**Day 81** **B Tier 10-a-day: Model Solutions**

## 1 Money

Zara buys 2 sandwiches at 30p each and 3 magazines at £1.65 each.
She pays with a £50 note.
Work out how much change she gets.

2 × 30p = 60p
3 × £1.65 = £4.95
Total = 60p + £4.95 = £5.55
Change = £50 − £5.55 = £44.45
**Answer: £44.45**

## 2 Angles in quadrilaterals

PQRS is an isosceles trapezium with PQ parallel to SR.
Angle SPQ = 76°.
(a) Write down the size of angle PQR.
(b) Work out the size of angle PSR.

(a) In an isosceles trapezium the base angles are equal, so angle PQR = 76°
(b) Co-interior angles add up to 180°
180 − 76 = 104
**Answer: (a) 76° (b) 104°**

## 3 Scaling a recipe

Here are the amounts needed to make flapjacks for 2 people.
90 g of oats, 60 g of butter
Work out the amounts needed to make flapjacks for 7 people.

For 1 person: 90 ÷ 2 = 45 g and 60 ÷ 2 = 30 g
For 7 people: 45 × 7 = 315 and 30 × 7 = 210
**Answer: 315 g of oats, 210 g of butter**

## 4 Adding fractions

Work out
(a) $\frac{5}{9} + \frac{5}{8}$
(b) $\frac{8}{9} - \frac{7}{12}$
Give each answer in its simplest form.

(a) Common denominator 72: $\frac{40}{72} + \frac{45}{72} = \frac{85}{72}$
(b) Common denominator 36: $\frac{32}{36} - \frac{21}{36} = \frac{11}{36}$
**Answer: (a) $1\frac{13}{72}$ (b) $\frac{11}{36}$**

## 5 Gradient and intercept

A straight line has equation y = −5x + 6
(a) Write down the gradient of the line.
(b) Write down the equation of a line that is parallel to this line and passes through the point (0, 1).

(a) The line is in the form y = mx + c, so the gradient m is the number in front of x
(b) Parallel lines have the same gradient, −5
It crosses the y-axis at 1, so c = 1
**Answer: (a) −5 (b) y = −5x + 1**

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## 6 Standard form calculations

Work out $(2.9 \times 10^5) \times (6 \times 10^7)$
Give your answer in standard form.

Multiply the numbers: $2.9 \times 6 = 17.4$
Add the powers: $10^5 \times 10^7 = 10^{12}$
$17.4 \times 10^{12} = 1.74 \times 10^{13}$ in standard form
**Answer: $1.74 \times 10^{13}$**

## 7 Arc length and sector area

The diagram shows a sector of a circle with radius 3 m and angle 240°.
Work out the area of the sector.
Give your answer in terms of $\pi$.
The diagram is not drawn accurately.

Sector area = $\frac{240}{360} \times \pi \times 3^2$
$= \frac{240}{360} \times 9\pi = 6\pi$
**Answer: $6\pi$ m$^2$**

## 8 Average speed

A lorry travels at 30 km/h for 2 hours and then at 72 km/h for 1 hour.
Work out its average speed for the whole journey.

Distance: $30 \times 2 = 60$ km and $72 \times 1 = 72$ km
Total distance = 132 km and total time = 3 hours
Average speed = $132 \div 3 = 44$
**Answer: 44 km/h**

## 9 Algebraic proof

Show that $5(2n + 3) + 5(2n + 13)$ is always a multiple of 20, where n is a whole number.

Expand: $10n + 15 + 10n + 65$
Collect like terms: $20n + 80$
Factorise: $20(n + 4)$, which is a multiple of 20
**Answer: $20(n + 4)$ is a multiple of 20**

## 10 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 12 m and 6 m.
Each sloping side is 5 m long.
(a) Work out the perpendicular height of the trapezium.
(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is $12 - 6 = 6$, so each end sticks out 3
$h^2 = 5^2 - 3^2 = 25 - 9 = 16$, so $h = 4$
(b) Area = $\frac{1}{2} \times (12 + 6) \times 4 = 36$
**Answer: (a) 4 m (b) 36 m$^2$**