



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

Junior Certificate Examination 2015

# Mathematics

Paper 2  
Ordinary Level

Monday 8 June – Morning 9:30 to 11:30

300 marks

Examination number
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Centre Stamp
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Running total	
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For examiner			
Question	Mark	Question	Mark
1		11	
2		12	
3			
4			
5			
6			
7			
8			
9			
10		Total	

Grade
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## **Instructions**

There are 12 questions on this examination paper. Answer **all** questions.

Questions do not necessarily carry equal marks. To help you manage your time during this examination, a maximum time for each question is suggested. If you remain within these times you should have about 10 minutes left to review your work.

Write your answers in the spaces provided in this booklet. You may lose marks if you do not do so. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

**You will lose marks if all necessary work is not clearly shown.**

**You may lose marks if the appropriate units of measurement are not included, where relevant.**

**You may lose marks if your answers are not given in simplest form, where relevant.**

Write the make and model of your calculator(s) here:

## Question 1

**(Suggested maximum time: 10 minutes)**

The songs on Gavin's phone are shown in the table below.

Singer	Number of songs
Usher	
Pharrell	15
Ed Sheeran	4
Hozier	3

Gavin has **30 songs** on his phone, in total.

- (a) Find how many songs by Usher are on Gavin's phone.

Gavin plays a song at random on his phone.

- (b) Find the probability that this song is by Hozier.

Answer =

1

- (c) Find the probability that this song is by Ed Sheeran or Pharrell.

**Answer =**

A diagram consisting of two line segments. A vertical line segment starts at the bottom left corner and extends upwards. A horizontal line segment starts at the bottom of the vertical line and extends to the right, ending with a short vertical tick mark.

Gavin plays a song by Ed Sheeran, and then plays a song by Hozier.

- (d)** In how many different ways can he do this?

Remember that he has 4 songs by Ed Sheeran and 3 songs by Hozier.

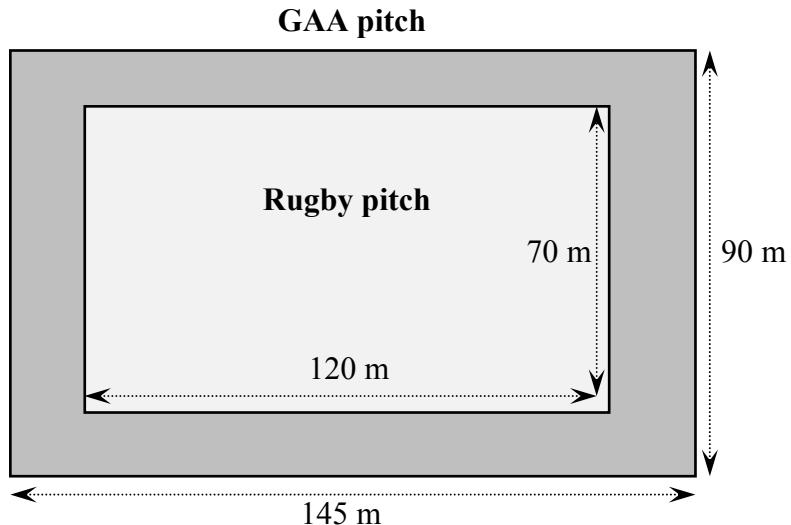
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**Question 2****(Suggested maximum time: 5 minutes)**

When the Irish rugby team played in Croke Park, a rugby pitch was made inside the GAA pitch.

The GAA pitch was 145 m long and 90 m wide.

The rugby pitch was 120 m long and 70 m wide.



- (a)** Find the area of each pitch.

Area of GAA pitch:

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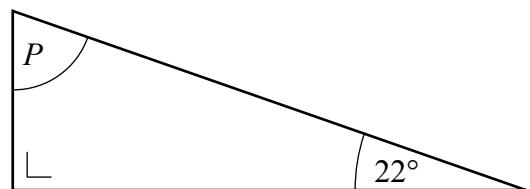
Area of rugby pitch:

- (b)** What area of the GAA pitch was **not** used for rugby?

