Day 6 **B Tier 10-a-day: Model Solutions**

1 Money

Tom buys 4 notebooks at £1.50 each and 2 sandwiches at £1.35 each.
He pays with a £50 note.
Work out how much change he gets.

4 × £1.50 = £6
2 × £1.35 = £2.70
Total = £6 + £2.70 = £8.70
Change = £50 − £8.70 = £41.30
Answer: £41.30

2 Metric conversions

(a) Convert 6 km to m.
(b) Convert 5 m^3 to cm^3.

(a) km → m: multiply by 1000: 6 × 1000 = 6000
(b) 1 m = 100 cm, so 1 m^3 = 100 × 100 × 100 = 1 000 000 cm^3. 5 × 1 000 000 = 5 000 000
Answer: (a) 6000 m (b) 5 000 000 cm^3

3 Prime factors

Write 84 as a product of its prime factors.
Give your answer in index form.

Divide by prime numbers, smallest first:
84 ÷ 2 = 42, 42 ÷ 2 = 21, 21 ÷ 3 = 7, 7 is prime
84 = 2 × 2 × 3 × 7
In index form: 84 = 2^2 × 3 × 7
Answer: 2^2 × 3 × 7

4 Cost formulae

A photographer charges £34 plus £7 for each hour of a wedding.
(a) Work out the total cost for 7 hours.
(b) The total cost is £139. Work out the number of hours.

(a) 7 × 7 = 49, then 34 + 49 = 83
(b) Take off the fixed charge: 139 − 34 = 105
Divide by the cost for each: 105 ÷ 7 = 15
Answer: (a) £83 (b) 15

5 Mean from a frequency table

The table shows the shoe sizes of students in a class.
Work out the mean.

Multiply each value by its frequency and add: 6 × 6 + 7 × 4 + 8 × 4 + 9 × 6 + 10 × 5 = 200
Total frequency = 6 + 4 + 4 + 6 + 5 = 25
Mean = 200 ÷ 25 = 8
Answer: 8

6 Collecting like terms

Simplify 3x − y + 4x + 5y

Collect the x terms: 3x + 4x = 7x
Collect the y terms: −y + 5y = 4y
Answer: 7x + 4y

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7 Ordering standard form

Write these numbers in order of size.
Start with the smallest.
2.3×10^6, 66,000, 4.7×10^{-3}, 2.9×10^{-5}

Write each in standard form: 2.3×10^6, 6.6×10^4, 4.7×10^{-3}, 2.9×10^{-5}
Compare the powers of 10 first (the bigger the power, the bigger the number)
Order: 2.9×10^{-5}, 4.7×10^{-3}, 66,000, 2.3×10^6
Answer: 2.9×10^{-5}, 4.7×10^{-3}, 66,000, 2.3×10^6

8 Trigonometry: finding a side

Find the length of x. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Label the sides: x is the hypotenuse and 15 cm is the opposite
We use sin (opposite and hypotenuse)

$\sin 29° = \frac{15}{x}$

$x = \frac{15}{\sin 29°} = 30.940...$

x = 30.9 cm (1 d.p.)
Answer: x = 30.9 cm

9 Average speed

A lorry travels at 60 km/h for 0.5 hours and then at 72 km/h for 2.5 hours.
Work out its average speed for the whole journey.

Distance: 60 × 0.5 = 30 km and 72 × 2.5 = 180 km
Total distance = 210 km and total time = 3 hours
Average speed = 210 ÷ 3 = 70
Answer: 70 km/h

10 Distance, speed and time

A scooter travels 90 km at an average speed of 30 km/h.
How long does the journey take?
Give your answer in hours and minutes.

Time = distance ÷ speed
90 ÷ 30 = 3 hours
3 hours = 3 hours
Answer: 3 hours