Day 187 **B Tier 10-a-day: Model Solutions**

1 Money

Sophie buys 5 pens at 25p each and 4 bottles of juice at £1.65 each.
She pays with a £50 note.
Work out how much change she gets.

5 × 25p = £1.25
4 × £1.65 = £6.60
Total = £1.25 + £6.60 = £7.85
Change = £50 − £7.85 = £42.15
Answer: £42.15

2 Laws of indices

Simplify fully
(a) $a^5 \div a^2$
(b) $p^2 \times p^3$

(a) Subtract the powers: 5 − 2 = 3
(b) Add the powers: 2 + 3 = 5
Answer: (a) a^3 (b) p^5

3 Growth and decay

Tom invests £2,000 for 2 years at 4% simple interest per year.
Work out the total interest he earns.

Interest each year = 4% of £2,000 = £80
Over 2 years: 2 × £80 = £160
Answer: £160

4 Comparing fractions and percentages

Farah has $\frac{3}{5}$ of £20.
Owen has 60% of £180.
Who has more money? You must show your working.

Farah: 20 ÷ 5 × 3 = £12
Owen: 180 ÷ 100 × 60 = £108
£108 is more than £12, so Owen has more
Answer: Owen

5 Similar shapes

The two triangles are similar.
(a) Write down the scale factor of the enlargement from the smaller triangle to the larger triangle.
(b) Work out the value of q.
The diagram is not drawn accurately.

(a) Scale factor = 15 ÷ 5 = 3
(b) q is on the smaller triangle, so divide: 21 ÷ 3 = 7
Answer: (a) 3 (b) q = 7 cm

6 Real-life graphs

A taxi firm charges a fixed amount plus a cost for each mile.
The graph shows the total cost.
(a) Write down the fixed charge.
(b) Work out the cost for each mile.

(a) The fixed charge is the cost when nothing has been used, where the line meets the vertical axis
(b) Take two points on the line, for example (0, 7) and (4, 15)
Cost for each mile = (15 − 7) ÷ 4 = 2
Answer: (a) £7 (b) £2

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7 Distance, speed and time

A scooter leaves at 7:40 am.
It travels 72 km at an average speed of 24 km/h.
At what time does it arrive?

Time = 72 ÷ 24 = 3 hours = 3 hours
7:40 am + 3 hours = 10:40 am
Answer: 10:40 am

8 Continuing sequences

Here are the first four terms of a sequence.
1, 2, 4, 8
(a) Write down the next two terms.
(b) Describe the rule for continuing the sequence.

Each term is 2 times the term before: 2 ÷ 1 = 2
8 × 2 = 16 and 16 × 2 = 32
Answer: (a) 16, 32 (b) Multiply by 2 each time

9 Reverse repeated percentages

In a sale, the price of a sofa is reduced by 25%. (Calculator)
Two weeks later it is reduced by a further 25% of the new price.
The final price is £112.50.
Work out the original price of the sofa.

Multipliers: 0.75 and 0.75
Overall multiplier = 0.75 × 0.75 = 0.5625
Original price = £112.50 ÷ 0.5625 = £200
Answer: £200

10 Circle theorems

PA and PB are tangents to a circle, centre O.
Angle APB = 72°.
Work out the size of angle PAB, marked p.
Give a reason for your answer.
The diagram is not drawn accurately.

PA = PB because tangents from a point to a circle are equal in length
Triangle PAB is isosceles
p = (180 − 72) ÷ 2 = 54°
Answer: p = 54°