Bounds and compound measures

ANSWERS

1

A runner covers 120 m, to the nearest 10 m, in 15.2 seconds, to 1 decimal place.
Work out the upper bound of her speed.
Give your answer to 3 significant figures.

distance 115 to 125 m
time 15.15 to 15.25 s
upper bound 125 ÷ 15.15 = 8.25 m/s

Answer 8.25 m/s

2

A metal block has a mass of 450 g, to the nearest 10 g, and a volume of 60 cm^3, to the nearest cm^3. Work out the upper bound of its density. Give your answer to 3 significant figures.

mass 445 to 455 g
volume 59.5 to 60.5 cm^3
upper bound 455 ÷ 59.5 = 7.65 g/cm^3

Answer 7.65 g/cm^3

3

A force of 900 N, to the nearest 50 N, acts on an area of 2.4 m^2, to 1 decimal place.
Work out the lower bound of the pressure.
Give your answer to 3 significant figures.

force 875 to 925 N
area 2.35 to 2.45 m^2
lower bound 875 ÷ 2.45 = 357 N/m^2

Answer 357 N/m^2

4

A coach travels 84 km, to the nearest km, in 1.5 hours, to the nearest 0.1 hour.
Work out the lower bound of its average speed. Give your answer to 3 significant figures.

lower bound 83.5 ÷ 1.55 = 53.9 km/h

Answer 53.9 km/h

5

A brass weight has a mass of 2.5 kg, to 1 decimal place. Brass has a density of 8.0 g/cm^3, to 1 decimal place. Work out the upper bound of its volume.
Give your answer to 3 significant figures.

volume = mass ÷ density: the upper bound is 2550 ÷ 7.95

Answer 321 cm^3

6

A cyclist rides 200 m, to the nearest metre, in 25.4 seconds, to 1 decimal place.
Work out her speed to a suitable degree of accuracy. Give a reason for your answer.

bounds 7.84 and 7.91 m/s both round to 8 to 1 s.f., not to the same value to 2 s.f.

Answer 8 m/s

7

A square tile with sides of 0.5 m, to 1 decimal place, supports a force of 600 N, to the nearest 10 N. Work out the upper bound of the pressure on the tile.
Give your answer to 3 significant figures.

the smallest area is $0.45^2 = 0.2025$ m^2: 605 ÷ 0.2025

Answer 2,990 N/m^2

8

A train travels 240 km, to the nearest 10 km, at an average speed of 80 km/h, to the nearest 5 km/h. Work out the upper bound of the time it takes.
Give your answer to 3 significant figures.

time = distance ÷ speed: 245 ÷ 77.5

Answer 3.16 hours

Bounds and compound measures *further practice*

ANSWERS

9

A stone has a mass of 3.2 kg, to 1 decimal place, and a volume of 400 cm^3, to the nearest 10 cm^3. Work out the lower bound of its density in g/cm^3.
Give your answer to 3 significant figures.

3150 ÷ 405

Answer 7.78 g/cm^3

10

A swimmer covers 100 m, to the nearest metre, in 12.3 seconds, to 1 decimal place. Work out the upper bound of the swimmer's speed.
Give your answer to 3 significant figures.

100.5 ÷ 12.25

Answer 8.20 m/s

11

A ring has a mass of 56 g, to the nearest gram, and a volume of 7.0 cm^3, to 1 decimal place. Work out its density to a suitable degree of accuracy.
Give a reason.

bounds 7.87 and 8.13 g/cm^3 agree only to 1 s.f.

Answer 8 g/cm^3

12

A crate pushes down with a force of 1200 N, to the nearest 100 N, on an area of 0.8 m^2, to 1 decimal place. Work out the lower bound of the pressure.
Give your answer to 3 significant figures.

1150 ÷ 0.85

Answer 1,350 N/m^2

13

A van travels at an average speed of 65 mph, to the nearest mph, for 2.5 hours, to the nearest half hour.
Work out the greatest distance it could have travelled, to the nearest mile.

distance = speed × time: 65.5 × 2.75

Answer 180 miles

14

A metal cube has sides of 4 cm, to the nearest cm, and a mass of 450 g, to the nearest 10 g. Work out the upper bound of its density. Give your answer to 3 significant figures.

the smallest volume is $3.5^3 = 42.875$ cm^3: 455 ÷ 42.875

Answer 10.6 g/cm^3

15

A car travels 0.5 miles, to 1 decimal place, in 58 seconds, to the nearest second.
The speed limit is 30 mph. Can you be sure the car broke the limit?
Show how you decide.

speed is between 27.7 and 34.4 mph, so it may be under 30

Answer No

16

A ball rolls 50 m, to the nearest metre, in 8 seconds, to the nearest second.
Raj works out the upper bound of its speed as 50.5 ÷ 8.5. Explain his mistake and find the upper bound.

dividing by the smallest time gives the biggest speed: 50.5 ÷ 7.5

Answer 6.73 m/s