
1 parts = £3, so 1 part = £3
Femi gets $2 \times$ £3 = £6
Answer: £6

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 $40 \div 2 = 20$: read across from 20 on the vertical axis to the curve, then down: 80
(b) Lower quartile at 10: 52.5. Upper quartile at 30: 85
IQR = $85 - 52.5 = 32.5$
Answer: (a) 80 minutes (b) 32.5 minutes