Day 17 **B Tier 10-a-day: Model Solutions**

1 Probability of not happening

The probability that a train is on time is 10%.
Work out the probability that a train is not on time.

Probabilities add up to 100%
100% − 10% = 90%
Answer: 90%

2 Interior angles of regular polygons

A regular pentagon has 5 sides.
(a) Work out the size of one exterior angle.
(b) Work out the size of one interior angle.

(a) Exterior angles add up to 360°, so 360 ÷ 5 = 72°
(b) Interior angle = 180 − 72 = 108°
Answer: (a) 72° (b) 108°

3 Population density

Region D has a population density of 250 people per km^2.
Its area is 4 km^2.
Work out its population.

Population = density × area
250 × 4 = 1,000
Answer: 1,000

4 Percentage as a fraction of

(a) Ivan scores 106 out of 125 in a test. Write this as a percentage.
(b) Write £1.90 as a percentage of £10.

(a) $\frac{106}{125} \times 100 = 84.8\%$
(b) Change both to pence: 190p and 1000p
$\frac{190}{1000} \times 100 = 19\%$
Answer: (a) 84.8% (b) 19%

5 Proving a triangle is right-angled

A triangle has sides of length 6 mm, 10 mm and 8 mm.
Is the triangle right-angled?
You must show your working.

The longest side is 10. Check whether $a^2 + b^2 = c^2$
$6^2 + 8^2 = 36 + 64 = 100$
$10^2 = 100$
These are equal, so the triangle is right-angled
Answer: Yes, $6^2 + 8^2 = 10^2$

6 Standard form

Write each number as an ordinary number.
(a) 8.4×10^5
(b) 4.4×10^{-3}

(a) Multiply by 10, 5 times: move the decimal point 5 places right
$8.4 \times 10^5 = 840{,}000$
(b) $10^{-3} = 0.001$, so move the decimal point 3 places left
$4.4 \times 10^{-3} = 0.0044$
Answer: (a) 840,000 (b) 0.0044

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7 Harder linear equations

Solve $15 - 4x = 5x - 21$

Add 4x to both sides: $15 = 9x - 21$
Add 21 to both sides: $36 = 9x$
Divide both sides by 9
Answer: x = 4

8 Pythagoras in context

A TV screen is a rectangle 80 cm wide and 60 cm high.
Work out the length of the diagonal of the screen.

$d^2 = 80^2 + 60^2 = 6400 + 3600 = 10000$
$d = \sqrt{10000} = 100$
Answer: 100 cm

9 Growth in standard form

There are 3.9×10^6 bacteria in a dish.
The number doubles every day.
How many are there after 4 days?
Give your answer in standard form.

Each day multiply by 2, so multiply by $2^4 = 16$
$3.9 \times 10^6 \times 16 = 62.4 \times 10^6$
In standard form: 6.24×10^7
Answer: 6.24×10^7

10 Iteration

Here is an iteration formula.
$x_{n+1} = \sqrt{5x_n + 16}$
$x_0 = 4$
(a) Work out x_1
(b) Work out x_2. Give your answer correct to 3 decimal places. (Calculator)

(a) $x_1 = \sqrt{5 \times 4 + 16} = \sqrt{36} = 6$
(b) $x_2 = \sqrt{5 \times 6 + 16} = \sqrt{46} = 6.78233...$
$= 6.782$
Answer: (a) 6 (b) 6.782