



Coimisiún na Scrúduithe Stáit  
State Examinations Commission

Junior Certificate Examination, 2013  
Sample Paper

# Mathematics

## (Project Maths – Phase 1)

Paper 2

Ordinary Level

Time: 2 hours

300 marks

Examination number

Centre stamp

Running total

For examiner			
Question	Mark	Question	Mark
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7			
8			
9			
10		Total	

Grade

## Instructions

There are 16 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.

Questions do not necessarily carry equal marks.

Write your answers in the spaces provided in this booklet. 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.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

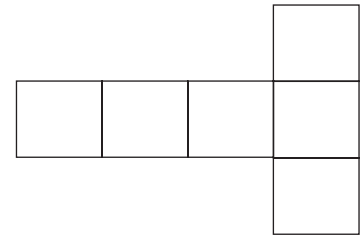
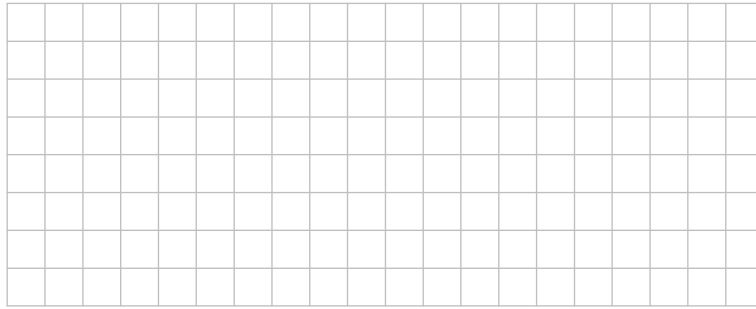
Answers should be given in simplest form, where relevant.

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

**Question 1**

(Suggested maximum time: 2 minutes)

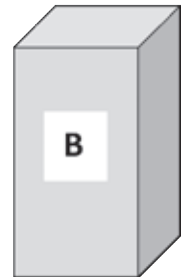
The shape below, on the right, consists of 6 squares. Each side is 2 cm long. It can be folded to form a cube. Find the surface area of the cube.



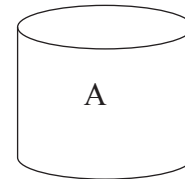
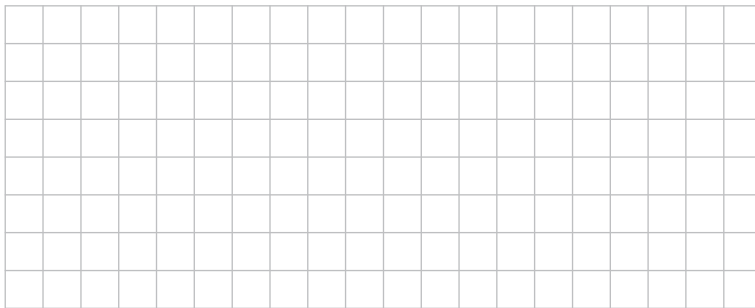
**Question 2**

(Suggested maximum time: 10 minutes)

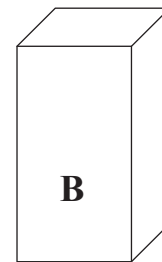
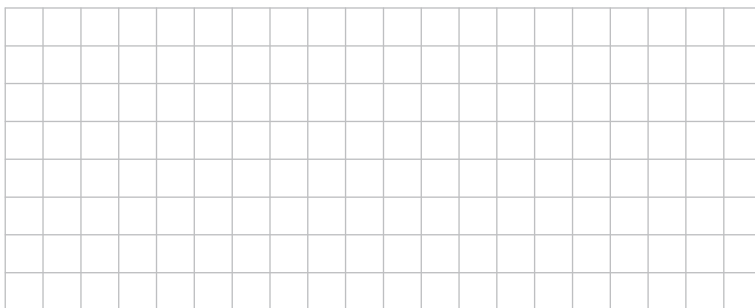
A food production company has to decide between a closed cylindrical tin A or a rectangular carton B to hold a product they are marketing for the first time. Both containers have the same volume.



