Day 95 **A Tier 10-a-day: Model Solutions**

1 Compound interest

Tom invests £500 in an investment bond. (Calculator)
The account pays compound interest at 5% per year.
Work out the total interest earned after 4 years.

Multiplier = 1 + 5 ÷ 100 = 1.05
£500 × 1.05^4 = £607.75
Interest = £607.75 − £500 = £107.75
Answer: £107.75

2 Area of parallelograms and kites

The diagram shows a parallelogram.
Work out its area.
The diagram is not drawn accurately.

Area = base × perpendicular height
= 19 × 4 = 76
(the slanted side, 8 cm, is not used)
Answer: 76 cm^2

3 Stem and leaf diagrams

The stem and leaf diagram shows the ages of 15 people.
Key: 2 | 0 represents 20 years
(a) Work out the median age.
(b) Work out the interquartile range.

(a) 15 values, so the median is the 8th value
Counting along the leaves gives 34
(b) LQ is the middle of the lower 7 values = 24
UQ is the middle of the upper 7 values = 45
IQR = 45 − 24 = 21
Answer: (a) 34 years (b) 21 years

4 Rearranging formulae

Make a the subject of b = 6a + 8

Subtract 8 from both sides: 6a = b − 8
Divide both sides by 6
$a = \frac{b - 8}{6}$
Answer: $a = \frac{b - 8}{6}$

5 Sectors: finding an angle or radius

A pizza slice is a sector of a circle has radius 6 cm and area 27π cm^2.
Work out the angle at the centre of the sector.

Area = $\frac{\theta}{360} \times \pi \times 6^2$
$27\pi = \frac{\theta}{360} \times 36\pi$
$\theta = 27 \times 360 \div 36$
$\theta = 270$
Answer: 270°

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6 Income tax

No tax is paid on the first £12,500 of income. Tax of 15% is paid on the next £28,000. Tax of 45% is paid on all income above £40,500. (Calculator)
Leah earns £55,500 a year.
Work out the income tax paid.

Next £28,000 at 15%: £28,000 × 0.15 = £4,200
Above £40,500: £55,500 − £40,500 = £15,000, taxed at 45%: £15,000 × 0.45 = £6,750
Total tax = £4,200 + £6,750 = £10,950
Answer: £10,950

7 Quadratic sequences

Here are the first five terms of a quadratic sequence.
2, −1, −2, −1, 2
(a) Find an expression for the nth term.
(b) Work out the 8th term.

First differences: −3, −1, 1
Second differences: 2, 2, so a = 2 ÷ 2 = 1
Subtract n^2 from each term (1, 4, 9, 16): 1, −5, −11, −17
This is linear: −6n + 7
nth term = $n^2 - 6n + 7$
(b) Substitute n = 8: $1 \times 8^2 - 6 \times 8 + 7 = 23$
Answer: (a) $n^2 - 6n + 7$ (b) 23

8 Simple and compound interest

Femi and Cara each invest £5000 for 3 years. (Calculator)
Femi's account pays 10% simple interest per year.
Cara's account pays 10% compound interest per year.
Work out how much more interest Cara earns than Femi.

Simple interest = £5000 × 10% × 3 = £1500
Compound: £5000 × 1.1^3 = £6655.00, so interest = £1655.00
Difference = 1655.00 − 1500 = £155.00 (to the nearest penny)
Answer: £155.00

9 Bounds in measurement

The length and width of a rectangular garden are 15.6 m and 7.4 m.
Each measurement is correct to 1 decimal place.
Work out the upper bound for the area.

Upper bound of length = 15.7 m, upper bound of width = 7.5 m
Upper bound of area = 15.65 × 7.45 = 116.5925
Answer: 116.5925 m^2

10 Combined means

The mean of 10 numbers is 53.
Another number is added. The mean of the 11 numbers is now 51.
Work out the number that was added.

Total of the first 10 numbers = 10 × 53 = 530
Total of the 11 numbers = 11 × 51 = 561
Number added = 561 − 530 = 31
Answer: 31