

# Bounds

## Things to remember:

- Calculating bounds is the opposite of rounding – they are the limits at which you would round up instead of down, and vice versa.

## Questions:

1. A piece of wood has a length of 65 centimetres to the nearest centimetre.

(a) What is the least possible length of the piece of wood?

.....  
(1)

(b) What is the greatest possible length of the piece of wood?

.....  
(1)

**(Total for Question is 2 marks)**

2. Chelsea's height is 168 cm to the nearest cm.

(a) What is Chelsea's minimum possible height?

..... cm  
(1)

(b) What is Chelsea's maximum possible height?

..... cm  
(1)

**(Total for Question is 2 marks)**

3. Dionne has 60 golf balls.

Each of these golf balls weighs 42 grams to the nearest gram.

Work out the greatest possible total weight of all 60 golf balls.

Give your answer in kilograms.

..... kg  
**(Total for Question is 3 marks)**

4. The length,  $L$  cm, of a line is measured as 13 cm correct to the nearest centimetre.

Complete the following statement to show the range of possible values of  $L$

.....  $\leq L <$  .....  
**(Total for question is 2 marks)**

5. Jim rounds a number,  $x$ , to one decimal place.  
The result is 7.2  
Write down the error interval for  $x$ .

.....  
**(Total for question = 2 marks)**

6. A pencil has a length of 17 cm measured to the nearest centimetre.  
(a) Write down the least possible length of the pencil.

.....  
**(1)**

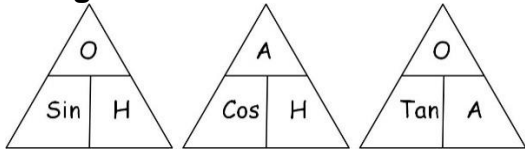
- (b) Write down the greatest possible length of the pencil.

.....  
**(1)**

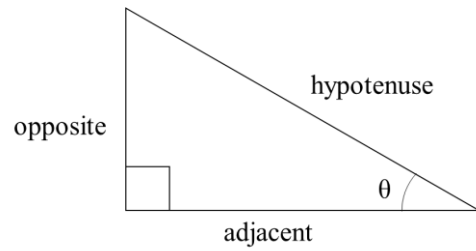
**(Total for Question is 2 marks)**

# Trigonometry – SOH CAH TOA

## Things to remember:



1. Label your sides first, you'll need O, H and A...
2. Choose if you need SOH, CAH or TOA...
3. Cover the one you need with your thumb,
4. Write the equation,
5. Solve it, then you're done!



## Questions:

1. The diagram shows triangle  $ABC$ .  
 $BC = 8.5$  cm.  
 Angle  $ABC = 90^\circ$ .  
 Angle  $ACB = 38^\circ$ .  
 Work out the length of  $AB$ .  
 Give your answer correct to 3 significant figures.

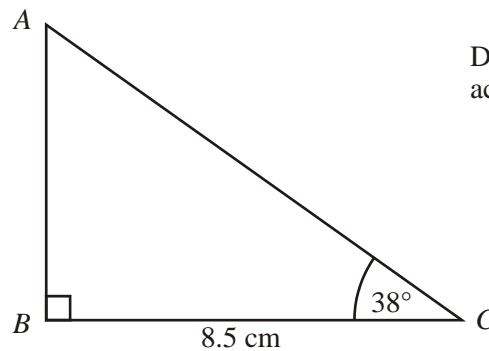


Diagram **NOT** accurately drawn

..... cm  
**(Total 3 marks)**

2.  $PQR$  is a triangle.  
 Angle  $PQR = 90^\circ$ .  
 $PQ = 12.5$  cm.  
 $QR = 5$  cm.  
 Calculate the value of  $x$ .  
 Give your answer correct to 1 decimal place.

