Day 99 **A Tier 10-a-day: Model Solutions**

1 Equation of a line from a graph

Find the equation of the straight line shown.
Give your answer in the form y = mx + c

The line crosses the y-axis at (0, −1), so c = −1

Gradient = $\frac{\text{change in y}}{\text{change in x}}$: from (0, −1) to (−4, 1), y changes by 2 and x changes by −4

m = $-\frac{1}{2}$

y = $-\frac{1}{2}x - 1$

Answer: y = $-\frac{1}{2}x - 1$

2 Exchange rates

The exchange rate is £1 = CHF 1.10. (Calculator)
Ella changes £300 into Swiss francs and spends CHF 165.
Ella changes the rest back into pounds at the same rate.
How much does Ella get back?

Amount received: £300 × 1.1 = CHF 330
Amount left: CHF 330 − CHF 165 = CHF 165
In pounds: 165 ÷ 1.1 = £150
Answer: £150

3 Converting speeds

A bus travels at 4 m/s.
Work out this speed in kilometres per hour.

In 1 hour there are 3600 seconds, so 4 m/s = 4 × 3600 m/h
= 14400 m/h = 14400 ÷ 1000 km/h
= 14.4
Answer: 14.4 km/h

4 Is it a right-angled triangle?

A triangle has sides of length 9 cm, 40 cm and 40 cm.
Is the triangle right-angled?
You must show your working.

Longest side^2 = 40^2 = 1600
Sum of the squares of the other two sides = $9^2 + 40^2$ = 81 + 1600 = 1681
1600 ≠ 1681, so the triangle is not right-angled
Answer: No, it is not right-angled

5 Scatter graphs

The scatter graph shows the ages and values of some cars.
A line of best fit is drawn.
(a) Describe the correlation.
(b) Estimate the value, in £100s, of a car that is 7 years old.

(a) As age of car increases, value decreases, so there is negative correlation
(b) Draw a line up from 7 on the horizontal axis to the line of best fit, then across to the vertical axis
The line gives a value of 16
Answer: (a) Negative correlation (b) 16

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6 Parallel and perpendicular lines

The line L has equation $y = -3x + 6$
Find the equation of the line that is parallel to L and passes through the point $(4, -19)$.

Parallel lines have the same gradient, so the gradient is -3
$y = -3x + c$, so $-19 = -3 \times 4 + c$
$c = -7$
$y = -3x - 7$
Answer: $y = -3x - 7$

7 Recurring decimals, show that

(a) Show that $0.\dot{9}\dot{6} = \frac{32}{33}$

(b) Hence write $1.\dot{9}\dot{6}$ as a mixed number in its simplest form.

(a) Let $x = 0.969696...$, so $100x = 96.9696...$

$100x - x = 96$, so $99x = 96$ and $x = \frac{96}{99} = \frac{32}{33}$

(b) $1.\dot{9}\dot{6} = 1 + \frac{32}{33} = 1\frac{32}{33}$

Answer: (b) $1\frac{32}{33}$

8 Area of a segment

The diagram shows a circle with centre O and radius 5 cm.
Angle AOB = 80°. (Calculator)
Work out the area of the shaded segment.
Give your answer to 3 significant figures.

Area of sector $= \frac{80}{360} \times \pi \times 5^2 = 17.453$

Area of triangle OAB $= \frac{1}{2} \times 5 \times 5 \times \sin 80° = 12.310$

Segment $= 17.453 - 12.310 = 5.14$

Answer: 5.14 cm^2

9 Bounds in measurement

The length and width of a rectangle are 15.9 cm and 10.3 cm.
Each measurement is correct to 1 decimal place.
Work out the upper bound for the area.

Upper bound of length = 15.9 cm, upper bound of width = 10.3 cm
Upper bound of area = $15.95 \times 10.35 = 165.0825$

Answer: 165.0825 cm^2

10 Reverse percentages

A watch costs £378 including VAT at 20%. (Calculator)
Work out the price of the watch before VAT is added.

Price including VAT is 120% of the price before VAT.
120% = £378, so 1% = £378 ÷ 120 = £3.15
100% = £3.15 × 100 = £315

Answer: £315