Day 230 **B Tier 10-a-day: Model Solutions**

1 Grouped frequency tables

The table shows the times taken by some students to complete a task.
(a) Write down the modal class.
(b) Work out an estimate for the mean.

(a) The highest frequency is 12
(b) Use the midpoint of each class: 2.5, 7.5, 12.5, 17.5
Sum of midpoint × frequency = 2.5 × 4 + 7.5 × 12 + 12.5 × 6 + 17.5 × 8 = 315
Total frequency = 30
Estimate = 315 ÷ 30 = 10.5
Answer: (a) $5 < t \leq 10$ (b) 10.5

2 Substitution into formulae

Here is a formula.
$y = mx + c$
Work out the value of y when m = 5, x = 2 and c = 3

$y = 5 \times 2 + 3$
$y = 13$
Answer: y = 13

3 Area of 2D shapes

Work out the area of the trapezium.
The diagram is not drawn accurately.

Area of a trapezium = ½ × (a + b) × h
½ × (15 + 6) × 4 = ½ × 21 × 4
= 42
Answer: 42 cm^2

4 Comparing fractions and percentages

Sophie has $\frac{2}{5}$ of £190.

Zara has 60% of £320.
Who has more money? You must show your working.

Sophie: 190 ÷ 10 × 4 = £76
Zara: 320 ÷ 100 × 60 = £192
£192 is more than £76, so Zara has more
Answer: Zara

5 Solving inequalities

Solve $\frac{y}{5} + 6 \geq 8$

Subtract 6 from both sides: $\frac{y}{5} \geq 2$

Multiply both sides by 5
Answer: $y \geq 10$

6 Trigonometry in context

A ramp is 10 m long and rises 4.3 m. (Calculator)
Work out the angle the ramp makes with the horizontal.
Give your answer correct to 1 decimal place.

The ramp is the hypotenuse and the rise is the opposite side

$\sin \theta = \frac{4.3}{10}$

$\theta = \sin^{-1}(\frac{4.3}{10}) = 25.468...$

$\theta = 25.5°$ (1 d.p.)
Answer: 25.5°

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7 Venn diagram problems

43 adults were asked.
18 of them like tea and 21 of them like coffee.
6 of them did both.
(a) How many did neither?
(b) One is chosen at random. Find the probability that they like tea but do not like coffee.

(a) Union = 18 + 21 − 6 = 33
Neither = 43 − 33 = 10
(b) Only like tea = 18 − 6 = 12
P = 12 out of 43

Answer: (a) 10 (b) $\frac{12}{43}$

8 Circle theorems

A, B, C and D are points on a circle.
Angle ABC = 113°.
Work out the size of angle ADC, marked x.
Give a reason for your answer.
The diagram is not drawn accurately.

ABCD is a cyclic quadrilateral
Opposite angles of a cyclic quadrilateral add up to 180°
x = 180 − 113 = 67°
Answer: x = 67°

9 Forming and solving equations

A rectangle has length (3x + 4) cm and width (x + 4) cm.
The perimeter of the rectangle is 88 cm.
(a) Work out the value of x.
(b) Work out the area of the rectangle.

(a) 2(3x + 4) + 2(x + 4) = 88
8x + 16 = 88
8x = 72, so x = 9
(b) Length = 31 cm and width = 13 cm, so area = 31 × 13 = 403

Answer: (a) x = 9 (b) 403 cm^2

10 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 10%. (Calculator)
Two weeks later it is reduced by a further 50% of the new price.
The final price is £45.
Work out the original price of the sofa.

Multipliers: 0.9 and 0.5
Overall multiplier = 0.9 × 0.5 = 0.45
Original price = £45 ÷ 0.45 = £100
Answer: £100