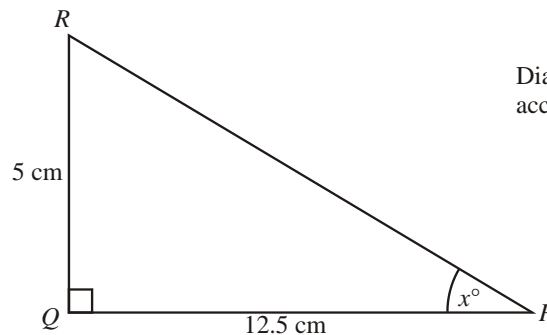


Diagram **NOT** accurately drawn

..... °  
**(Total 3 marks)**

3. A lighthouse,  $L$ , is 3.2 km due West of a port,  $P$ .  
A ship,  $S$ , is 1.9 km due North of the lighthouse,  $L$ .

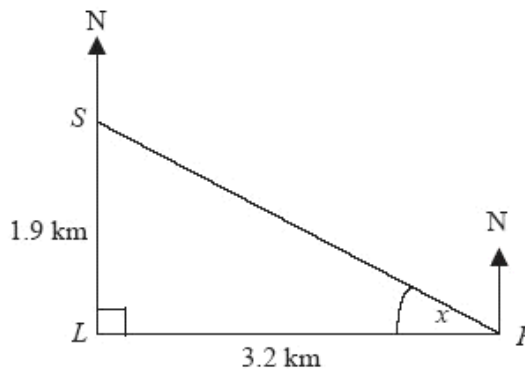


Diagram **NOT** accurately drawn

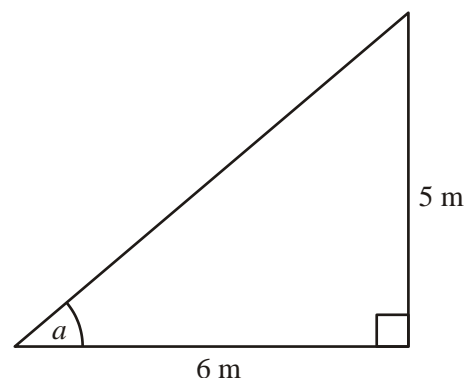
- (a) Calculate the size of the angle marked  $x$ .  
Give your answer correct to 3 significant figures.

..... °  
(3)

- (b) Find the bearing of the port,  $P$ , from the ship,  $S$ .  
Give your answer correct to 3 significant figures.

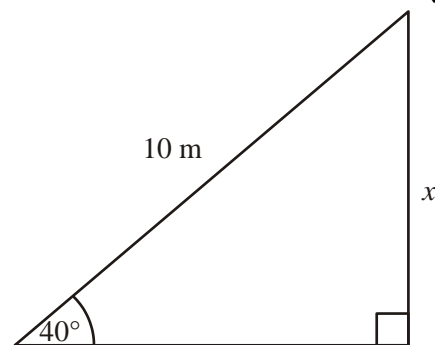
..... °  
(1)  
**(Total 4 marks)**

4. (a) Calculate the size of angle  $a$  in this right-angled triangle.  
Give your answer correct to 3 significant figures.  
Diagram **NOT** accurately drawn



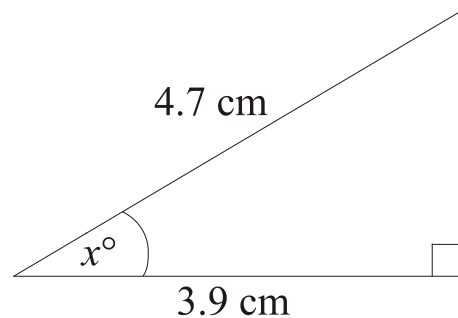
..... °  
(3)

- (b) Calculate the length of the side  $x$  in this right-angled triangle.  
Give your answer correct to 3 significant figures.  
Diagram **NOT** accurately drawn



