Day 126 **B Tier 10-a-day: Model Solutions**

1 Rounding

Write 5.3495
(a) correct to 2 decimal places,
(b) correct to 3 significant figures.

(a) Look at the next digit after the second decimal place: 9
So 5.3495 rounds to 5.35
(b) The first significant figure is the first non-zero digit. Count 3 figures and look at the next digit.
5.3495 rounds to 5.35
Answer: (a) 5.35 (b) 5.35

2 Fuel use

A car uses 40 litres of petrol to travel 480 km.
Work out how many kilometres it travels on each litre of petrol.

480 ÷ 40 = 12
Answer: 12 km per litre

3 Volume of cuboids

A cube has volume 1728 cm^3.
Work out the side length of the cube.

Side length = the cube root of 1728
12 × 12 × 12 = 1728, so the side is 12
Answer: 12 cm

4 Gradient and intercept

A straight line has equation $y = 6x + 1$
(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, 7).

(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, 6
It crosses the y-axis at 7, so c = 7
Answer: (a) 6 (b) $y = 6x + 7$

5 Metric conversions

(a) Convert 8000 g to kg.
(b) Convert 2 m^2 to cm^2.

(a) g → kg: divide by 1000: 8000 ÷ 1000 = 8
(b) 1 m = 100 cm, so 1 m^2 = 100 × 100 = 10 000 cm^2. 2 × 10 000 = 20 000
Answer: (a) 8 kg (b) 20 000 cm^2

6 Substitution into formulae

$y = 4x^2 - 6x - 6$
Work out the value of y when $x = -2$

$y = 4 \times (-2)^2 + (-6) \times (-2) + (-6)$
$y = 16 + 12 + (-6) = 22$
Answer: y = 22

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7 Multiplying and dividing fractions

Work out

(a) $\frac{2}{9} \times \frac{4}{5}$

(b) $\frac{1}{2} \div \frac{5}{6}$

Give each answer in its simplest form.

(a) Multiply the tops and the bottoms: $\frac{8}{45}$

(b) Turn the second fraction upside down and multiply: $\frac{1}{2} \times \frac{6}{5} = \frac{6}{10} = \frac{3}{5}$

Answer: (a) $\frac{8}{45}$ (b) $\frac{3}{5}$

8 Equation of a line

A straight line has gradient -2 and passes through the point $(-3, -2)$.
Find the equation of the line.

The equation is $y = -2x + c$
Substitute $x = -3$ and $y = -2$: $-2 = -2 \times (-3) + c$
$-2 = 6 + c$
$c = -2 - 6 = -8$
Answer: $y = -2x - 8$

9 Grouped frequency tables

The table shows the masses of some parcels.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 10
(b) Use the midpoint of each class: 2.5, 7.5, 12.5, 17.5, 22.5
Sum of midpoint × frequency = 2.5 × 10 + 7.5 × 8 + 12.5 × 4 + 17.5 × 8 + 22.5 × 2 = 320
Total frequency = 32
Estimate = 320 ÷ 32 = 10
Answer: (a) $0 < m \leq 5$ (b) 10

10 Bearings with Pythagoras and trigonometry

A boat sails 8 m on a bearing of 000° from P to Q, then 15 m on a bearing of 090° to R. (Calculator)
(a) Work out the distance PR.
(b) Work out the bearing of R from P.
Give your answers correct to 1 decimal place.

(a) Triangle PQR has a right angle at Q
$PR^2 = 8^2 + 15^2 = 289$
$PR = \sqrt{289} = 17$ m

(b) tan (angle QPR) = $\frac{15}{8}$, so angle QPR = 61.928° (to 3 d.p.)

PQ is on a bearing of 000° and R is 61.9° clockwise from PQ
Bearing = 0 + 61.928 = 61.9°
Answer: (a) 17 m (b) 061.9°