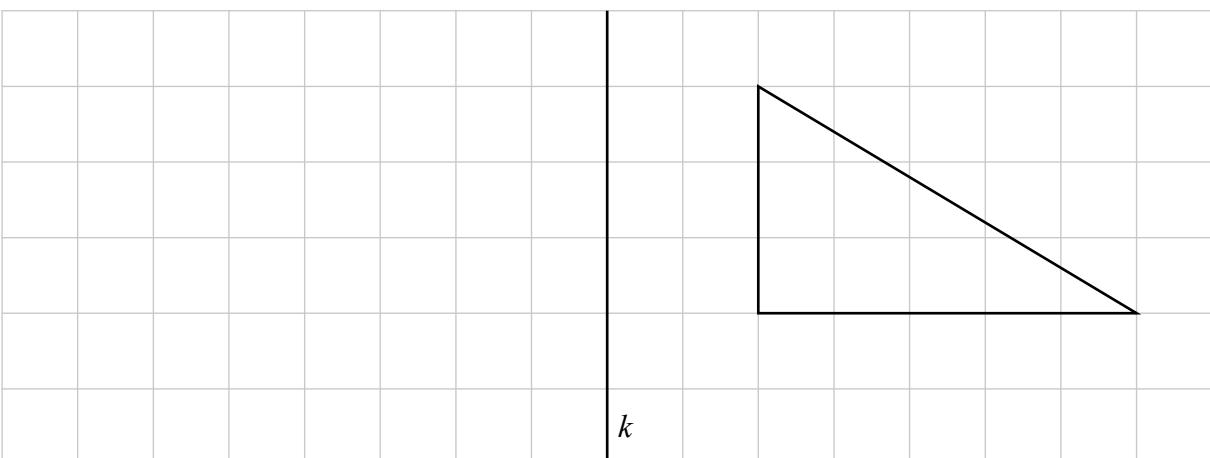
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**Question 3****(Suggested maximum time: 10 minutes)**

- (a) Calculate the size of the angle marked  $P$  in the right-angled triangle below.

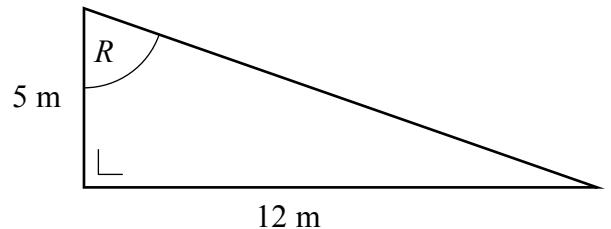


- (b) Draw the image of the triangle below under **axial symmetry** in the line  $k$ .

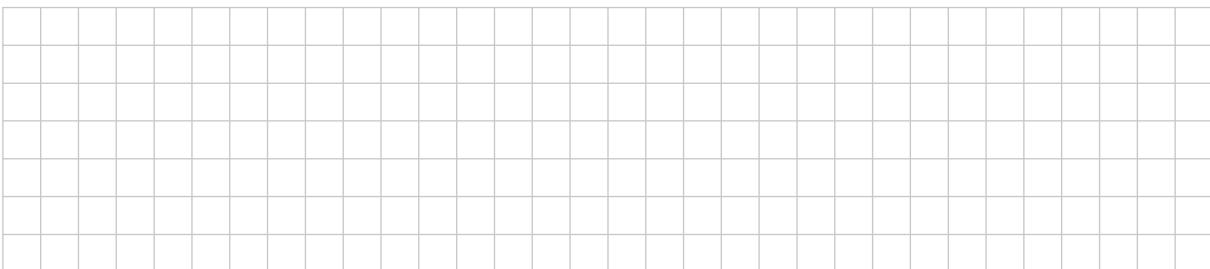


- (c) (i) Write down the length of the side **opposite** the angle  $R$  in the triangle shown.

Opposite =  m



- (ii) Use the Theorem of Pythagoras to find the length of the **hypotenuse** of this triangle.

