Day 200 **B Tier 10-a-day: Model Solutions**

1 Metric conversions

(a) Convert 750 mm to m.

(b) Convert 30 000 cm^2 to m^2.

(a) mm → m: divide by 1000: 750 ÷ 1000 = 0.75

(b) 1 m = 100 cm, so 1 m^2 = 100 × 100 = 10 000 cm^2. 30 000 ÷ 10 000 = 3

Answer: (a) 0.75 m (b) 3 m^2

2 Scaling a recipe

Here are the amounts needed to make soup for 6 people.

180 g of lentils, 360 g of carrots

Work out the amounts needed to make soup for 3 people.

For 1 person: 180 ÷ 6 = 30 g and 360 ÷ 6 = 60 g

For 3 people: 30 × 3 = 90 and 60 × 3 = 180

Answer: 90 g of lentils, 180 g of carrots

3 Ordering fractions

Write these in order of size.

Start with the smallest.

$\frac{8}{25}$, 50%, 60%, 0.85

Write each as a decimal:

$\frac{8}{25}$ = 0.32, 50% = 0.5, 60% = 0.6, 0.85 = 0.85

Order: $\frac{8}{25}$, 50%, 60%, 0.85

Answer: $\frac{8}{25}$, 50%, 60%, 0.85

4 Inequalities on a number line

Write down the inequality shown on the number line. Use x for the variable.

The circle at −3 is filled in, so −3 is included

The line goes to the left, so x is less than −3

Answer: $x \leq -3$

5 Ordering standard form

Write these numbers in order of size.

Start with the smallest.

6.3×10^1, 550,000, 6×10^{-5}, 700

Write each in standard form: 6.3×10^1, 5.5×10^5, 6×10^{-5}, 7×10^2

Compare the powers of 10 first (the bigger the power, the bigger the number)

Order: 6×10^{-5}, 6.3×10^1, 700, 550,000

Answer: 6×10^{-5}, 6.3×10^1, 700, 550,000

6 Inverse proportion

9 workers take 4 days to dig a trench.

All the workers work at the same rate.

How long would it take 4 workers?

The total work stays the same: 9 × 4 = 36 workers-days

With 4 workers: 36 ÷ 4 = 9 days

Answer: 9 days

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7 Trigonometry: finding a side

Calculate the length of q. (Calculator)
Give your answer correct to 1 decimal place.
The diagram is not drawn accurately.

Label the sides: q is the opposite and 8 m is the adjacent
We use tan (opposite and adjacent)

$\tan 48° = \frac{q}{8}$

$q = 8 \times \tan 48° = 8.885...$
q = 8.9 m (1 d.p.)
Answer: q = 8.9 m

8 Difference of two squares

Factorise $9x^2 - 121$

$9x^2 = (3x)^2$ and $121 = 11^2$
$(3x)^2 - 11^2 = (3x - 11)(3x + 11)$
Answer: $(3x - 11)(3x + 11)$

9 Sample space of two dice

Two fair six-sided spinners are spun.
Work out the probability that the product of the two scores is odd.

There are 6 × 6 = 36 equally likely outcomes
The product is odd only when both scores are odd: 3 × 3 = 9 outcomes
P = 9 out of 36
Answer: $\frac{1}{4}$

10 Error intervals

The number x is rounded to the nearest 10.
The result is 100.
Write down the error interval for x.

The rounding unit is 10, so x can be up to half of this, 5, either side of 100
Lower bound = 100 − 5 = 95 and upper bound = 100 + 5 = 105
Answer: $95 \leq x < 105$