Day 231 **B Tier 10-a-day: Model Solutions**

1 Money

Hannah buys 4 magazines at 60p each and 3 notebooks at 95p each.
She pays with a £10 note.
Work out how much change she gets.

4 × 60p = £2.40
3 × 95p = £2.85
Total = £2.40 + £2.85 = £5.25
Change = £10 − £5.25 = £4.75
Answer: £4.75

2 Expanding brackets

Expand
(a) $2(3x - 4)$
(b) $3x(x - 6)$

(a) $2 \times 3x = 6x$ and $2 \times (-4) = -8$
(b) $3x \times x = 3x^2$ and $3x \times (-6) = -18x$
Answer: (a) $6x - 8$ (b) $3x^2 - 18x$

3 Comparing fractions and percentages

Will has $\frac{1}{2}$ of £48.

Kofi has 60% of £180.
Who has more money? You must show your working.

Will: 48 ÷ 8 × 4 = £24
Kofi: 180 ÷ 100 × 60 = £108
£108 is more than £24, so Kofi has more
Answer: Kofi

4 Gradient of a line

Work out the gradient of the straight line that passes through the points (4, −5) and (2, −14).

Gradient = $\frac{\text{change in y}}{\text{change in x}}$
Change in y = −14 − (−5) = −9
Change in x = 2 − 4 = −2
Gradient = $\frac{-9}{-2} = \frac{9}{2}$
Answer: $\frac{9}{2}$

5 Enlargement

A rectangle is 2 cm long and 10 cm wide.
It is enlarged by scale factor 4.
(a) Write down the length and width of the enlarged rectangle.
(b) Work out the perimeter of the enlarged rectangle.

(a) 2 × 4 = 8 and 10 × 4 = 40
(b) Perimeter = 2 × (8 + 40) = 96
Answer: (a) 8 cm by 40 cm (b) 96 cm

6 Density

A stone has a mass of 150 g and a volume of 60 cm^3.
Work out its density.
Give your answer in g/cm^3.

Density = mass ÷ volume
150 ÷ 60 = 2.5
Answer: 2.5 g/cm^3

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7 Trigonometry: finding a side

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

Label the sides: x is the adjacent and 25 cm is the opposite
We use tan (opposite and adjacent)

$\tan 32° = \frac{25}{x}$

$x = \frac{25}{\tan 32°} = 40.008...$

x = 40.0 cm (1 d.p.)

Answer: x = 40.0 cm

8 Perimeter expressions

A rectangle has length (5x + 8) cm and width (x + 3) cm.
Write down an expression, in terms of x, for the perimeter of the rectangle.
Give your answer in its simplest form.

Perimeter = 2 × length + 2 × width
2(5x + 8) + 2(x + 3) = 10x + 16 + 2x + 6
= 12x + 22

Answer: 12x + 22 cm

9 Average speed

A lorry travels at 80 km/h for 0.5 hours and then at 20 km/h for 2.5 hours.
Work out its average speed for the whole journey.

Distance: 80 × 0.5 = 40 km and 20 × 2.5 = 50 km
Total distance = 90 km and total time = 3 hours
Average speed = 90 ÷ 3 = 30

Answer: 30 km/h

10 Trigonometry in isosceles triangles

Triangle XYZ is isosceles with XY = XZ = 20 cm. (Calculator)
The base YZ = 30 cm.
Work out the size of angle XYZ.
Give your answer correct to 1 decimal place.

Split the triangle into two right-angled triangles. Half the base = 30 ÷ 2 = 15

$\cos Y = \frac{15}{20}$

Angle XYZ = $\cos^{-1}(\frac{15}{20}) = 41.410...$

= 41.4° (1 d.p.)

Answer: 41.4°