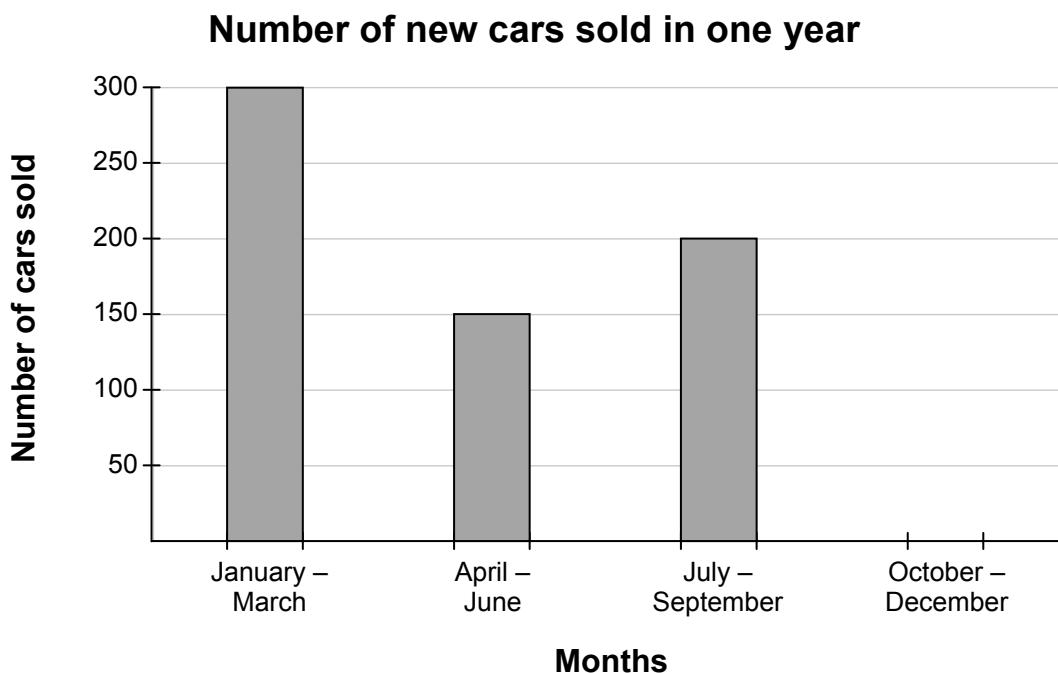


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## Question 4

**(Suggested maximum time: 15 minutes)**

The diagram shows the number of new cars sold in a garage in one year.



- (a) How many new cars were sold in the months **April – June**?

1

In the months **October – December**, there were exactly **half** as many new cars sold as in April – June.

- (b) How many new cars were sold in October – December?

- (c) Draw the bar for **October – December** on the diagram above.

- (d) When were the **most** new cars sold? Put a tick (✓) in the correct box.

January – March	April – June	July – September	October – December
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- (e) Calculate the **total** number of new cars sold in the year.

- (f) Calculate the **average** (mean) number of new cars sold **per month** in the year.  
Give your answer correct to one decimal place.

## Question 5

**(Suggested maximum time: 5 minutes)**

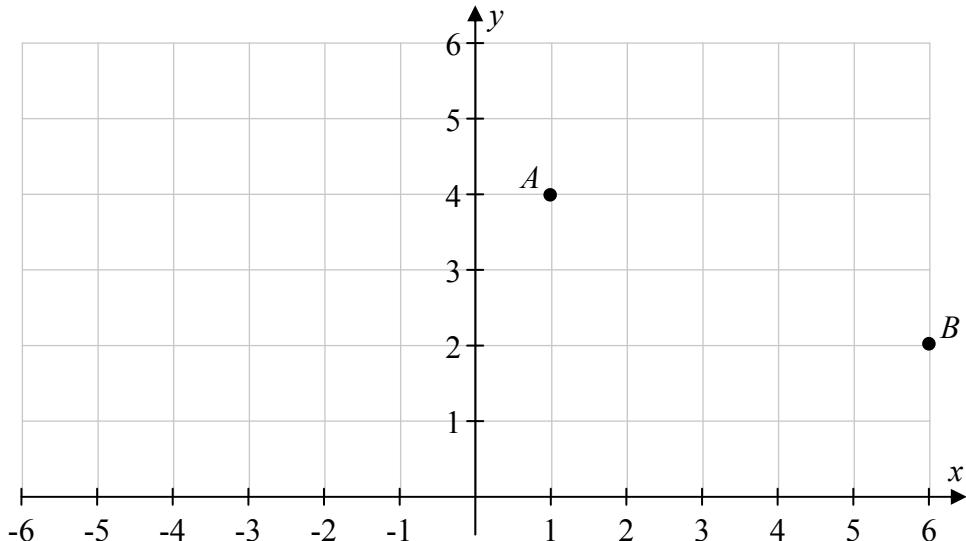
- (a)** One of the following is a description of the **mode** of a list.  
Put a tick ( $\checkmark$ ) in the correct box to show which one.

Description	Put a tick (✓) in <b>one</b> box
The <b>middle</b> value in an ordered list	
The <b>biggest</b> value in a list	
The <b>most common</b> value in a list	

- (b) Write out a list that has a mode, and write down the mode of your list.

**Question 6****(Suggested maximum time: 10 minutes)**

The points  $A$  and  $B$  are shown on the co-ordinate grid below.

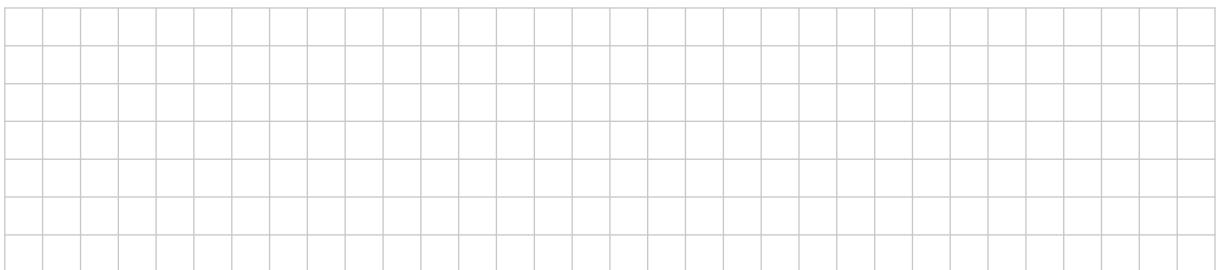


- (a)** Write down the co-ordinates of the point  $A$ .

$$A = ( \quad , \quad )$$

$B$  is the point  $(6, 2)$ .

