



## "Full Coverage": Bounds

This worksheet is designed to cover one question of each type seen in past papers, for each GCSE Higher Tier topic. This worksheet was automatically generated by the DrFrostMaths Homework Platform: students can practice this set of questions interactively by going to [www.drfrostmaths.com/homework](http://www.drfrostmaths.com/homework), logging on, *Practise* → *Past Papers/Worksheets* (or *Library* → *Past/Past Papers* for teachers), and using the 'Revision' tab.

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### Question 1

**Categorisation: Calculate a bound involving significant figures.**

*[Edexcel GCSE June2006-6H Q19a(ii)]*

The length of a rectangle is 6.7 cm, correct to 2 significant figures.

For the length of the rectangle write down the lower bound.

..... cm

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### Question 2

**Categorisation: Calculate a bound involving rounding to the nearest whole.**

*[Edexcel GCSE June2006-3I Q17b, June2006-5H Q7b]*

A gold necklace has a mass of 127 grams, correct to the nearest gram.

Write down the greatest possible mass of the necklace.

..... g

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### Question 3

**Categorisation: Calculate a bound involving rounding to some other specified value, e.g. "nearest 10".**

Dave records the distance he drives to work, which was 15 km correct to the nearest 5 km.

What is the upper bound of the distance he travels?

..... km

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### Question 4

**Categorisation: Determine an error interval.**

*[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 2F Q20]*

Lyn measures the length,  $x$  cm, of a piece of string as 3.5 cm correct to the nearest millimetre.

Write down the error interval for  $x$ .

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### Question 5

**Categorisation: Find bounds for values rounded by truncation.**

A number, **truncated to 1 decimal place**, is equal to 105.9 .

Write down the lower and upper bounds of the number.

Lower bound = .....

Upper bound = .....

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## Question 6

**Categorisation: Determine an error interval for a value rounded by truncation.**

Martin makes a calculation on his calculator, and truncates the result to 2 decimal places, to obtain 0.58 .

Write an error interval for his original result.

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## Question 7

**Categorisation: Calculate a further bound for a given formula involving a multiplication (and possibly powers).**

*[Edexcel GCSE Nov2007-6H Q23]*

The mass  $M$  grams of a cube with edges of length  $L$  cm and density  $D$  grams per  $cm^3$  is given by the formula

$$M = DL^3$$

$D = 8$  correct to 1 significant figure.  $L = 6.4$  correct to 1 decimal place.

Calculate the upper bound of  $M$  .

Give your answer correct to 2 significant figures.

.....

## Question 8

**Categorisation: Calculate a further bound for a given formula involving a subtraction.**

*[Edexcel GCSE June2016-2H Q21 Edited]*

$$I = 5(v - u)$$

$v = 14$  correct to 2 significant figures

$u = 8.7$  correct to 2 significant figures

Work out the upper bound for the value of  $I$ .

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## Question 9

**Categorisation: Calculate a further bound for a given formula involving multiple arithmetic operations.**

$x$ ,  $y$ ,  $z$  and  $w$  are related by the equation:

$$x = \frac{y}{z - w}$$

$y$  is 20 when rounded to the nearest whole.  
 $z$  is 4.8 when rounded to 1 decimal place.  
 $w$  is 2.4 when rounded to 1 decimal place.

Determine the upper bound of  $x$ , rounding your answer to 2 decimal places.

.....

## Question 10

**Categorisation:** Calculate a further bound, and be able to specify it to “a suitable degree of accuracy” (Hint: using your lower and upper bound, keep increasing the accuracy of both until the bounds are the same value)

*[Edexcel GCSE Nov2009-4H Q28 Edited]*

$$v = \sqrt{\frac{a}{b}}$$

$x = 6.43$  correct to 2 decimal places.

$b = 5.514$  correct to 3 decimal places.

By considering bounds, work out the value of  $v$  to a suitable degree of accuracy, justifying your answer.

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## Question 11

**Categorisation:** Use bounds in the context of perimeter.

*[Edexcel GCSE June2010-4H Q21b]*

A field is in the shape of a rectangle.

The width of the field is 28 metres, measured to the nearest metre.

The length of the field is 145 metres, measured to the nearest 5 metres.

Work out the upper bound for the perimeter of the field.

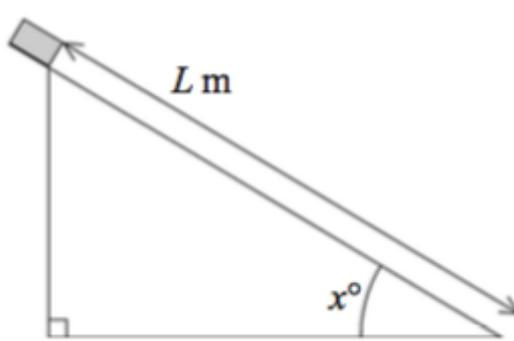
..... m

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## Question 12

**Categorisation: Use bounds in a trigonometric context.**

[Edexcel GCSE June2003-6H Q16b Edited]



Elliot did an experiment to find the value of  $g \text{ m/s}^2$ , the acceleration due to gravity. He measured the time,  $T$  seconds, that a block took to slide  $L \text{ m}$  down a smooth slope of angle  $x^\circ$ .

He then used the formula

$$g = \frac{2L}{T^2 \sin x}$$

to calculate an estimate for  $g$ .

$T = 1.3$  correct to 1 decimal place.  $L = 4.50$  correct to 2 decimal places.  $x = 30$  correct to the nearest integer.

