Day 317 **B Tier 10-a-day: Model Solutions**

1 Adding fractions

Work out

(a) $\frac{8}{9} + \frac{2}{5}$

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

Give each answer in its simplest form.

(a) Common denominator 45: $\frac{40}{45} + \frac{18}{45} = \frac{58}{45}$

(b) Common denominator 20: $\frac{5}{20} - \frac{4}{20} = \frac{1}{20}$

Answer: (a) $1\frac{13}{45}$ (b) $\frac{1}{20}$

2 Points on a line

Does the point (−4, 3) lie on the line
y = x + 7 ?
You must show your working.

Put x = −4 into the equation: y = 1 × (−4) + 7 = 3
The y-coordinate of the point is 3, which is 3
Answer: Yes, when x = −4 the line has y = 3

3 Expected outcomes

The probability that a biased dice lands on a six is 0.8.
Work out how many times you would expect this to happen in 200 rolls of the dice.

Expected number = probability × number of trials
0.8 × 200 = 160
Answer: 160

4 Enlargement

A rectangle is 4 cm long and 9 cm wide.
It is enlarged by scale factor 2.
(a) Write down the length and width of the enlarged rectangle.
(b) Work out the perimeter of the enlarged rectangle.

(a) 4 × 2 = 8 and 9 × 2 = 18
(b) Perimeter = 2 × (8 + 18) = 52
Answer: (a) 8 cm by 18 cm (b) 52 cm

5 Changing the subject

Make m the subject of the formula
T = 2m − 5

Add 5 to both sides: T + 5 = 2m
Divide both sides by 2
Answer: m = $\frac{T + 5}{2}$

6 Two-way tables

The table shows some information about 63 members of a leisure centre.
A person is chosen at random.
Find the probability that the person is in the group "Children" and chose "Swim".

Children who chose Swim = 63 − 24 − 24 = 15
P = 15 out of 63
Answer: $\frac{5}{21}$

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7 Area of shaded regions

The diagram shows a rectangle 23 m by 9 m with a circle of radius 2 m cut out.
The circle is in the centre of the rectangle.
Work out the area of the shaded region.
Give your answer in terms of π.
The diagram is not drawn accurately.

Area of rectangle = $23 \times 9 = 207$

Area of circle = $\pi \times 2^2 = 4\pi$

Shaded area = $207 - 4\pi$

Answer: $207 - 4\pi$ m^2

8 Fraction problems

A water tank is $\frac{1}{4}$ full.

180 litres of water are added.

The water tank is now $\frac{7}{10}$ full.

Work out the capacity of the water tank.

Fraction added = $\frac{7}{10} - \frac{1}{4} = \frac{9}{20}$

$\frac{9}{20}$ of the capacity = 180 litres

$\frac{1}{20}$ of the capacity = $180 \div 9 = 20$ litres

Whole capacity = $20 \times 20 = 400$ litres

Answer: 400 litres

9 Independent events

Two fair 6-sided dice are each rolled once.
Each dice is numbered from 1.
Work out the probability that both dice show a number greater than 2.

P(first greater than 2) = $\frac{2}{3}$

P(second greater than 2) = $\frac{2}{3}$

Multiply: $\frac{2}{3} \times \frac{2}{3} = \frac{4}{9}$

Answer: $\frac{4}{9}$

10 Compound shapes with semicircles

A window is made from a rectangle and a semicircle. (Calculator)
The rectangle is 10 m wide and 7 m high.
The diameter of the semicircle is 10 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: $10 \times 7 = 70$

Semicircle: $\frac{1}{2} \times \pi \times 5^2 = 39.270...$

Total = 109.3 m^2

(b) Curved edge: $\frac{1}{2} \times \pi \times 10 = 15.708...$

Straight edges: $10 + 7 + 7 = 24$

Total = 39.7 m

Answer: (a) 109.3 m^2 (b) 39.7 m