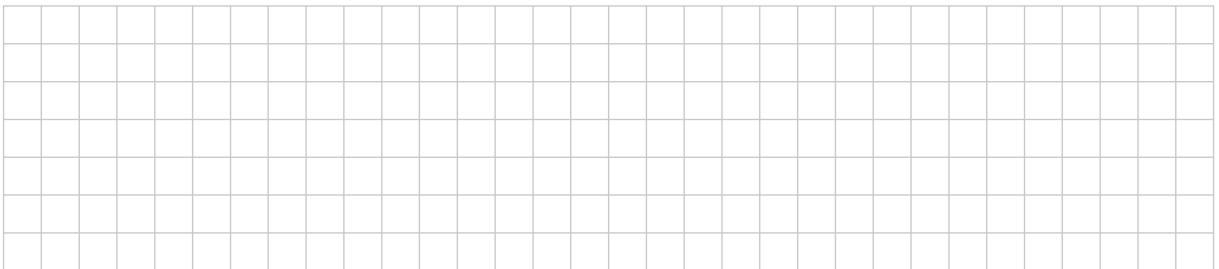
- (b)** Find the length of  $[AB]$ . Give your answer in the form  $\sqrt{x}$ , where  $x \in \mathbb{N}$ .



$C$  is the point  $(-4, 1)$ .

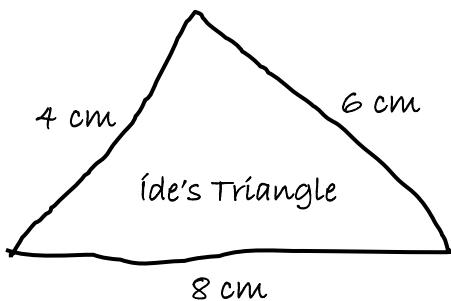
- (c)** Plot the point  $C$  on the co-ordinate grid above.  
Label the point  $C$  clearly.

- (d)** Find the slope of the line  $CA$ .



**Question 7****(Suggested maximum time: 10 minutes)**

Íde draws the sketch of the triangle shown. The lengths of the sides are 4 cm, 6 cm, and 8 cm.



- (a) What type of triangle has Íde sketched? Put a tick ( $\checkmark$ ) in the correct box.

Type of Triangle	Put a tick ( $\checkmark$ ) in one box
Isosceles	
Scalene	
Equilateral	

- (b) Construct Íde's triangle in the box below. Show your construction lines clearly.

- (c) Measure the biggest angle in your triangle from part (b).

Write the size of this angle into the box below, correct to the nearest degree.

Size of biggest angle =  °

## Question 8

**(Suggested maximum time: 10 minutes)**

The marks that 9 students got on a test are:

23	16	13	30	26	15	18	23	20
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- (a)** Write out all 9 marks **in order**, from the smallest to the biggest.

Answer =

- (b) Write down the **median** mark.

Median mark=

1

- (c) Find the **range** of the marks.

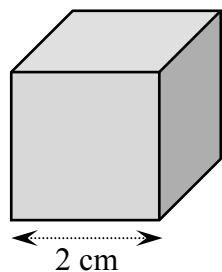
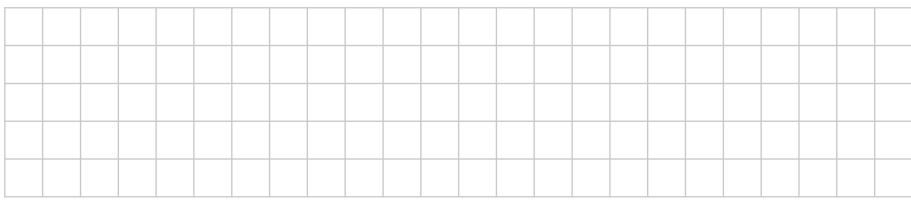
The teacher **adds 2 marks** onto each student's mark.

- (d) Find the **new range** of the marks.

