Day 360 **B Tier 10-a-day: Model Solutions**

1 Bar charts

The bar chart shows some information.
(a) How many more were there for Squash than for Darts?
(b) Work out the total of all five bars.

(a) Squash: 20, Darts: 10
20 − 10 = 10
(b) 10 + 30 + 15 + 20 + 10 = 85
Answer: (a) 10 (b) 85

2 Transformations of a point

(a) The point P(−5, −4) is rotated 90° anticlockwise about the origin. Write down the coordinates of the image.
(b) The point P(−5, −4) is rotated 180° about the origin. Write down the coordinates of the image.

(a) A 90° anticlockwise turn takes (x, y) to (−y, x): (4, −5)
(b) A half turn takes (x, y) to (−x, −y): (5, 4)
Answer: (a) (4, −5) (b) (5, 4)

3 Prime factors

Write 525 as a product of its prime factors.
Give your answer in index form.

Divide by prime numbers, smallest first:
525 ÷ 3 = 175, 175 ÷ 5 = 35, 35 ÷ 5 = 7, 7 is prime
525 = 3 × 5 × 5 × 7
In index form: 525 = $3 \times 5^2 \times 7$
Answer: $3 \times 5^2 \times 7$

4 Circumference and area of a circle

The diagram shows a circle with diameter 10 cm. (Calculator)
Work out the area of the circle.
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Area = $\pi \times \text{radius}^2$
Radius = 10 ÷ 2 = 5
$\pi \times 5^2 = 78.540...$
= 78.5 cm^2 (1 d.p.)
Answer: 78.5 cm^2

5 Equation of a line

Line L has equation y = 5x − 3
Line M is parallel to line L and passes through the point (5, −2).
Find the equation of line M.

Parallel lines have the same gradient, so line M is y = 5x + c
Substitute x = 5 and y = −2: −2 = 5 × 5 + c
c = −2 − 25 = −27
Answer: y = 5x − 27

6 Mean from a frequency table

The table shows the goals scored in each match by a team.
Work out the mean.

Multiply each value by its frequency and add: 1 × 6 + 2 × 4 + 3 × 4 + 4 × 1 + 5 × 3 = 45
Total frequency = 6 + 4 + 4 + 1 + 3 = 18
Mean = 45 ÷ 18 = 2.5
Answer: 2.5

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7 Mixed numbers

Work out $3\frac{3}{4} + 3\frac{1}{3}$

Give your answer as a mixed number.

Whole numbers: 3 + 3 = 6

Fractions: $\frac{3}{4} + \frac{1}{3} = \frac{13}{12} = 1\frac{1}{12}$

Total = $7\frac{1}{12}$

Answer: $7\frac{1}{12}$

8 Surface area of a cylinder

A drum has radius 5 m and height 15 m. (Calculator)
It is open at one end (no lid).
Work out the total outside surface area.
Give your answer correct to 1 decimal place.

One circle: $\pi \times 5^2 = 25\pi$
Curved surface: $2 \times \pi \times 5 \times 15 = 150\pi$
Total = $25\pi + 150\pi = 175\pi$
= 549.8 m^2 (1 d.p.)
Answer: 549.8 m^2

9 Fraction problems

A paddling pool is $\frac{1}{4}$ full.

50 litres of water are added.

The paddling pool is now $\frac{1}{2}$ full.

Work out the capacity of the paddling pool.

Fraction added = $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}$

$\frac{1}{4}$ of the capacity = 50 litres

Whole capacity = 50 × 4 = 200 litres
Answer: 200 litres

10 Algebraic proof

Show that $(2n + 9)^2 - (2n - 9)^2$ is a multiple of 72 for any whole number n.

Expand: $(2n + 9)^2 = 4n^2 + 36n + 81$ and $(2n - 9)^2 = 4n^2 - 36n + 81$
Subtract: the $4n^2$ terms and the 81s cancel, leaving 72n
72n is a multiple of 72
Answer: 72n is a multiple of 72