Lower bound of  $g = 9.719\dots$

Upper bound of  $g = 11.710\dots$

Use these answers to write down the value of  $g$  to a suitable degree of accuracy. Explain your reasoning.

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### Question 13

**Categorisation:** Use bounds in the context of the area of circles.

[Edexcel GCSE Nov2005-6H Q14b]

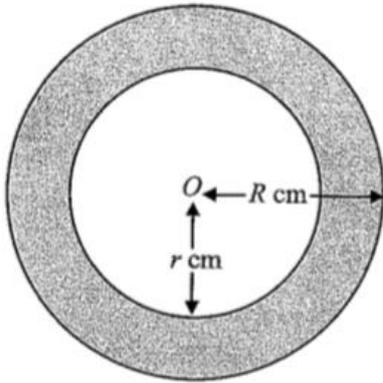


Diagram NOT accurately drawn

$O$  is the centre of both circle. The radius of the outer circle is  $R$  cm.

The radius of the inner circle is  $r$  cm.  $R = 15.8$  correct to 1 decimal place.  $r = 14.2$  correct to 1 decimal place.

The upper bound for the area, in  $cm^2$ , of the shaded region is  $k\pi$ .

Find the exact value of  $k$ .

$k = \dots\dots\dots$

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### Question 14

**Categorisation:** Use bounds in the context of the area of rectangles.

[Edexcel GCSE June2006-6H Q19bi]

The length of a rectangle is 6.7 cm, correct to 2 significant figures. The area of the rectangle is  $26.9 cm^2$ , correct to 3 significant figures.

Calculate the upper bound for the width of the rectangle.

Write down all the figures on your calculator display.

$\dots\dots\dots$  cm

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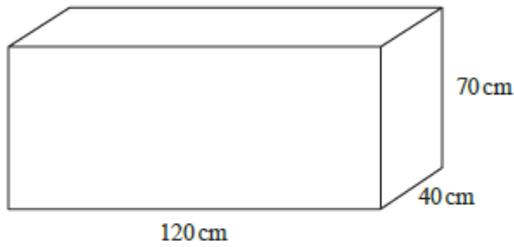
### Question 15

**Categorisation: Use bounds in the context of volume.**

*[Edexcel GCSE(9-1) Mock Set 2 Spring 2017 2H Q17 Edited]*

The diagram shows Helen's fish tank. The fish tank is in the shape of a cuboid.

All the dimensions are correct to the nearest centimetre.



Helen is going to use a bucket to fill the fish tank completely with water. There are 14 litres, correct to the nearest litre, of water in a full bucket.

What's the maximum number of buckets required to fill the tank?  
Give your answer correct to 1 decimal place.

..... buckets (1dp)

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### Question 16

**Categorisation: Use bounds in the context of speed-distance-time.**

*[Edexcel GCSE Nov2014-2H Q23 Edited]*

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.

What is greatest Kirsty's speed could have been?  
Give your answer correct to 1 decimal place.

..... km/h

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### Question 17

**Categorisation: Use bounds in the context of gradient.**

[Edexcel GCSE Nov2006-6H Q21ai]

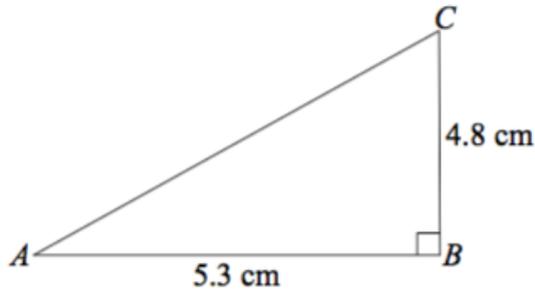


Diagram **NOT** accurately drawn

In triangle ABC, angle ABC =  $90^\circ$

AB = 5.3 cm, correct to 2 significant figures. BC = 4.8 cm, correct to 2 significant figures.

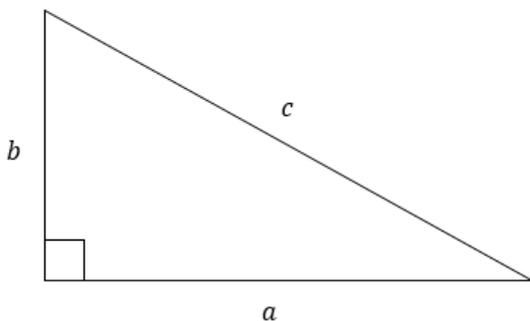
The base, AB, of the triangle is horizontal. Calculate the lower bound for the gradient of the line AC.

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### Question 18

**Categorisation: Use bounds in the context of Pythagoras.**

In the following diagram,  $a$  is 3cm correct to the nearest cm, and  $b$  is 4cm correct to the nearest cm. Determine the upper bound of  $c$ , giving your answer to 5 decimal places.



..... cm

## Answers

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### Question 1

6.65 cm

### Question 2

127.5 g

### Question 3

17.5 km

### Question 4

$3.45 \leq x < 3.55$

### Question 5

Lower bound = 105.9 and Upper bound = 106

### Question 6

$x \geq 0.58$  or  $x < 0.59$

### Question 7

2300

### Question 8

29.25

### Question 9

8.91

### Question 10

1.08 , "both bounds agree to 2 decimal places"

### Question 11

352 m

### Question 12

"10" and "the bounds both agree to the nearest whole"

### **Question 13**

$k = 51$

### **Question 14**

4.05263 cm

### **Question 15**

25.5 buckets (1dp)

### **Question 16**

80.6 km/h

### **Question 17**

0.88

### **Question 18**

5.70088 cm