**Question 9****(Suggested maximum time: 5 minutes)**

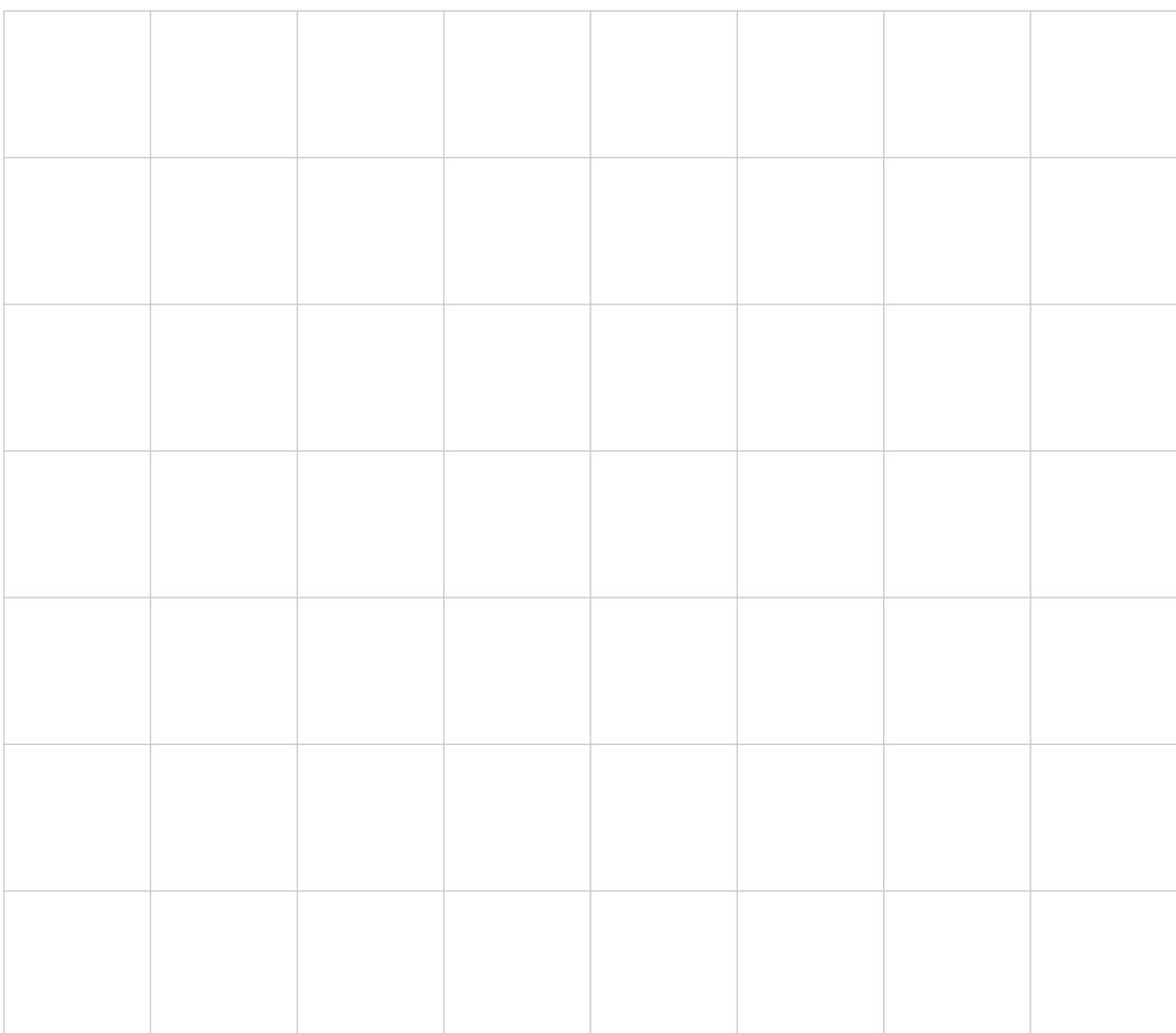
A cube has sides of length 2 cm.

- (a) Find the **volume** of the cube.



- (b) How many **faces** does a cube have?

- (c) Draw a **net** of the cube, as accurately as you can.

