Day 237 **B Tier 10-a-day: Model Solutions**

1 Adding fractions

Work out

(a) $\frac{8}{9} + \frac{1}{4}$

(b) $\frac{5}{6} - \frac{1}{4}$

Give each answer in its simplest form.

(a) Common denominator 36: $\frac{32}{36} + \frac{9}{36} = \frac{41}{36}$

(b) Common denominator 12: $\frac{10}{12} - \frac{3}{12} = \frac{7}{12}$

Answer: (a) $1\frac{5}{36}$ (b) $\frac{7}{12}$

2 Metric conversions

(a) Convert 12 500 ml to litres.

(b) Convert 1500 cm^3 to litres.

(a) ml → litres: divide by 1000: 12 500 ÷ 1000 = 12.5

(b) 1 litre = 1000 cm^3. 1500 ÷ 1000 = 1.5

Answer: (a) 12.5 litres (b) 1.5 litres

3 Comparing data sets

Here are Amy's and Priya's daily sales.

Amy: 36, 40, 52, 54, 52

Priya: 47, 46, 49, 43, 47

Compare their results using the mean and the range.

Amy: mean = 234 ÷ 5 = 46.8, range = 54 − 36 = 18

Priya: mean = 232 ÷ 5 = 46.4, range = 49 − 43 = 6

Amy has the higher mean

Priya has the smaller range, so is more consistent

Answer: Amy has the higher mean (46.8 v 46.4). Priya is more consistent (range 6 v 18)

4 Midpoint of a line segment

M is the midpoint of AB.

A is the point (5, −1) and M is the point (5, 0).

Find the coordinates of B.

From A to M, x changes by 0 and y changes by 1

Do the same change again from M to get to B: x = 5 + 0 = 5, y = 0 + 1 = 1

Answer: (5, 1)

5 Ratio and changes

In a room, the ratio of small boxes to large boxes is 4 : 5.

There are 40 large boxes.

More small boxes join so that there are equal numbers of small boxes and large boxes.

How many small boxes join?

5 parts = 40, so 1 part = 8

Originally there are 4 × 8 = 32 small boxes

To equal 40, add 40 − 32 = 8

Answer: 8

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6 Fractions and decimals

(a) Write $\frac{23}{40}$ as a decimal.

(b) Write $\frac{1}{12}$ as a recurring decimal.

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

(a) 23 ÷ 40 = 0.575
(b) 1 ÷ 12: use short division, adding zeros
1 ÷ 12 = 0.08333333...
The digit 3 repeats
Answer: (a) 0.575 (b) 0.08333333... (3 repeats)

7 Changing the subject

Make a the subject of the formula
F = ma

Divide both sides by m
Answer: $a = \frac{F}{m}$

8 Area of a triangle using sine

In triangle ABC, AB = 8 cm, BC = 6 cm and angle ABC = 75°. (Calculator)
Work out the area of the triangle.
Give your answer correct to 1 decimal place.

Area = ½ab sin C
Area = ½ × 8 × 6 × sin 75°
= 23.182...
= 23.2 cm^2 (1 d.p.)
Answer: 23.2 cm^2

9 LCM problems

Two lights flash at 11:30.
One light flashes every 20 minutes.
The other light flashes every 12 minutes.
At what time do both lights next flash together?

Multiples of 20: 20, 40, 60
Multiples of 12: 12, 24, 36, 48, 60
The first common multiple is 60, so the LCM is 60 minutes
11:30 + 60 minutes = 12:30
Answer: 12:30

10 Average speed

A coach travels at 50 km/h for 3 hours and then at 36 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: 50 × 3 = 150 km and 36 × 1 = 36 km
Total distance = 186 km and total time = 4 hours
Average speed = 186 ÷ 4 = 46.5
Answer: 46.5 km/h