- (a) Tin A has a radius of 3 cm and a height of 10 cm. Find the volume of tin A.



- (b) Carton B has a square base of length 5 cm. Use the volume you got in (a) above to find the height of carton B. Give your answer correct to one decimal place.



- (c) Which one of the above containers do you think the company might choose? Give a reason for your answer.

Container:	
Reason:	

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**Question 3**

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

Mary is planning to fly to London. The table shows the flights leaving Dublin Airport (DUB) and arriving in London Heathrow Airport (LHR) on a particular day.

Departing		Arriving	
DUB	06:40	LHR	08:05
DUB	07:30	LHR	09:05
DUB	08:50	LHR	10:15
DUB	09:50	LHR	11:10
DUB	12:10	LHR	13:25
DUB	13:40	LHR	14:55
DUB	14:40	LHR	15:55
DUB	15:50	LHR	17:10

(a) Mary needs to arrive in Heathrow by 10:30 am. What is the departure time of the latest flight that she can take from Dublin Airport? \_\_\_\_\_

(b) Find the time of her flight in hours and minutes.


(c) Mary would like to arrive in Dublin Airport 75 minutes before that flight leaves. At what time should she arrive at the airport?


(d) Mary checks in one bag. The cost of checking in a bag is €25. The fare summary for her journey is given in the table below. Find how much the taxes and charges amount to.

<b>Fare Summary (€)</b>	
<b>From Dublin to London/Heathrow</b>	
Fare	74.99
Taxes and Charges	
Baggage	25.00
<b>Total</b>	<b>133.88</b>




**Question 5****(Suggested maximum time: 10 minutes)**

The following question was asked on the phase 9 *CensusAtSchool* questionnaire:  
“Approximately how many hours per week do you spend on social networking sites?”

The data below are from two samples of students chosen at random from the UK and Ireland.

Number of hours	UK Number of students	Ireland Number of students
1		
2	1	1
3	2	3
4	1	2
5	2	2
6	7	2
7		3
8		
9	1	5
10		2
11		3
12		3
13	4	4
14	1	2
15	5	
16	5	5
17	2	1
18	4	2
19	5	4
20	3	2
21	2	
22	3	
23	1	
24		
25	1	4

(a) How many students are in each sample? UK \_\_\_\_\_ Ireland \_\_\_\_\_

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**Question 10**

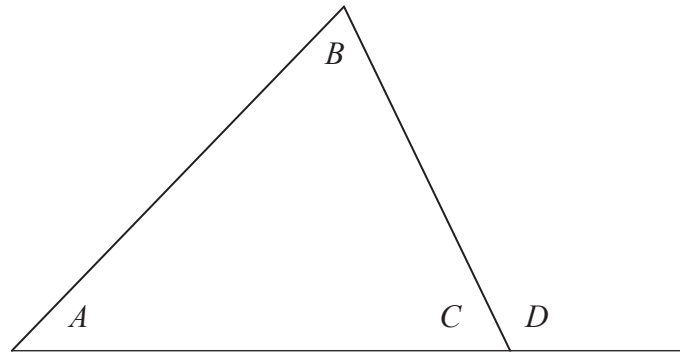
(Suggested maximum time: 10 minutes)

- (a) From the diagram opposite write down three angles which together add up to  $180^\circ$ .

