Day 234 **B Tier 10-a-day: Model Solutions**

1 Area of 2D shapes

Here is a parallelogram.
Find the area of the parallelogram.
The diagram is not drawn accurately.

Area of a parallelogram = base × perpendicular height
The slanting side is not needed
14 × 4 = 56
Answer: 56 m^2

2 Expanding and simplifying

Expand and simplify $2(x - 5) - 6(x - 1)$

Expand each bracket: $2x - 10 - 6x + 6$
Collect like terms: $-4x - 4$
Answer: $-4x - 4$

3 Rates

Electricity costs 12p per unit.
There is also a standing charge of £10.
Work out the total bill for 350 units.

Cost of units: 350 × 12p = 4200p = £42
Add the standing charge: £42 + £10 = £52
Answer: £52

4 Percentage increase and decrease

A coat costs £300. In a sale the price is reduced by 25%.
(a) Work out the new price.
(b) A car is worth £1500. Its value goes down by 30% in a year. Work out its new value.

(a) The multiplier is 0.75, so new price = £300 × 0.75 = £225
(b) The multiplier is 0.7, so new value = £1500 × 0.7 = £1050
Answer: (a) £225 (b) £1050

5 Forming equations

I think of a number.
I multiply it by 2 and then subtract 11.
The answer is 11.
Work out my number.

Let the number be n: $2n - 11 = 11$
Add 11: $2n = 22$
Divide by 2
Answer: 11

6 Repeated percentage change

The price of a laptop is £80.
The price is first reduced by 25%, then the new price is increased by 30%.
(a) Work out the final price.
(b) Work out the overall percentage decrease in the price.

(a) Multipliers: 0.75 and 1.3
80 × 0.75 × 1.3 = £78
(b) Overall multiplier = 0.975
Overall decrease = 2.5%
Answer: (a) £78 (b) 2.5% decrease

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7 Area of an isosceles trapezium

An isosceles trapezium has parallel sides of length 31 m and 13 m.
Each sloping side is 15 m long.
(a) Work out the perpendicular height of the trapezium.
(b) Work out the area of the trapezium.

(a) The difference in the parallel sides is 31 − 13 = 18, so each end sticks out 9
$h^2 = 15^2 - 9^2 = 225 - 81 = 144$, so h = 12
(b) Area = ½ × (31 + 13) × 12 = 264
Answer: (a) 12 m (b) 264 m^2

8 Compound interest

Maya invests £1,000 in an account paying 10% compound interest per year. (Calculator)
Work out the value of her investment after 2 years.

Multiplier = 1 + 10 ÷ 100 = 1.1
Value = $1{,}000 \times 1.1^2$
= £1,210
Answer: £1,210

9 Negative and zero indices

Work out
(a) 3^{-3}
(b) $7^0 + \sqrt{25}$

(a) A negative power means the reciprocal: $3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

(b) Anything to the power 0 is 1, so $7^0 = 1$
$\sqrt{25} = 5$, so 1 + 5 = 6
Answer: (a) $\frac{1}{27}$ (b) 6

10 Tree diagrams

A bag contains 7 green beads and 5 yellow beads.
Leo takes one at random, replaces it, then takes a second.
Work out the probability that both are green.

P(first green) = $\frac{7}{12}$

P(second green) = $\frac{7}{12}$

P(both green) = $\frac{7}{12} \times \frac{7}{12} = \frac{49}{144}$

Answer: $\frac{49}{144}$