Test answers - Units, estimation, rounding and bounds

Year: Year 10 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. $3.2 \times 10\,000 =$ **32 000 cm²** (1) One square metre is 10 000 square centimetres, so we multiply by 10 000.
b. $72\,000 \div 3600$ (1) $=$ **20 m/s** (1) Change kilometres into metres by multiplying by 1000, then divide by 3600 seconds in an hour.
c. $850 \div 1000 =$ **0.85 litres** (1) There are 1000 cm³ in a litre, so divide by 1000.

A common error in (a) is to multiply by 100 only, giving 320 cm².

Answer to Question 2 (4 marks)

a. **0.036** (1) The zero after the decimal point is not significant. The first two significant figures are 3 and 5, and the next digit 7 makes the 5 round up to 6.
b. $\dfrac{50 \times 3}{0.5} =$ **300** (1 for rounding, 1 for the answer) Round 49.6 to 50, 3.1 to 3 and 0.52 to 0.5. Then $50 \times 3 = 150$ and $150 \div 0.5 = 300$.
c. Accurate value is 295.7, so the estimate is **bigger** (1) The estimate is bigger mainly because 49.6 was rounded up and the denominator 0.52 was rounded down.

Answer to Question 3 (4 marks)

a. $6.65 \leq x < 6.75$ (1 for each end) The length was rounded to 1 decimal place, so it can be up to 0.05 below or above 6.7.
b. $3750 \leq m < 3850$ (1 for each end) Rounding 3800 to 2 significant figures means rounding to the nearest 100, so the mass can be up to 50 below or above 3800.

The upper end uses a strict inequality, because 6.75 would round up to 6.8.

Answer to Question 4 (4 marks)

a. 12.55×8.45 (1) $=$ **106.0475 m²** (1) Each length can be up to 0.05 m more than the measurement, so multiply the two upper bounds. The upper bound of the area is 106.0475 m².
b. $2(12.45 + 8.35)$ (1) $=$ **41.6 m** (1) Use the lower bounds of both lengths: 12.45 m and 8.35 m. The lower bound of the perimeter is 41.6 m.

Answer to Question 5 (4 marks)

a. $\frac{205}{11.5}$ (1) $=$ **17.83 m/s** (1) The greatest speed uses the greatest distance, 205 m, and the shortest time, 11.5 s. The upper bound is 17.83 m/s.

b. $\frac{195}{12.5}$ (1) $=$ **15.60 m/s** (1) The least speed uses the least distance, 195 m, and the longest time, 12.5 s. The lower bound is 15.60 m/s.

Using 210 m or 11 s as bounds is a common error: the bounds are half a unit either side.