

Rounding, estimation and error intervals

Topic cliff notes / objectives, key ideas and examples

Learning objectives

- Round to a stated accuracy and estimate calculations.
- Find the error interval for a rounded positive measurement.

Key ideas

- Decimal places count from the decimal point; significant figures start at the first non-zero digit.
- Inspect the next digit: five or more rounds up; otherwise keep the selected digit.
- Estimate by rounding inputs to convenient numbers; keep full accuracy in exact working.
- For usual rounding of positive measurements, use half the rounding step on each side.

$$v - \frac{s}{2} \leq x < v + \frac{s}{2} \quad (\text{step } s, \text{ stated value } v)$$

- The lower boundary is included; the upper boundary is excluded.

Worked example

Find the interval for a length stated to the nearest tenth of a centimetre.

$$v = 7.4, \quad s = 0.1, \quad \frac{s}{2} = 0.05$$

$$7.4 - 0.05 = 7.35, \quad 7.4 + 0.05 = 7.45$$

Answer

$$7.35 \text{ cm} \leq L < 7.45 \text{ cm}$$

Quick example

Round the decimal to two significant figures. The next digit is eight, so round up.

$$0.04786 \approx 0.048 \quad (2 \text{ significant figures})$$

Answer

$$0.048$$

Watch out

Leading zeros are not significant figures. Do not round intermediate steps unless the question requests an estimate.

