Shreeji Education
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Upper bound - Lower bound

IGCSE

Reference - IGCSE past papers

Question 1

A fence is made from 32 identical pieces of wood, each of length 2 metres correct to the nearest centimetre.
Calculate the lower bound for the total length of the wood used to make this fence.
Write down your full calculator display.

Click to display solution

Question 2

Helen measures a rectangular sheet of paper as 197mm by 210 mm.
Calculate the upper bound of the perimeter of the sheet of the paper.

Click to display solution

Question 3

The length of each side of an equilateral triangle is 74 mm, correct to the nearest millimetre.
Calculate the smallest possible perimeter of the triangle.

Click to display solution

Question 4

In 2005 there were 9 million bicycles in Beijing, correct to the nearest million.
The average distance travelled by each bicycle in one day was 6.5 km correct to one decimal place.
Work out the upper bound for the total distance travelled by all the bicycles in one day.

Click to display solution

Question 5

If the distance travelled by train is 68 km correct to 100 m and the time taken is 65 minutes correct to 1 minute, calculate the upper bound and lower bound of speed of the train.

Click to display solution

Question 6

Calculate the lower and upper bound of density when the mass of an object is 640 g nearest to 10 grams and the volume of the object is 1600 cm^3 nearest to 50 cm^3.

Click to display solution

Question 1 - solution

2m = 200 cm. (to nearest cm $\Rightarrow \frac{1}{2} = 0.5$)

So $199.5 < 200 < 200.5$

LB = 199.5

length of 32 identical pieces = 32×199.5

= 6384 cm.

Go to question 1

Go to question 2

Question 2 - solution

$L = 210$ mm to nearest mm

$\Rightarrow 209.5 \leq 210 \leq 210.5$

$B = 197$ mm to nearest mm

$\Rightarrow 196.5 \leq 197 \leq 197.5$

$P = 2(L + B)$

$= 2(210.5 + 197.5) = 816$ mm.

Go to question 2

Go to question 3

Question 3 - solution

Side = 74 mm to nearest mm

$\Rightarrow 73.5 \leq 74 \leq 74.5$

$P = 3 \times \text{side}$

Smallest perimeter $= 3 \times 73.5$

$= 220.5$ mm.

Go to question 3

Go to question 4

Question 4

distance = 6.5 km → to one decimal place

$\Rightarrow 6.4 < 6.5 < 6.6$

→ upper bound of total distance travelled = $6.6 \times (9 \times 10^6)$

$= 59.4 \times 10^6$ km.

Go to question 4

Go to question 5

Question 5 - solution

distance = 68 km = 68000 m

→ correct to 100 m

⇒ uncertainty = 100/2 50

⇒ 67950 < 68000 < 68050

time = 65 minutes

→ correct to 1 minute ∴ 1/2 = 05

⇒ 64.5 < 65 < 65.5

upper bound of speed

$$= \frac{68050}{64.5} = 1055 \text{ m/min}$$

lower bound of speed $= \frac{67950}{65.5}$

$= 1037 \text{ m/min}$

Go to question 5

Go to question 6

Question 6 - solution

Mass → 640 g nearest to 10 grams

∴ uncertainty is $10/2 = 5$ grams

$\Rightarrow 635 < 640 < 645$

Volume → 1600 nearest to 50 cm^3

∴ uncertainty $= 50/2 = 25$

$\Rightarrow 1575 < 1600 < 1625$

upper bound of density $= \frac{645}{1575} = 0.4095\ g/cm^3$

lower bound of density $= \frac{635}{1625} = 0.3908\ g/cm^3$

Go to question 6

End