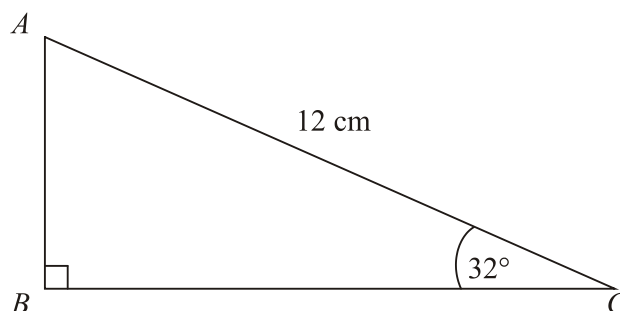
..... cm  
(3)  
**(Total 6 marks)**

5. Diagram **NOT** accurately drawn  
 Work out the value of  $x$ .  
 Give your answer correct to 1 decimal place.



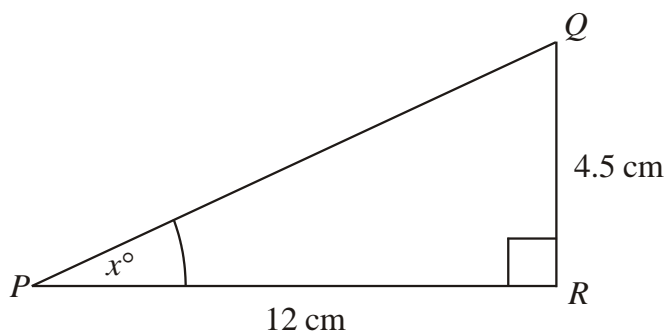
..... °  
**(Total 3 marks)**

6. Diagram **NOT** accurately drawn  
 $AC = 12$  cm.  
 Angle  $ABC = 90^\circ$ .  
 Angle  $ACB = 32^\circ$ .  
 Calculate the length of  $AB$ .  
 Give your answer correct to 3 significant figures.



..... cm  
**(Total 3 marks)**

7. Diagram **NOT** accurately drawn  
 $PQR$  is a right-angled triangle.  
 $PR = 12$  cm.  
 $QR = 4.5$  cm.  
 Angle  $PRQ = 90^\circ$ .  
 Work out the value of  $x$ .  
 Give your answer correct to one decimal place.



..... °  
**(Total 3 marks)**

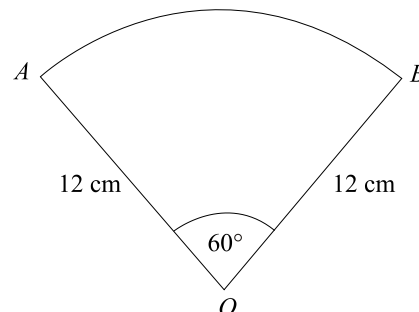
## Area and Perimeter of Sectors

### Things to remember:

- Area of a sector =  $\frac{\theta}{360} \times \pi \times r^2$
- Length of an arc =  $\frac{\theta}{360} \times \pi \times d$

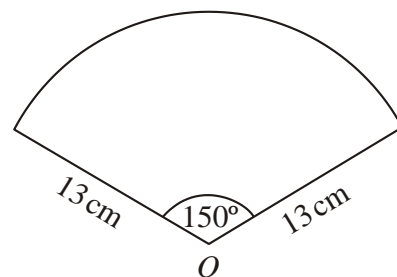
### Questions:

1. Diagram NOT accurately drawn  
 $OAB$  is a sector of a circle, centre  $O$ .  
 Angle  $AOB = 60^\circ$ .  
 $OA = OB = 12$  cm.  
 Work out the length of the arc  $AB$ .  
 Give your answer in terms of  $\pi$ .



..... cm  
**(Total 3 marks)**

2. Diagram NOT accurately drawn  
 The diagram shows a sector of a circle, centre  $O$ .  
 The radius of the circle is 13 cm.  
 The angle of the sector is  $150^\circ$ .  
 Calculate the area of the sector.  
 Give your answer correct to 3 significant figures.



..... cm<sup>2</sup>  
**(Total 2 marks)**

3. The diagram shows a sector of a circle, centre  $O$ .  
 The radius of the circle is 9 cm.  
 The angle at the centre of the circle is  $40^\circ$ .  
 Find the perimeter of the sector.  
 Leave your answer in terms of  $\pi$ .

