Number & Measures: Bounds & Accuracy

Practice Worksheet (Edexcel GCSE 1MA1 Nov 2024 2H Style)

I Do

$$T = \frac{w}{a - c}$$

$w = 435$ correct to the nearest 5.
$a = 9.8$ correct to 2 significant figures.
$c = 2.5$ correct to 2 significant figures.

By considering bounds, calculate the value of T to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

We Do

$$T = \frac{v}{p - q}$$

$v = 280$ correct to the nearest 10.
$p = 12.4$ correct to 3 significant figures.
$q = 4.8$ correct to 2 significant figures.

By considering bounds, calculate the value of T to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

You Do

$$T = \frac{m}{x - y}$$

$m = 360$ correct to the nearest 5.
$x = 8.4$ correct to 2 significant figures.
$y = 3.2$ correct to 2 significant figures.

By considering bounds, calculate the value of T to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

Challenge

$$P = \frac{F}{(x - y)^2}$$

$F = 520$ correct to the nearest 10.
$x = 6.8$ correct to 2 significant figures.
$y = 1.8$ correct to 2 significant figures.

By considering bounds, calculate the value of P to a suitable degree of accuracy.
You must show all your working and give a reason for your final answer.

Answers & Worked Solutions

- **I Do:**
  1. Bounds for w: $432.5 \leq w < 437.5$ (nearest 5).
  2. Bounds for a: $9.75 \leq a < 9.85$ (2 s.f.).
  3. Bounds for c: $2.45 \leq c < 2.55$ (2 s.f.).
  4. Upper bound $T_{\text{UB}} = \frac{w_{\text{UB}}}{a_{\text{LB}} - c_{\text{UB}}} = \frac{437.5}{9.75-2.55} = \frac{437.5}{7.20} = \mathbf{60.7638}\ldots$
  5. Lower bound $T_{\text{LB}} = \frac{w_{\text{LB}}}{a_{\text{UB}} - c_{\text{LB}}} = \frac{432.5}{9.85-2.45} = \frac{432.5}{7.40} = \mathbf{58.4459}\ldots$
  6. Both bounds round to **60** to 1 significant figure (or 10 to the nearest 10).
  7. **Final Answer:** $T = \mathbf{60}$

  Reason: Both the upper bound ($60.76\ldots$) and lower bound ($58.44\ldots$) round to 60 to 1 significant figure.

- **We Do:**
  1. Bounds for v: $275 \leq v < 285$.
  2. Bounds for p: $12.35 \leq p < 12.45$.
  3. Bounds for q: $4.75 \leq q < 4.85$.
  4. Upper bound $T_{\text{UB}} = \frac{285}{12.35-4.85} = \frac{285}{7.50} = \mathbf{38.0}$
  5. Lower bound $T_{\text{LB}} = \frac{275}{12.45-4.75} = \frac{275}{7.70} = \mathbf{35.7142}\ldots$
  6. Both 38.0 and $35.71\ldots$ round to **40** to 1 significant figure.
  7. **Final Answer:** $T = \mathbf{40}$

  Reason: Both bounds round to 40 when rounded to 1 significant figure.

- **You Do:**
  1. Bounds for m: $357.5 \leq m < 362.5$.
  2. Bounds for x: $8.35 \leq x < 8.45$.
  3. Bounds for y: $3.15 \leq y < 3.25$.
  4. Upper bound $T_{\text{UB}} = \frac{362.5}{8.35-3.25} = \frac{362.5}{5.10} = \mathbf{71.0784}\ldots$
  5. Lower bound $T_{\text{LB}} = \frac{357.5}{8.45-3.15} = \frac{357.5}{5.30} = \mathbf{67.4528}\ldots$
  6. Both $71.07\ldots$ and $67.45\ldots$ round to **70** to 1 significant figure.
  7. **Final Answer:** $T = \mathbf{70}$

  Reason: Both bounds round to 70 to 1 significant figure.

- **Challenge:**
  1. Bounds for F: $515 \leq F < 525$.
  2. Bounds for x: $6.75 \leq x < 6.85$.
  3. Bounds for y: $1.75 \leq y < 1.85$.
  4. Upper bound $P_{\text{UB}} = \frac{525}{(6.75-1.85)^2} = \frac{525}{(4.90)^2} = \frac{525}{24.01} = \mathbf{21.8658}\ldots$
  5. Lower bound $P_{\text{LB}} = \frac{515}{(6.85-1.75)^2} = \frac{515}{(5.10)^2} = \frac{515}{26.01} = \mathbf{19.8000}\ldots$
  6. Both $21.86\ldots$ and $19.80\ldots$ round to **20** to 1 significant figure.
  7. **Final Answer:** $P = \mathbf{20}$

  Reason: Both bounds round to 20 to 1 significant figure.