Day 53 **B Tier 10-a-day: Model Solutions**

1 Function notation

f(x) = 6x − 5
(a) Work out f(7)
(b) Solve f(x) = 25

(a) f(7) = 6 × 7 − 5 = 37
(b) 6x − 5 = 25
Add 5 to both sides: 6x = 30
Divide both sides by 6
Answer: (a) 37 (b) x = 5

2 Median and range

Here are the numbers of runs scored by a batter.
27, 7, 20, 4, 30, 9, 24, 14, 31
(a) Find the median.
(b) Work out the range.

(a) Put in order: 4, 7, 9, 14, 20, 24, 27, 30, 31
The middle value is number 5: 20
(b) Range = largest − smallest = 31 − 4 = 27
Answer: (a) 20 (b) 27

3 Symmetry

How many lines of symmetry does a rhombus have?

A rhombus has 2 lines of symmetry (its diagonals)
Answer: 2

4 Comparing data sets

Here are Kira's and Harry's scores in a game.
Kira: 67, 62, 53, 55, 47
Harry: 55, 55, 53, 56, 59
Compare their results using the mean and the range.

Kira: mean = 284 ÷ 5 = 56.8, range = 67 − 47 = 20
Harry: mean = 278 ÷ 5 = 55.6, range = 59 − 53 = 6
Kira has the higher mean
Harry has the smaller range, so is more consistent
Answer: Kira has the higher mean (56.8 v 55.6). Harry is more consistent (range 6 v 20)

5 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of C after a reflection in the line x = 2.
(b) Write down the coordinates of the image of A after a reflection in the y-axis.

(a) C is at (1, 1). Reflect in the line x = 2: (3, 1)
(b) A is at (3, 1). Reflect in the y-axis: (−3, 1)
Answer: (a) (3, 1) (b) (−3, 1)

6 Midpoint of a line segment

M is the midpoint of AB.
A is the point (−5, 7) and M is the point (−3, 3).
Find the coordinates of B.

From A to M, x changes by 2 and y changes by −4
Do the same change again from M to get to B: x = −3 + 2 = −1, y = 3 − 4 = −1
Answer: (−1, −1)

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7 Adding fractions

Work out

(a) $\frac{4}{5} + \frac{1}{12}$

(b) $\frac{5}{6} - \frac{5}{9}$

Give each answer in its simplest form.

(a) Common denominator 60: $\frac{48}{60} + \frac{5}{60} = \frac{53}{60}$

(b) Common denominator 18: $\frac{15}{18} - \frac{10}{18} = \frac{5}{18}$

Answer: (a) $\frac{53}{60}$ (b) $\frac{5}{18}$

8 Trigonometry: finding an angle

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

We know the opposite (12 cm) and the adjacent (13 cm), so use tan

$\tan x = \frac{12}{13}$

$x = \tan^{-1}(\frac{12}{13}) = 42.709...$

$x = 42.7°$ (1 d.p.)

Answer: x = 42.7°

9 Fractions and decimals

(a) Write $\frac{3}{20}$ as a decimal.

(b) Write $\frac{2}{3}$ as a recurring decimal.

For part (b), write down the first 8 decimal places and say which digits repeat.

(a) 3 ÷ 20 = 0.15
(b) 2 ÷ 3: use short division, adding zeros
2 ÷ 3 = 0.66666666...
The digit 6 repeats
Answer: (a) 0.15 (b) 0.66666666... (6 repeats)

10 Pressure

A crate exerts a force of 30 newtons on the floor.
The area in contact with the floor is 10 m^2.
Work out the pressure on the floor.
Give your answer in N/m^2.

Pressure = force ÷ area
30 ÷ 10 = 3
Answer: 3 N/m^2