Day 48 **B Tier 10-a-day: Model Solutions**

1 Faces, edges and vertices

Write down the number of faces and vertices of a triangular-based pyramid.

Faces: a 3-sided base and 3 triangles = 4
Vertices: 3 on the base plus the top point = 4
Answer: faces: 4 vertices: 4

2 Forming expressions

Dan is n years old.
Dan's sister is 5 years older.
Dan's father is 4 times as old as Dan.
(a) Write an expression, in terms of n, for the age of Dan's sister.
(b) Write an expression, in terms of n, for the sum of the ages of all three people. Give your answer in its simplest form.

(a) Dan's sister is 5 years older: n + 5
(b) Dan's father is 4n
Sum = n + (n + 5) + 4n
Collect like terms: 6n + 5
Answer: (a) n + 5 (b) 6n + 5

3 Rates

Leo types at 30 words per minute.
(a) How many words does Leo type in 12 minutes?
(b) How long does Leo take to type 1080 words?

(a) 30 × 12 = 360
(b) 1080 ÷ 30 = 36 minutes
Answer: (a) 360 words (b) 36 minutes

4 Fractions in simplest form

What fraction of 1 hour is 45 minutes?
Give your answer in its simplest form.

1 hour = 60 minutes
$\frac{45}{60} = \frac{3}{4}$
Answer: $\mathbf{\frac{3}{4}}$

5 Direct proportion

F is directly proportional to m.
When m = 6, F = 48.
Find the value of m when F = 112.

F = km
k = 48 ÷ 6 = 8
m = 112 ÷ 8 = 14
Answer: m = 14

6 Error intervals

The time of a race is 25.9 seconds, correct to 1 decimal place.
Write down the error interval for the time.
Use the letter t.

The rounding unit is 0.1, so half of it is 0.05
Lower bound = 25.9 − 0.05 = 25.85
Upper bound = 25.9 + 0.05 = 25.95
Answer: $\mathbf{25.85 \leq t < 25.95}$

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7 Fuel use

A car travels 8 km on each litre of petrol. (Calculator)
Petrol costs £1.60 per litre.
Work out the cost of the petrol for a journey of 320 km.

Litres needed = 320 ÷ 8 = 40
Cost = 40 × £1.60 = £64
Answer: £64

8 Radius from area or circumference

The area of a circle is 225π m^2.
Work out the radius of the circle.

Area = πr^2, so $r^2 = 225$
$r = \sqrt{225} = 15$
Answer: 15 m

9 Iteration

Here is an iteration formula.

$$x_{n+1} = 6 + \frac{15}{x_n}$$

$x_0 = 3$
(a) Work out x_1
(b) Work out x_2. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = 6 + \frac{15}{3} = 6 + 5 = 11$

(b) $x_2 = 6 + \frac{15}{11} = 7.36364...$

$= 7.364$
Answer: (a) 11 (b) 7.364

10 Bounds

The length of a rectangle is 27 cm and its width is 18 cm.
Both measurements are correct to the nearest cm.
Work out the upper bound for the perimeter of the rectangle.

Upper bound of each side = value + 0.5: 27.5 cm and 18.5 cm
Perimeter = 2 × (27.5 + 18.5) = 92 cm
Answer: 92 cm