

Upper and Lower Bounds

For AQA GCSE Mathematics (8300) • Higher tier

Name _____

Total marks: **28**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method. You may use a calculator.

- 1** The mass of a parcel is 4.7 kg to 1 decimal place.
Circle the error interval for the mass, m kg.

[1 mark]

$4.6 \leq m < 4.8$

$4.65 \leq m < 4.75$

$4.65 \leq m \leq 4.75$

$4.7 \leq m < 4.8$

- 2** A floor tile is 1.2 cm thick, correct to 1 decimal place.

- (a) Complete the error interval for the thickness, t cm, of one tile.

[2 marks]

Answer _____ $\leq t <$ _____

- (b) 15 of these tiles are stacked on top of each other.
Could the height of the stack be 19 cm?
Tick a box.
Give a reason for your answer.

[1 mark]

☐ Yes

☐ No

- 3 (a) $x = 3.7$ truncated to 1 decimal place.
Complete the error interval for x .

[2 marks]

Answer _____ $\leq x <$ _____

- (b) When w is truncated to a whole number, the answer is 12
Sacha writes the error interval due to truncation as $11.5 \leq w < 12.5$
Give a reason why Sacha is wrong and state the correct error interval for w .

[2 marks]

Reason _____

Correct error interval _____ $\leq w <$ _____

- 4 A rectangle has length 12 cm and width 7 cm, both correct to the nearest centimetre.
Work out the upper bound for the area of the rectangle.

[2 marks]

Answer _____ cm^2

- 5 A runner runs 100 m, correct to the nearest metre.
Her time is 12.4 seconds, correct to 1 decimal place.
Work out the lower bound for her average speed.
Give your answer to 3 decimal places.

[3 marks]

Answer _____ m/s

6 $r = \frac{a^2}{c+2}$

$a = 6.4$ correct to 1 decimal place.

$c = 3.8$ correct to 2 significant figures.

Work out the upper bound for r .

Give your answer to 3 significant figures.

[3 marks]

Answer _____

7 $m = 0.6$ to 1 significant figure

$n = 40$ to the nearest 5

Work out the lower bound for $n - 30m$

You must show your working.

[3 marks]

Answer _____

- 8** A fish tank is a cuboid.
Its inside measurements are 80 cm by 50 cm by 40 cm, each to the nearest centimetre.
The empty tank is filled with water from a hose.
Water flows from the hose at 12 litres per minute, to the nearest litre per minute.
- Work out the upper bound for the time it takes to fill the tank.
Give your answer in minutes to 3 significant figures.
You must show your working.

[5 marks]

Answer _____ minutes

- 9** Kofi has a small metal bar.
- The mass of the bar is 395 g, to the nearest 5 g.
 - The volume of the bar is 20 cm^3 , to the nearest cm^3 .
- Pure gold has a density of 19.3 g/cm^3 .
Kofi says, " $395 \div 20 = 19.75$, so my bar cannot be pure gold."
- Is Kofi correct?
Tick a box.
Show working to support your answer.

[4 marks]

☐ Yes

☐ No