N308 Upper and lower bounds

Q1.

$$D = \frac{x}{y}$$

x = 99.7 correct to 1 decimal place.
y = 67 correct to 2 significant figures.

Work out an upper bound for D.

....

(Total for question is 3 marks)

Q2.

$$I = \frac{V}{R}$$

V = 250 correct to the nearest 5

R = 3900 correct to the nearest 100

Work out the lower bound for the value of I.
Give your answer correct to 3 decimal places.
You must show your working.

....

(Total for question = 3 marks)

Q3.

$$a = \frac{v - u}{t}$$

v = 37.6 correct to 3 significant figures.
u = 11.3 correct to 3 significant figures.
t = 8.4 correct to 2 significant figures.

Work out the upper bound for the value of a.
Show your working clearly.

....

(Total for question = 3 marks)

Q4.

A machine puts drinks into cups.
The volume of a cup is 200 m*l*, correct to the nearest 0.5 m*l*.

(a) Write down the lower bound for the volume of a cup.

.... m*l*

(1)

The machine puts tea and milk into each cup.
It puts into each cup

175 m*l* of tea measured correct to the nearest m*l*
24 m*l* of milk measured correct to the nearest m*l*

*(b) Is it possible that the total volume of tea and milk put in a cup is greater than the volume of the cup?
You must show how you get your answer.

(3)

(Total for question = 4 marks)

Q5.

The value of *p* is 4.3
The value of *q* is 0.4

Both *p* and *q* are given correct to the nearest 0.1

(a) Write down the lower bound for *p*.

....
(1)

$$r = p + \frac{1}{q}$$

(b) Work out the upper bound for *r*.
   You must show all your working.

....
(3)

(Total for question = 4 marks)

Q6.

* A road is 4530 m long, correct to the nearest 10 metres.
Kirsty drove along the road in 205 seconds, correct to the nearest 5 seconds.

The average speed limit for the road is 80 km/h.

Could Kirsty's average speed have been greater than 80 km/h?
You must show your working.

(Total for question = 5 marks)

Q7.

$$m = \frac{\sqrt{s}}{t}$$

$s = 3.47$ correct to 3 significant figures

$t = 8.132$ correct to 4 significant figures

By considering bounds, work out the value of m to a suitable degree of accuracy.
Give a reason for your answer.

(Total for question = 5 marks)

Q8.

$$D = \frac{u^2}{2a}$$

u = 26.2 correct to 3 significant figures

a = 4.3 correct to 2 significant figures

(a) Calculate the upper bound for the value of D.
Give your answer correct to 6 significant figures.
You must show all your working.

....

(3)

The lower bound for the value of D is 78.6003 correct to 6 significant figures.
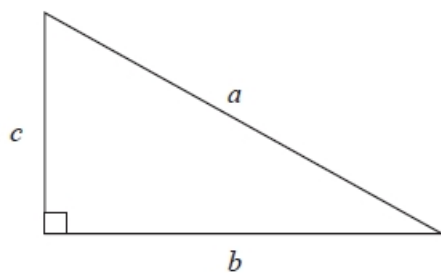
(b) By considering bounds, write down the value of D to a suitable degree of accuracy.
You must give a reason for your answer.

....

....

(2)

(Total for question = 5 marks)

Q9.

a is 8.3 cm correct to the nearest mm
b is 6.1 cm correct to the nearest mm

Calculate the upper bound for *c*.
You must show your working.

.... cm

(Total for question = 4 marks)

Q10.

A high speed train travels a distance of 487 km in 3 hours.

The distance is measured correct to the nearest kilometre.
The time is measured correct to the nearest minute.

By considering bounds, work out the average speed, in km/minute, of the train to a suitable degree of accuracy.
You must show all your working and give a reason for your answer.

.... km/minute

(Total for question = 5 marks)

Q11.

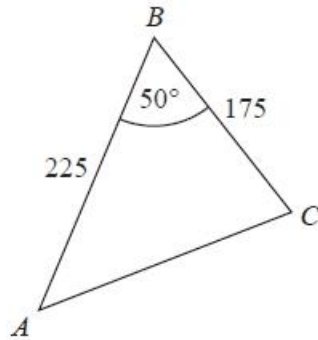Jerry wants to cover a triangular field, *ABC*, with fertiliser.

Diagram **NOT** accurately drawn

Here are the measurements Jerry makes

angle *ABC* = 50° correct to the nearest degree,
BA = 225 m correct to the nearest 5 m,
BC = 175 m correct to the nearest 5 m.

Work out the upper bound for the area of the field.
You must show your working.

....m²

(Total for Question is 3 marks)

Q12.

Jackson is trying to find the density, in g/cm^3, of a block of wood.
 The block of wood is in the shape of a cuboid.

He measures

the length as 13.2 cm, correct to the nearest mm
 the width as 16.0 cm, correct to the nearest mm
 the height as 21.7 cm, correct to the nearest mm

He measures the mass as 1970 g, correct to the nearest 5 g.

By considering bounds, work out the density of the wood.
 Give your answer to a suitable degree of accuracy.

You must show all your working and give a reason for your final answer.

(Total for question = 5 marks)