Day 125 **B Tier 10-a-day: Model Solutions**

1 Substitution

Work out the value of $3t - 1$ when $t = 9$

Replace t with 9: $3 \times 9 - 1$
$27 - 1 = 26$
Answer: 26

2 Order of operations

Work out
(a) $(5 + 9) \times 7 - 14$
(b) $5 \times (7 + 35) \div 6$

(a) Brackets first: $5 + 9 = 14$
Multiply: $14 \times 7 = 98$
Subtract: $98 - 14 = 84$
(b) Brackets first: $7 + 35 = 42$
Multiply: $5 \times 42 = 210$
Divide: $210 \div 6 = 35$
Answer: (a) 84 (b) 35

3 Solving equations

Solve $8y + 16 = 80$

Subtract 16 from both sides: $8y = 64$
Divide both sides by 8
Answer: $y = 8$

4 Angles in parallel lines

In the diagram, KL is parallel to MN.
(a) Work out the size of angle q.
(b) Give a reason for your answer.
The diagram is not drawn accurately.

Angle q and the 120° angle are alternate angles (Z shape)
$q = 120°$
Alternate angles are equal
Answer: (a) q = 120° (b) Alternate angles are equal

5 Compound interest

£5,000 is invested for 2 years at 2% compound interest per year. (Calculator)
Work out the total interest earned.

Multiplier = 1.02
Value after 2 years = $5{,}000 \times 1.02^2 = £5{,}202$
Interest = £5,202 − £5,000 = £202
Answer: £202

6 Compound percentages

The population of a town is 5000. (Calculator)
It increases by 6% each year.
Work out the population after 2 years.
Give your answer to the nearest whole number.

Multiplier = 1.06
Population = 5000×1.06^2
= 5618.00, which is 5618 to the nearest whole number
Answer: 5618

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7 Perimeter with algebra

An equilateral triangle has sides of length (5x + 8) m.
The perimeter of the triangle is 204 m.
Work out the value of x.

3(5x + 8) = 204
5x + 8 = 68
5x = 60
x = 12
Answer: x = 12

8 Venn diagram problems

33 households were asked.
19 of them have a cat and 16 of them have a dog.
10 of them did both.
(a) How many did neither?
(b) One is chosen at random. Find the probability that they have a cat but do not have a dog.

(a) Union = 19 + 16 − 10 = 25
Neither = 33 − 25 = 8
(b) Only have a cat = 19 − 10 = 9
P = 9 out of 33
Answer: (a) 8 (b) $\frac{3}{11}$

9 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 30%. (Calculator)
Two weeks later it is reduced by a further 20% of the new price.
The final price is £280.
Work out the original price of the sofa.

Multipliers: 0.7 and 0.8
Overall multiplier = 0.7 × 0.8 = 0.56
Original price = £280 ÷ 0.56 = £500
Answer: £500

10 Frequency trees

There are 200 bus passengers.
$\frac{3}{10}$ of them are adults and the rest are children.
$\frac{4}{5}$ of the adults and $\frac{3}{5}$ of the children have a pass.
One person is chosen at random. Work out the probability that they have a pass.

adults: $\frac{3}{10}$ × 200 = 60 and children: 200 − 60 = 140

adults who have a pass: $\frac{4}{5}$ × 60 = 48

children who have a pass: $\frac{3}{5}$ × 140 = 84

P = (48 + 84) out of 200

Answer: $\frac{33}{50}$