$$\square + \square + \square = 180^\circ$$

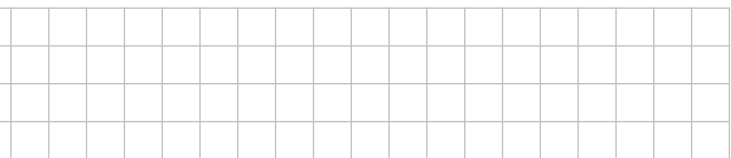
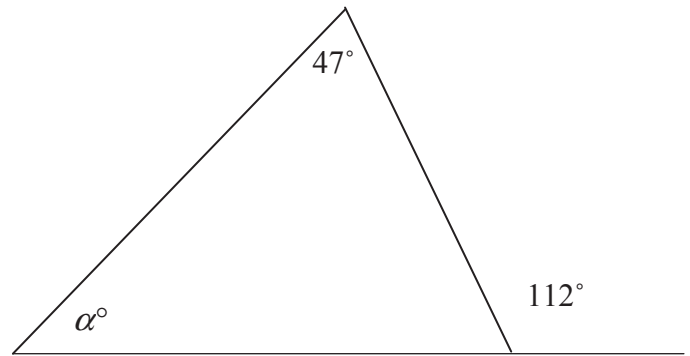
- (b) From the diagram opposite write down two angles which together add up to  $180^\circ$ .

$$\square + \square = 180^\circ$$



- (c) What can you conclude from your two statements about the relationship between  $|\angle D|$  and  $(|\angle A| + |\angle B|)$

- (d) Find  $\alpha$  in the diagram.



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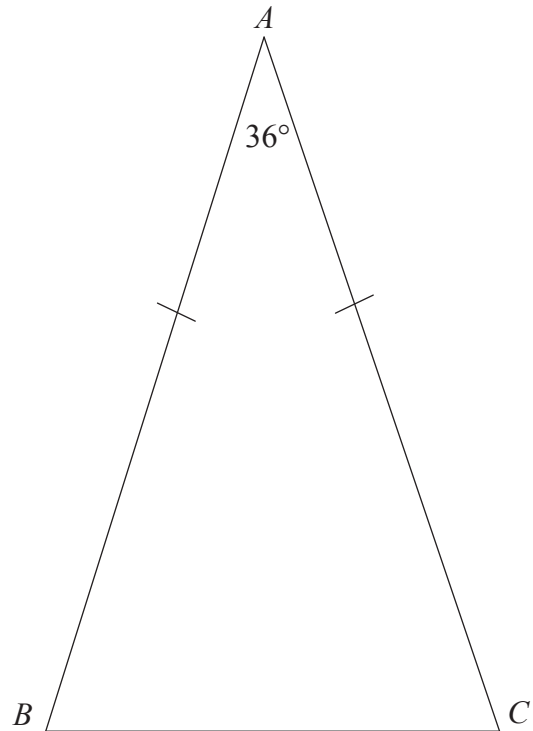
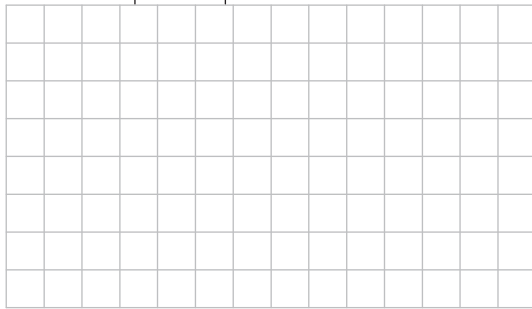
**Question 11**

(Suggested maximum time: 15 minutes)

The triangle  $ABC$  is isosceles.

$|\angle BAC| = 36^\circ$ .

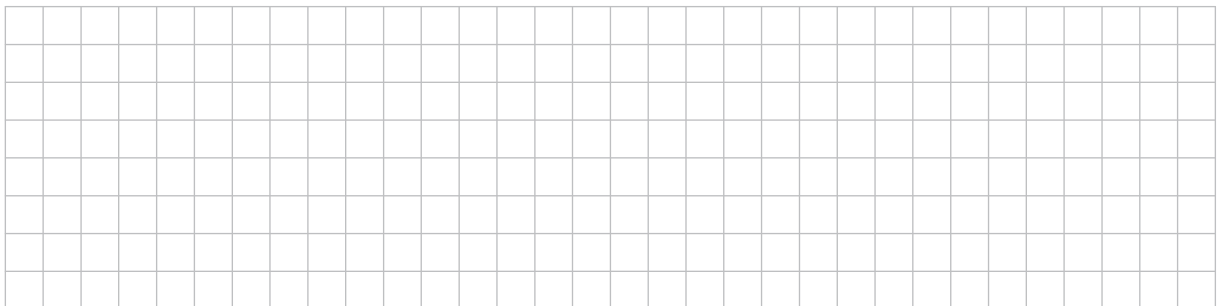
- (a) Calculate  $|\angle ACB|$ .



