Day 2 **B Tier 10-a-day: Model Solutions**

1 Unitary method

7 cakes cost £1.75.
Work out the cost of 12 cakes.

1 cake costs £1.75 ÷ 7 = 25p
12 cakes cost 12 × 25p = £3
Answer: £3

2 Expanding and simplifying

Expand and simplify $5(x + 5) - 3(x - 6)$

Expand each bracket: $5x + 25 - 3x + 18$
Collect like terms: $2x + 43$
Answer: $2x + 43$

3 Enlargement

A rectangle is 11 m long and 6 m wide.
It is enlarged by scale factor 2.
(a) Write down the length and width of the enlarged rectangle.
(b) Work out the perimeter of the enlarged rectangle.

(a) 11 × 2 = 22 and 6 × 2 = 12
(b) Perimeter = 2 × (22 + 12) = 68
Answer: (a) 22 m by 12 m (b) 68 m

4 Adding fractions

Work out
(a) $\frac{4}{5} + \frac{5}{8}$
(b) $\frac{3}{4} - \frac{2}{9}$
Give each answer in its simplest form.

(a) Common denominator 40: $\frac{32}{40} + \frac{25}{40} = \frac{57}{40}$
(b) Common denominator 36: $\frac{27}{36} - \frac{8}{36} = \frac{19}{36}$
Answer: (a) $1\frac{17}{40}$ (b) $\frac{19}{36}$

5 Scaling a recipe

Here are the amounts needed to make a smoothie for 6 people.
480 g of strawberries, 360 ml of juice
Work out the amounts needed to make a smoothie for 12 people.

For 1 person: 480 ÷ 6 = 80 g and 360 ÷ 6 = 60 ml
For 12 people: 80 × 12 = 960 and 60 × 12 = 720
Answer: 960 g of strawberries, 720 ml of juice

6 Laws of indices

Write each answer as a single power of 4.
(a) $4^8 \times 4^6$
(b) $4^{14} \div 4^6$

(a) Add the powers: 8 + 6 = 14
(b) Subtract the powers: 14 − 6 = 8
Answer: (a) 4^{14} (b) 4^8

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7 Trigonometry in context

A ladder 6 m long leans against a vertical wall. (Calculator)
The ladder makes an angle of 72° with the horizontal ground.
Work out how high up the wall the ladder reaches.
Give your answer correct to 1 decimal place.

The ladder is the hypotenuse and the height is the opposite side

$\sin 72° = \frac{h}{6}$

$h = 6 \times \sin 72° = 5.706...$
$h = 5.7$ m (1 d.p.)
Answer: 5.7 m

8 The nth term

Here are the first four terms of a sequence.
2, 11, 20, 29
Find an expression, in terms of n, for the nth term of this sequence.

The terms go up by 9 each time, so the nth term starts with 9n
When n = 1: 9 and the first term is 2, so we need to subtract 7
nth term = $9n - 7$
Answer: $9n - 7$

9 Cumulative frequency

The cumulative frequency graph shows the times taken by 40 students to complete a puzzle.
(a) Use the graph to estimate the median.
(b) Work out an estimate for the interquartile range.

(a) Median is at $40 \div 2 = 20$: read across from 20 on the vertical axis to the curve, then down: 106
(b) Lower quartile at 10: 84. Upper quartile at 30: 116
IQR = $116 - 84 = 32$
Answer: (a) 106 minutes (b) 32 minutes

10 Iteration

Here is an iteration formula.

$x_{n+1} = \sqrt{3x_n + 7}$

$x_0 = 3$

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

(a) $x_1 = \sqrt{3 \times 3 + 7} = \sqrt{16} = 4$
(b) $x_2 = \sqrt{3 \times 4 + 7} = \sqrt{19} = 4.3589...$
$= 4.359$
Answer: (a) 4 (b) 4.359