Day 215 **B Tier 10-a-day: Model Solutions**

1 Money

Beth buys 5 sandwiches at £1.45 each and 2 notebooks at 45p each.
She pays with a £10 note.
Work out how much change she gets.

5 × £1.45 = £7.25
2 × 45p = 90p
Total = £7.25 + 90p = £8.15
Change = £10 − £8.15 = £1.85
Answer: £1.85

2 Interior angles of regular polygons

Work out the sum of the interior angles of a polygon with 30 sides.

Sum = (n − 2) × 180°
(30 − 2) × 180 = 28 × 180 = 5040°
Answer: 5040°

3 Cost formulae

A plumber charges a call-out fee of £34 plus £13 for each hour of work.
(a) Work out the total cost for 7 hours.
(b) The total cost is £138. Work out the number of hours.

(a) 13 × 7 = 91, then 34 + 91 = 125
(b) Take off the fixed charge: 138 − 34 = 104
Divide by the cost for each: 104 ÷ 13 = 8
Answer: (a) £125 (b) 8

4 Congruent triangles

Triangle ABC has sides of 6 cm and 7 cm, and an angle of 40° that is not between them.
Triangle XYZ has sides of 6 cm and 7 cm, and an angle of 40° between them.
Are the two triangles congruent?
Give a reason for your answer.

In triangle ABC the angle is not between the two sides, in triangle XYZ it is
Two sides and a non-included angle do not prove congruence
Answer: No, the equal angle is in a different position

5 Two-way tables

The table shows some information about 59 students.
One person from the group "Girls" is chosen at random.
Find the probability that this person chose "Walk".

Girls total = 59 − 18 = 41
Girls who chose Walk = 41 − 14 = 27
P = 27 out of 41
Answer: $\frac{27}{41}$

6 Reflection

The diagram shows triangle ABC on a grid.
(a) Write down the coordinates of the image of B after a reflection in the line x = 1.
(b) Write down the coordinates of the image of C after a reflection in the line y = x.

(a) B is at (3, 4). Reflect in the line x = 1: (−1, 4)
(b) C is at (3, 1). Reflect in the line y = x: (1, 3)
Answer: (a) (−1, 4) (b) (1, 3)

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7 LCM problems

Two buses leave a bus station at 07:15.
One bus leaves every 16 minutes.
The other bus leaves every 10 minutes.
At what time do both buses next leave together?

Multiples of 16: 16, 32, 48, 64, 80
Multiples of 10: 10, 20, 30, 40, 50, 60, 70, 80
The first common multiple is 80, so the LCM is 80 minutes
07:15 + 80 minutes = 08:35
Answer: 08:35

8 Speed unit conversion

A horse gallops at 5 metres per second.
Work out this speed in kilometres per hour.

In 1 hour (3600 s) it travels 5 × 3600 = 18,000 m
18,000 m = 18 km
Answer: 18 km/h

9 Equation of a straight line graph

The diagram shows a straight line.
(a) Work out the gradient of the line.
(b) Find the equation of the line.

(a) The line crosses the y-axis at 1. Pick two points on the line and work out change in y divided by change in x
Gradient = 2
(b) The equation is y = mx + c with m = 2 and c = 1
Answer: (a) 2 (b) $y = 2x + 1$

10 Algebraic proof

Show that the sum of 7 consecutive whole numbers is always a multiple of 7.

Let the middle number be n. The numbers are $n - 3$, $n - 2$, $n - 1$, n, $n + 1$, $n + 2$, $n + 3$
Add them: the extra parts cancel, giving 7n
7n is a multiple of 7 because n is a whole number
Answer: 7n is a multiple of 7