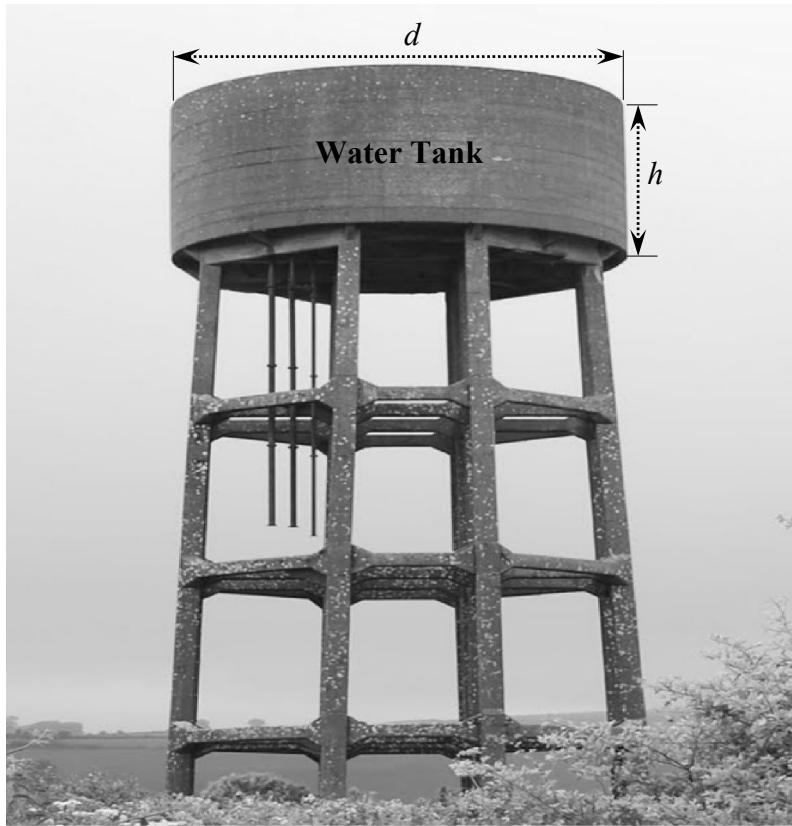


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**Question 10****(Suggested maximum time: 15 minutes)**

The photograph shows a water tank in the shape of a cylinder.

The height ( $h$ ) and diameter ( $d$ ) of the tank are marked.



Source: www.watertowersofireland.com. Altered.

- (a)** Using your **ruler**, find the height and the diameter of the tank in the photograph.  
Give each answer correct to the nearest centimetre.

$$h = \boxed{\phantom{00}} \text{ cm}$$

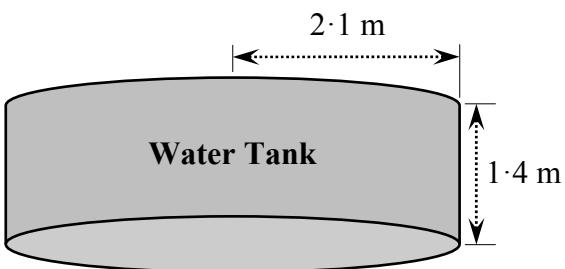
$$d = \boxed{\phantom{00}} \text{ cm}$$

Jenny thinks that the **actual height** of the water tank is 1 m.

- (b)** Use Jenny's value to find the **actual diameter** and the **actual radius** of the tank.  
Give each answer in metres.

Actual diameter =	
Actual radius =	

Colm finds other values for the actual height and the actual radius of the tank. They are shown in the diagram below.



- (c) Use Colm's values to find the **volume** of the tank.  
Give your answer in  $\text{m}^3$ , correct to one decimal place.

## Question 11

**(Suggested maximum time: 5 minutes)**

- (a)** Use your calculator to find the value of each of the following.  
Give each answer correct to two decimal places.

(i)  $\sin 20^\circ =$  [ ] and  $\cos 70^\circ =$  [ ]

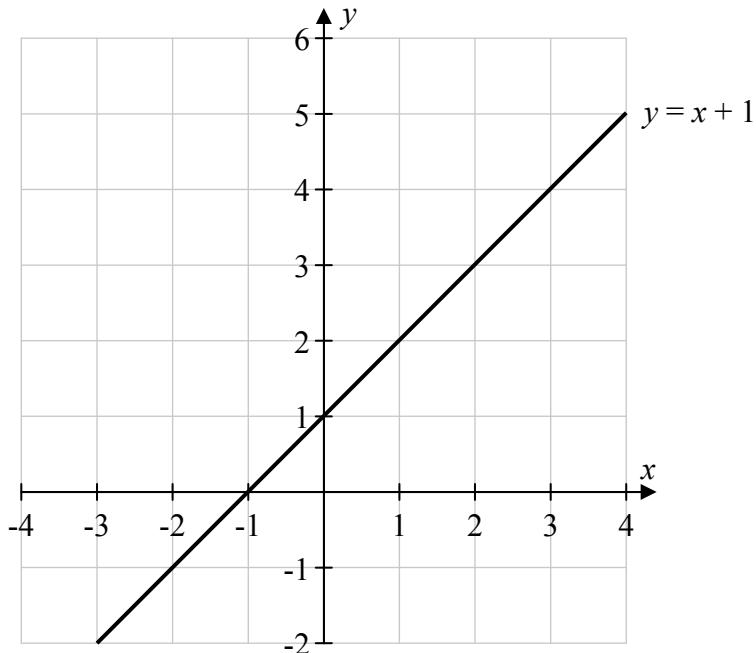
(ii)  $\sin 50^\circ =$   and  $\cos 40^\circ =$