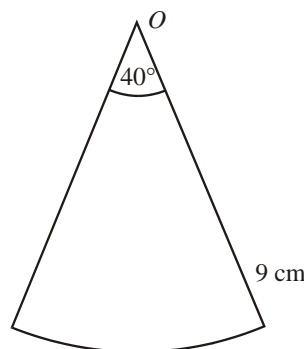
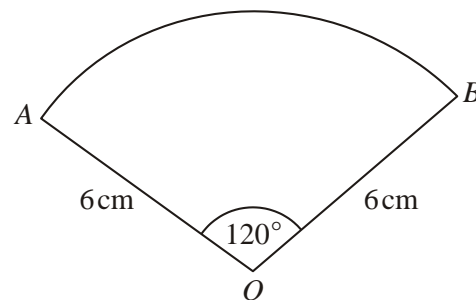


Diagram NOT  
 accurately drawn

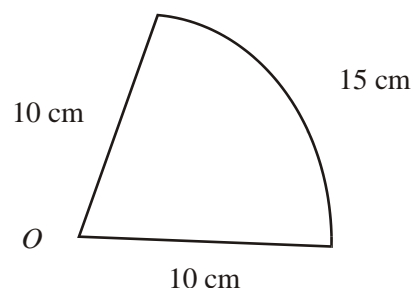
..... cm  
**(Total 4 marks)**

4. Diagram NOT accurately drawn  
 The diagram shows a sector of a circle, centre  $O$ .  
 The radius of the circle is 6 cm.  
 Angle  $AOB = 120^\circ$ .  
 Work out the perimeter of the sector.  
 Give your answer in terms of  $\pi$  in its simplest form.



..... cm  
**(Total 3 marks)**

5. Diagram NOT accurately drawn  
 The diagram shows a sector of a circle, centre  $O$ , radius 10 cm.  
 The arc length of the sector is 15 cm.  
 Calculate the area of the sector.



..... cm<sup>2</sup>  
**(Total 4 marks)**

## Averages from Tables

### Things to remember:

- The mode is the one with the highest frequency.
- To calculate the median, find where the middle value is located by using  $\frac{n+1}{2}$ .
- The mean is given by  $\frac{\sum fx}{\sum f}$ , ie. the total frequency x midpoint divided by the total frequency.
- Always look back at the data to check your answer looks realistic.

### Questions:

1. Zach has 10 CDs. The table gives some information about the number of tracks on each CD.

Number of tracks	Frequency	
11	1	
12	3	
13	0	
14	2	
15	4	

- (a) Write down the mode.

.....  
(1)

- (b) Work out the mean.

.....  
(3)  
(Total 4 marks)

2. 30 adults took part in a survey. They were each asked how much money they spent on lottery tickets last week. The table shows the results of the survey.

Money (£)	Frequency	
0	5	
2	16	
4	6	
20	2	
30	1	

Work out the mean amount of money the 30 adults spent on lottery tickets.

£ .....  
(Total 3 marks)



3. Josh asked 30 adults how many cups of coffee they each drank yesterday. The table shows his results.

Number of cups	Frequency	
0	5	
1	9	
2	7	
3	4	
4	3	
5	2	

Work out the mean.

.....  
(Total 3 marks)

4. Majid carried out a survey of the number of school dinners 32 students had in one week. The table shows this information.

Number of school dinners	Frequency	
0	0	
1	8	
2	12	
3	6	
4	4	
5	2	

Calculate the mean.

.....  
(Total 3 marks)

5. Fred did a survey on the areas of pictures in a newspaper. The table gives information about the areas.

Area ( $A$ cm <sup>2</sup> )	Frequency
$0 < A \leq 10$	38
$10 < A \leq 25$	36
$25 < A \leq 40$	30
$40 < A \leq 60$	46

Work out an estimate for the mean area of a picture.

..... cm<sup>2</sup>  
(Total 4 marks)

6. The table gives some information about the time taken by a group of 100 students to complete an IQ test.

<b>Time (<math>t</math> seconds)</b>	<b>Frequency</b>	
$60 < t < 70$	12	
$70 < t < 80$	22	
$80 < t < 90$	23	
$90 < t < 100$	24	
$100 < t < 110$	19	

- (a) Write down the modal class interval.

.....

**(1)**

- (b) Calculate an estimate for the mean time taken by the students.

..... seconds

**(4)**

**(Total 5 marks)**

7. The table gives some information about the time taken by a group of 100 students to complete an IQ test.

<b>Time (<math>t</math> seconds)</b>	<b>Frequenc y</b>	
$60 < t \leq 70$	12	
$70 < t \leq 80$	22	
$80 < t \leq 90$	23	
$90 < t \leq 100$	24	
$100 < t \leq 110$	19	

Calculate an estimate for the mean time taken by the students.

