Day 102 **B Tier 10-a-day: Model Solutions**

1 Collecting like terms

Simplify $5m + 6n - 6m - 5n$

Collect the m terms: $5m - 6m = -m$
Collect the n terms: $6n - 5n = n$
Answer: $-m + n$

2 Best buys

Pasta is sold in two sizes.
Small: 300 g for £1.02
Large: 600 g for £2.40
Which size is better value for money?
You must show your working.

Compare the cost of 600 g of each
Small: $2 \times$ £1.02 = £2.04
Large: $1 \times$ £2.40 = £2.40
The small is cheaper for the same amount
Answer: The small size

3 Angles in quadrilaterals

PQRS is an isosceles trapezium with PQ parallel to SR.
Angle SPQ = 75°.
(a) Write down the size of angle PQR.
(b) Work out the size of angle PSR.

(a) In an isosceles trapezium the base angles are equal, so angle PQR = 75°
(b) Co-interior angles add up to 180°
$180 - 75 = 105$
Answer: (a) 75° (b) 105°

4 Distance, speed and time

A cyclist travels at a constant speed of 18 km/h for 10 minutes.
How far does it travel?

10 minutes = $\frac{1}{6}$ hour

Distance = speed $\times$ time = $18 \times \frac{1}{6} = 3$

Answer: 3 km

5 Tables of values for quadratics

Complete the table of values for $y = x^2 + x - 1$

$x = -2$: $y = (-2)^2 + 1 \times (-2) + (-1) = 1$
$x = -1$: $y = (-1)^2 + 1 \times (-1) + (-1) = -1$
$x = 0$: $y = 0^2 + 1 \times 0 + (-1) = -1$
$x = 1$: $y = 1^2 + 1 \times 1 + (-1) = 1$
Answer: $x = -2$: 1, $x = -1$: -1, $x = 0$: -1, $x = 1$: 1

6 LCM problems

Two lights flash at 08:30.
One light flashes every 9 minutes.
The other light flashes every 12 minutes.
At what time do both lights next flash together?

Multiples of 9: 9, 18, 27, 36
Multiples of 12: 12, 24, 36
The first common multiple is 36, so the LCM is 36 minutes
08:30 + 36 minutes = 09:06
Answer: 09:06

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7 Isosceles triangles and Pythagoras

Triangle ABC is isosceles with AB = AC = 13 m.
The base BC = 10 m.
(a) Work out the perpendicular height of the triangle.
(b) Work out the area of the triangle.

(a) The height splits the base in half: 10 ÷ 2 = 5
$h^2 = 13^2 - 5^2 = 169 - 25 = 144$, so h = 12
(b) Area = ½ × 10 × 12 = 60
Answer: (a) 12 m (b) 60 m^2

8 Frequency trees

There are 300 bus passengers.
$\frac{3}{5}$ of them are adults and the rest are children.
$\frac{1}{5}$ of the adults and $\frac{2}{5}$ of the children have a pass.
One person is chosen at random. Work out the probability that they have a pass.

adults: $\frac{3}{5} \times 300 = 180$ and children: 300 − 180 = 120

adults who have a pass: $\frac{1}{5} \times 180 = 36$

children who have a pass: $\frac{2}{5} \times 120 = 48$

P = (36 + 48) out of 300

Answer: $\frac{7}{25}$

9 Volume of cones and pyramids

A square-based pyramid has base side 8 m and vertical height 3 m.
Volume of a pyramid = $\frac{1}{3}$ × base area × height
Work out the volume of the pyramid.

Base area = 8 × 8 = 64
Volume = $\frac{1}{3} \times 64 \times 3 = 64$
Answer: 64 m^3

10 Reverse percentages

In a sale, all prices are reduced by 8%. (Calculator)
A bike costs £110.40 in the sale.
Work out the original price of the bike.

The sale price is 100% − 8% = 92% of the original price.
92% = £110.40, so 1% = £110.40 ÷ 92 = £1.20
100% = £1.20 × 100 = £120
Answer: £120