- (b) Hence, or otherwise, fill in the correct angle below.

$$\sin 10^\circ = \cos$$

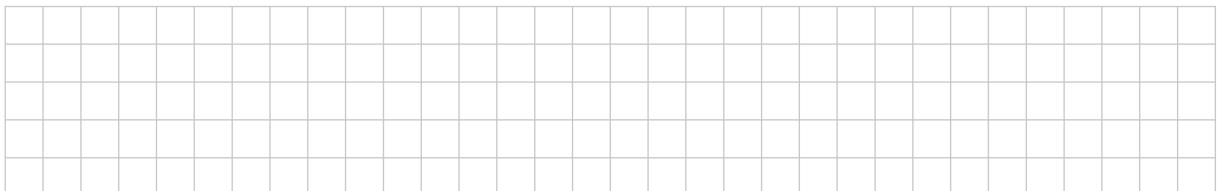
**Question 12****(Suggested maximum time: 10 minutes)**

The graph of the line  $y = x + 1$  is shown on the co-ordinate grid below.



- (a) Write down the co-ordinates of the point where this line crosses the  $y$ -axis. (      ,      )
- (b) Write down the co-ordinates of the point where the line  $y = x + 4$  crosses the  $y$ -axis.

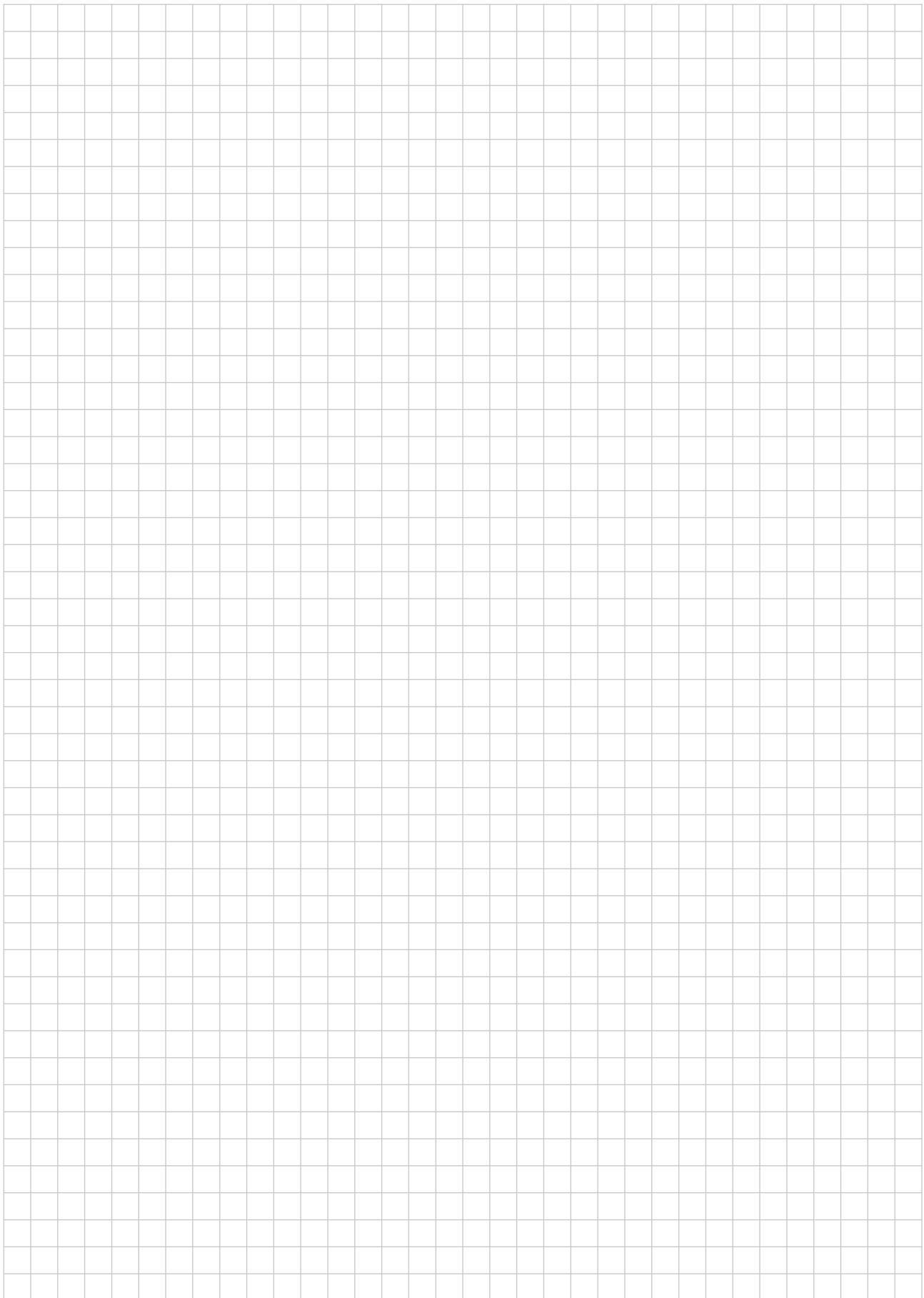
Answer: (      ,      )



