The effect of rounding and repeated approximations

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Compare $7 \times (\frac{1}{7})$ exactly with 7×0.14. [2 marks]

Exact factors cancel.

$7 \times 0.14 = 0.98$.

Answer: 1 and 0.98

2. Compare $(\sqrt{50})^2$ exactly with 7.07^2. [2 marks]

The exact square root squares to 50.

$7.07^2 = 49.9849$.

Answer: 50 and 49.9849

3. Calculate $4 \times (\frac{2}{3})$ exactly and compare with 4×0.67. [2 marks]

The exact result is $\frac{8}{3}$.

$4 \times 0.67 = 2.68$.

Answer: $\frac{8}{3}$ and 2.68

4. Find the circumference of an exact-radius 4 cm circle to 2 decimal places, rounding at the end. [2 marks]

$8\pi \approx 25.132741.$

Round once to 25.13.

Answer: 25.13 cm

5. Compare $100\sqrt{5}$ with 100×2.24, both to 2 decimal places. [2 marks]

$100\sqrt{5} \approx 223.60679.$

$2.24 \times 100 = 224.00.$

Answer: 223.61 and 224.00

6. A ruler gives 4.2 cm to the nearest 0.1 cm. Does reporting a derived area to 8 decimal places make that measurement more precise? [3 marks]

The length remains uncertain by up to 0.05 cm.

Extra arithmetic digits cannot remove instrument uncertainty.

Answer: No.