## Proportion

### Things to remember:

- Start by checking the question for squares, cubes and roots;
- “x is directly proportional to y” looks like  $x \propto y$  or  $x = ky$
- “x is inversely proportional to y” looks like  $x \propto \frac{1}{y}$  or  $x = \frac{k}{y}$

### Questions:

1. The shutter speed,  $S$ , of a camera varies inversely as the square of the aperture setting,  $f$ .  
When  $f = 8$ ,  $S = 125$

(a) Find a formula for  $S$  in terms of  $f$ .

.....

(3)

(b) Hence, or otherwise, calculate the value of  $S$  when  $f = 4$

$S =$  .....

(1)

(Total 4 marks)

2. In a factory, chemical reactions are carried out in spherical containers.  
The time,  $T$  minutes, the chemical reaction takes is directly proportional to the square of the radius,  $R$  cm, of the spherical container.  
When  $R = 120$ ,  $T = 32$   
Find the value of  $T$  when  $R = 150$

$T =$  .....

(Total 4 marks)

3.  $d$  is directly proportional to the square of  $t$ .  
 $d = 80$  when  $t = 4$

(a) Express  $d$  in terms of  $t$ .

.....  
(3)

(b) Work out the value of  $d$  when  $t = 7$

$d =$  .....  
(1)

(c) Work out the positive value of  $t$  when  $d = 45$

$t =$  .....  
(2)  
**(Total 6 marks)**

4. The distance,  $D$ , travelled by a particle is directly proportional to the square of the time,  $t$ , taken. When  $t = 40$ ,  $D = 30$

(a) Find a formula for  $D$  in terms of  $t$ .

$D =$  .....  
(3)

(b) Calculate the value of  $D$  when  $t = 64$

.....  
(1)

(c) Calculate the value of  $t$  when  $D = 12$   
Give your answer correct to 3 significant figures.

.....  
(2)  
**(Total 6 marks)**

5. The time,  $T$  seconds, it takes a water heater to boil some water is directly proportional to the mass of water,  $m$  kg, in the water heater. When  $m = 250$ ,  $T = 600$

(a) Find  $T$  when  $m = 400$

$$T = \dots\dots\dots (3)$$

The time,  $T$  seconds, it takes a water heater to boil a constant mass of water is inversely proportional to the power,  $P$  watts, of the water heater.

When  $P = 1400$ ,  $T = 360$

(b) Find the value of  $T$  when  $P = 900$

$$T = \dots\dots\dots (3)$$

**(Total 6 marks)**

6. A ball falls vertically after being dropped.  
 The ball falls a distance  $d$  metres in a time of  $t$  seconds.  
 $d$  is directly proportional to the square of  $t$ .  
 The ball falls 20 metres in a time of 2 seconds.

(a) Find a formula for  $d$  in terms of  $t$ .

$$d = \dots\dots\dots (3)$$

(b) Calculate the distance the ball falls in 3 seconds.

$$\dots\dots\dots \text{ m} (1)$$

(c) Calculate the time the ball takes to fall 605 m.

$$\dots\dots\dots \text{ seconds} (3)$$

**(Total 7 marks)**

7. In a spring, the tension ( $T$  newtons) is directly proportional to its extension ( $x$  cm). When the tension is 150 newtons, the extension is 6 cm.

(a) Find a formula for  $T$  in terms of  $x$ .

$$T = \dots\dots\dots \text{newtons} \quad (3)$$

(b) Calculate the tension, in newtons, when the extension is 15 cm.

$$\dots\dots\dots \text{newtons} \quad (1)$$

(c) Calculate the extension, in cm, when the tension is 600 newtons.

$$\dots\dots\dots \text{cm} \quad (1)$$

**(Total 5 marks)**

8.  $f$  is inversely proportional to  $d$ .  
When  $d = 50$ ,  $f = 256$   
Find the value of  $f$  when  $d = 80$

$$f = \dots\dots\dots \quad (Total\ 3\ marks)$$