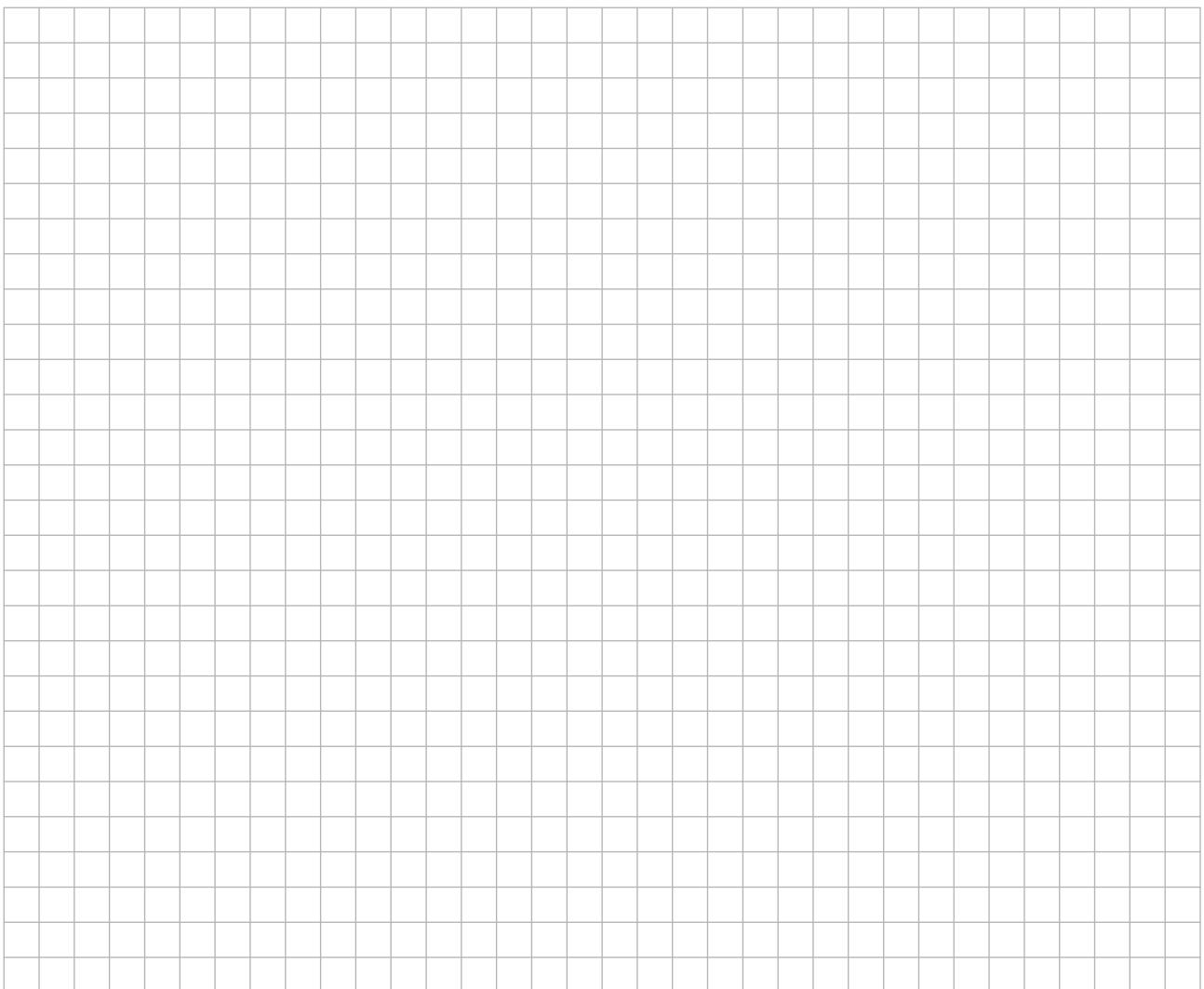
- (c) Hence, or otherwise, draw the graph of the line  $y = x + 4$  on the co-ordinate grid above.



You may use this page for extra work.



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