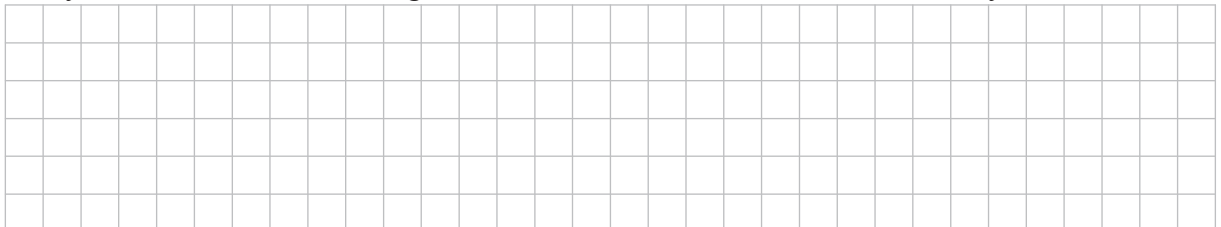
- (b) On the diagram construct the bisector of  $\angle ABC$ . Show all construction lines clearly.

- (c) Mark in the point  $D$  where your bisector meets the line  $AC$ .

- (d) Calculate all the angles in the triangle  $BDC$  and write them into the diagram.



- (e) Can you conclude that the triangle  $BDC$  is also isosceles? Give a reason for your answer.



- (f) Measure  $|AC|$  and  $|BC|$ .

$|AC| = \underline{\hspace{2cm}} \text{ cm}$

$|BC| = \underline{\hspace{2cm}} \text{ cm}$

- (g) Calculate the ratio  $\frac{|AC|}{|BC|}$  correct to three places of decimals.  $\frac{|AC|}{|BC|} = \underline{\hspace{2cm}}$

**Question 12**

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

During a trigonometry lesson a group of students made some predictions about what they expected to find for the values of the trigonometric functions of some angles. They then found the sine, cosine and tangent of  $25^\circ$  and  $50^\circ$ .

- (a) In the table given, show, correct to three decimal places, the values they found.

$\sin 25^\circ =$	$\cos 25^\circ =$	$\tan 25^\circ =$
$\sin 50^\circ =$	$\cos 50^\circ =$	$\tan 50^\circ =$

- (b) (i) Maria had said “The value from any of these trigonometric functions will always be less than 1”. Was Maria correct? Give a reason for your answer.

Answer:

Reason:

- (ii) Sharon had said “If the size of the angle is doubled then the value from any of these trigonometric functions will also double.” Was Sharon correct? Give a reason for your answer.

Answer:

Reason:

- (iii) James had said “The value from all of these trigonometric functions will increase if the size of the angle is increased.” Was James correct? Give a reason for your answer.

