Day 194 **B Tier 10-a-day: Model Solutions**

1 Factors and multiples

Write down all the common factors of 36 and 48.

Factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36
Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
The common factors are the numbers in both lists
Answer: 1, 2, 3, 4, 6, 12

2 Symmetry

(a) Write down the number of lines of symmetry of an equilateral triangle.
(b) Write down the order of rotational symmetry of an equilateral triangle.

A equilateral triangle has 3 lines of symmetry
A equilateral triangle looks the same 3 times in a full turn, so the order of rotational symmetry is 3
Answer: (a) 3 (b) 3

3 Equations with fractional answers

Solve $8x + 11 = 18$
Give your answer as a fraction in its simplest form.

Subtract 11 from both sides: $8x = 7$
Divide both sides by 8: $x = \frac{7}{8}$
Answer: $x = \frac{7}{8}$

4 Distance, speed and time

A scooter leaves at 1:20 pm.
It travels 150 km at an average speed of 30 km/h.
At what time does it arrive?

Time = 150 ÷ 30 = 5 hours = 5 hours
1:20 pm + 5 hours = 6:20 pm
Answer: 6:20 pm

5 Tables of values

Complete the table of values for $y = x - 3$

$x = 0$: $y = 1 \times 0 - 3 = -3$
$x = 1$: $y = 1 \times 1 - 3 = -2$
$x = 2$: $y = 1 \times 2 - 3 = -1$
Answer: $x = 0: -3$, $x = 1: -2$, $x = 2: -1$

6 Mean from a frequency table

The table shows the numbers of brothers and sisters of some students.
Work out the mean.

Multiply each value by its frequency and add: $2 \times 1 + 3 \times 1 + 4 \times 1 + 5 \times 3 + 6 \times 6 = 60$
Total frequency = 1 + 1 + 1 + 3 + 6 = 12
Mean = 60 ÷ 12 = 5
Answer: 5

7 Compound percentages

The population of a town is 12,000. (Calculator)
It increases by 5% each year.
Work out the population after 2 years.
Give your answer to the nearest whole number.

Multiplier = 1.05
Population = $12{,}000 \times 1.05^2$
= 13,230.00, which is 13,230 to the nearest whole number
Answer: 13,230

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8 Trigonometry: finding a side

Work out 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 adjacent and 18 m is the opposite
We use tan (opposite and adjacent)

$\tan 38° = \frac{18}{x}$

$x = \frac{18}{\tan 38°} = 23.039...$

x = 23.0 m (1 d.p.)

Answer: x = 23.0 m

9 Fraction problems

A storage tank is $\frac{4}{5}$ full.

3 litres of oil are added.

The storage tank is now $\frac{7}{8}$ full.

Work out the capacity of the storage tank.

Fraction added = $\frac{7}{8} - \frac{4}{5} = \frac{3}{40}$

$\frac{3}{40}$ of the capacity = 3 litres

$\frac{1}{40}$ of the capacity = 3 ÷ 3 = 1 litres

Whole capacity = 1 × 40 = 40 litres

Answer: 40 litres

10 Algebraic proof

Show that 5(2n + 5) + 5(2n + 7) is always a multiple of 20, where n is a whole number.

Expand: 10n + 25 + 10n + 35
Collect like terms: 20n + 60
Factorise: 20(n + 3), which is a multiple of 20

Answer: 20(n + 3) is a multiple of 20