

Bounds in Calculations *extend*

1



A block is a cuboid 12 cm by 8 cm by 5 cm, each to the nearest cm.
Its mass is 520 g, to the nearest 10 g.
Find the greatest possible density of the block, to 3 significant figures.

$$525 \div (11.5 \times 7.5 \times 4.5)$$

$$= 525 \div 388.125$$

$$1.35 \text{ g/cm}^3$$

Answer

2



A pendulum swings in T seconds, where

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$l = 0.82$ m to 2 decimal places and $g = 9.8$ to 1 decimal place.

Use bounds to give T to a suitable accuracy. Explain why.

$$T \text{ is between } 1.807 \text{ and } 1.828$$

both are 1.8 to 2 s.f., not the same to 3 s.f.

$$1.8 \text{ s (2 s.f.)}$$

Answer

3



$a = 6.2$ and $b = 3.8$, each to 1 decimal place.

Find the upper bound of $\frac{a+b}{a-b}$

Give your answer to 2 decimal places.

$$\frac{a+b}{a-b} = 1 + \frac{2b}{a-b}, \text{ so small } a, \text{ large } b$$

$$10 \div 2.3$$

$$4.35$$

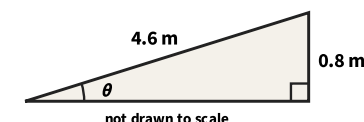
Answer

4



A ramp is 4.6 m long and rises 0.8 m, each to 1 decimal place.

Find the greatest possible angle θ the ramp makes with the ground, to 1 decimal place.



$$\sin \theta = 0.85 \div 4.55$$

$$\theta = \sin^{-1}(0.1868)$$

$$10.8^\circ$$

Answer

5



A circle has an area of 50 cm^2 , to the nearest cm^2 .
Find the upper bound of its radius, to 3 significant figures.

$$\pi r^2 = 50.5$$

$$r = \sqrt{(50.5 \div \pi)}$$

$$4.01 \text{ cm}$$

Answer

6



A field is a rectangle 120 m by 85 m, each to the nearest 5 m. One bag of fertiliser covers 400 m^2 .
How many bags must be bought to be sure of covering the field?

$$122.5 \times 87.5 = 10718.75 \text{ m}^2$$

$$10718.75 \div 400 = 26.80, \text{ round up}$$

$$27 \text{ bags}$$

Answer

7



Ama runs 100 m in 12.3 s.

Bo runs 200 m in 24.9 s.

Distances are to the nearest metre and times to 1 decimal place.

Can you be sure who has the greater average speed? Show how you know.

$$\text{Ama: } 8.06 \text{ to } 8.20 \text{ m/s}$$

$$\text{Bo: } 8.00 \text{ to } 8.07 \text{ m/s}$$

$$\text{No: the ranges overlap}$$

Reason

8



$x = 5$, to the nearest whole number.

Sam says the upper bound of $x^2 - 4x$ is $5.5^2 - 4 \times 4.5 = 12.25$.

Explain why Sam is wrong and find the right upper bound.

$$x \text{ has one value, so it is } 5.5 \text{ in both terms}$$

$$5.5^2 - 4 \times 5.5 = 30.25 - 22$$

$$8.25$$

Answer