

1.4 Bounds

Name: _____ Class: _____ Date: _____

KEY WORDS lower bound

<!-- Session 2 native-skill companion -->

Objective

Practise bounds within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Accuracy, bounds and compound measures · Higher

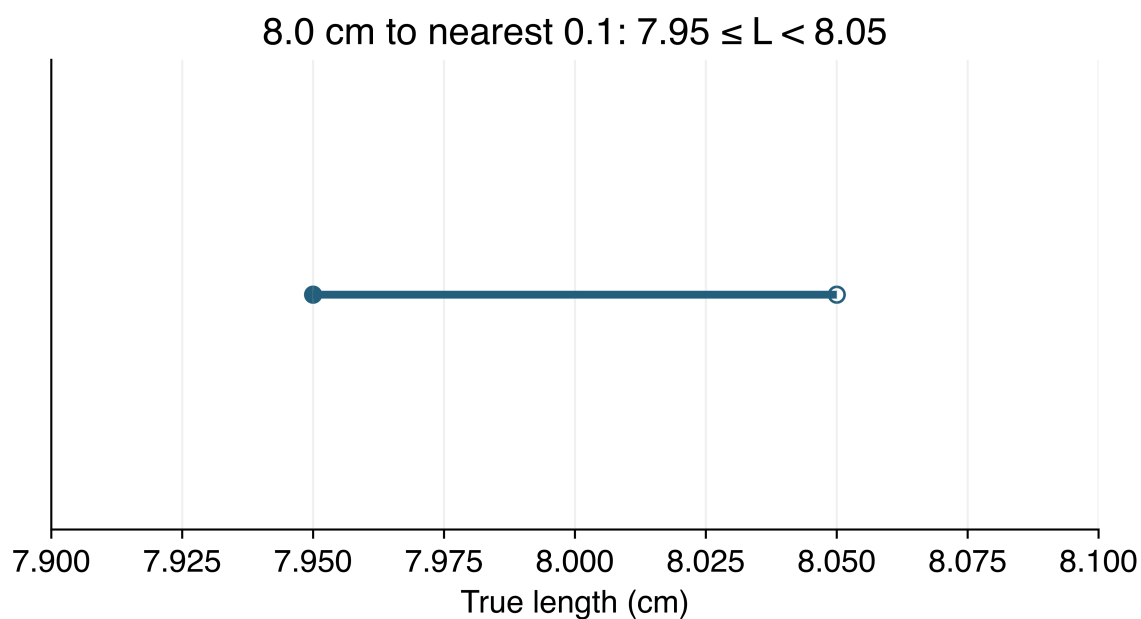
A value rounded to the nearest unit u lies from stated value- $u/2$ up to, but usually not including, stated value+ $u/2$. For positive quantities, combine extremes according to the operation.

$$A = LW, \quad v = \frac{d}{t}$$

The lengths satisfy $7.95 \leq L < 8.05$ and $4.95 \leq W < 5.05$. Since $A = LW$, $39.3525 \leq A < 40.6525$. For speed d/t , the largest speed uses the largest distance and smallest positive time.

An upper bound is not automatically achieved. Dividing upper distance by upper time does not give the largest speed. Keep enough digits in intermediate calculations.

Distinguish measurement uncertainty from arithmetic rounding. A sensible reported precision cannot be finer than the measurements justify.



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Higher) Find the lower bound of 3.4 rounded to the nearest 0.1.

2.2 (Higher) Find the upper bound of 250 rounded to the nearest 10.

2.3 (Higher) A distance is at most 105 m and time at least 20 s. Find the upper speed bound.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: The greatest value of positive d/t uses the greatest d and greatest t .

Solutions

2.1 Half the rounding unit is 0.05. Lower bound= $3.4-0.05=3.35$.

2.2 Half of 10 is 5. Upper bound= $250+5=255$; the upper endpoint is excluded.

2.3 For positive d and t , the largest quotient uses the greatest d and least t : $105/20=5.25$.

3.1 False. With $8 \leq d < 9$ and $2 \leq t < 3$, $8.9/2=4.45$ exceeds $8.9/2.9 \approx 3.07$. Increase the numerator and decrease the positive denominator; distinguish a supremum from an attained maximum.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.