Year 9 Standard Form and Bounds – Challenge

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Answers and worked solutions · 8 questions

A. Think like a mathematician

1. No. 6.5 m would round up to 7 m, so the length is less than 6.5 m.

Test it with an example

6.5 m would round up to 7 m, so the length is less than 6.5 m.

Decide whether it is true

2. Yes. $10^{-2} = 1/100$, so $\times 10^{-2}$ means $\times 1/100$, which is $\div 100$.

Test it with an example

$10^{-2} = 1/100$, so $\times 10^{-2}$ means $\times 1/100$, which is $\div 100$.

Decide whether it is true

3. The powers of 10 are the same, so just add the numbers: 3×10^5.

Error: the indices were added, but this is an addition, not a multiplication

2 lots of 10^5 plus 1 lots of 10^5

$= 3 \times 10^5$

4. Dividing by 10^{-3} is the same as multiplying by 1000: $4.2 \div 10^{-3} = 4200$.

Error: $\div 10^{-3}$ was treated as $\div 1000$

$10^{-3} = 1/1000$, and $\div 1/1000$ means $\times 1000$

$= 4200$

5. No. Each plank is less than 0.5 cm longer than its rounded length, so the total is less than 128 cm.

Upper bounds: 68.5 cm and 59.5 cm

Upper bound of the total: 128 cm

The upper bound itself is not possible, so the total is always less than this

6. 1.1×10^7 is larger: its power of 10 is higher, and the numbers in front are both between 1 and 10.

Compare the powers of 10 first: $10^7 > 10^6$

Each power of 10 is 10 times the one before, and $4.6 < 10 \times 1.1$

So 1.1×10^7 is larger

7. 300 people per km²

People per km² = population ÷ area

$(7.5 \times 10^7) \div (2.5 \times 10^5) = 3 \times 10^2$

$= 300$

8. 6.8×10^{-6}

Write both with 10^{-6}: $4 \times 10^{-7} = 0.4 \times 10^{-6}$

$= 6.8 \times 10^{-6}$