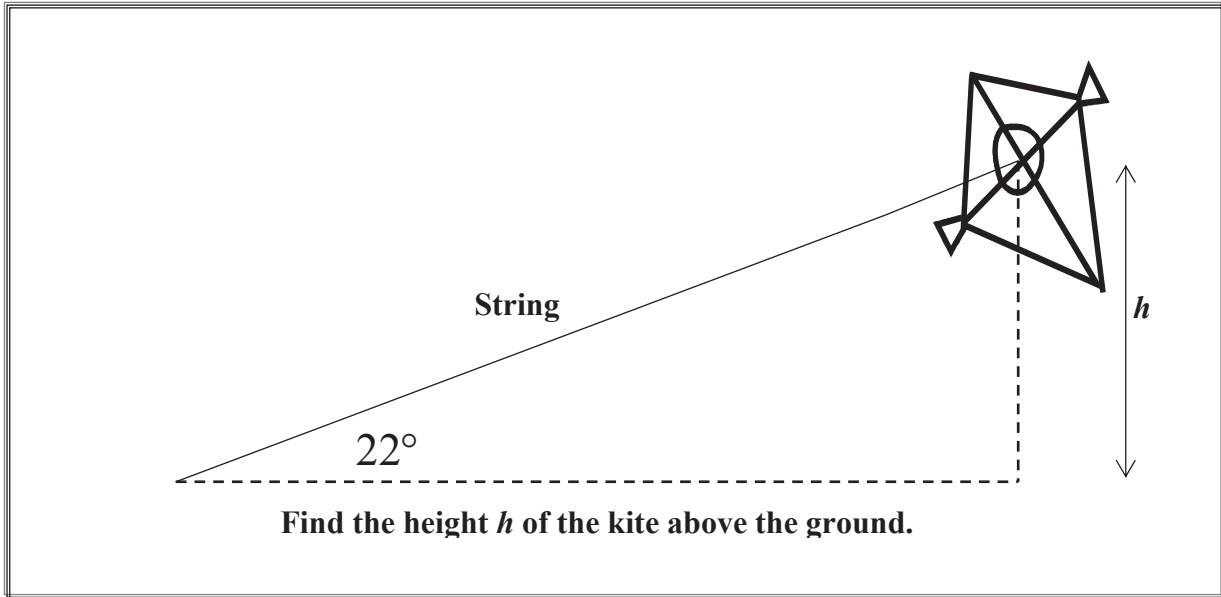
Answer:

Reason:

**Question 13**

(Suggested maximum time: 5 minutes)

Anne wanted to create a question which would use  $\sin 22^\circ$  in its solution. She drew the diagram and wrote the question in the box below.



- (a) Anne has not enough information to answer the question. Put in an appropriate measurement on the diagram to complete it for her.
- (b) Using your measurement, find the height  $h$  in the diagram.

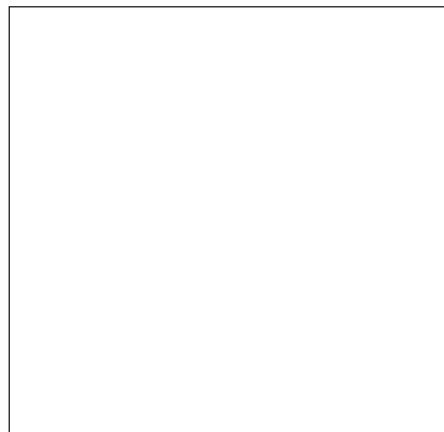


**Question 14**

(Suggested maximum time: 2 minutes)

The following diagram shows a square.

Draw in all its axes of symmetry.

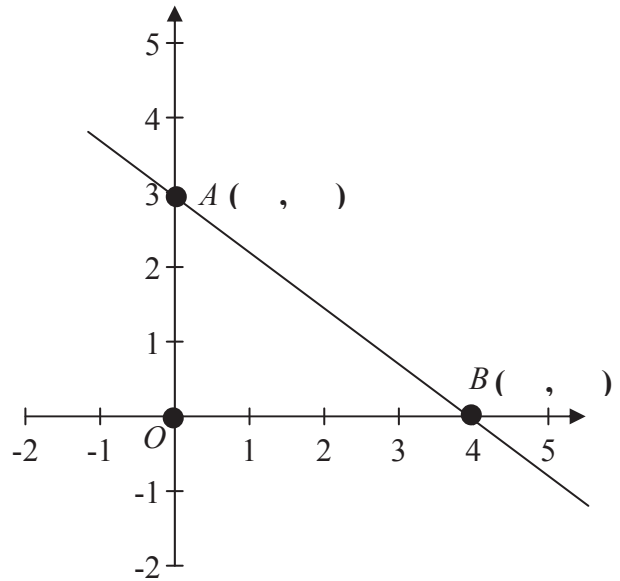


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**Question 15**

(Suggested maximum time: 5 minutes)

- (a) Write down the coordinates of the point  $A$  and the point  $B$  on the diagram.  
 (b) Use the distance formula to find  $|AB|$ .

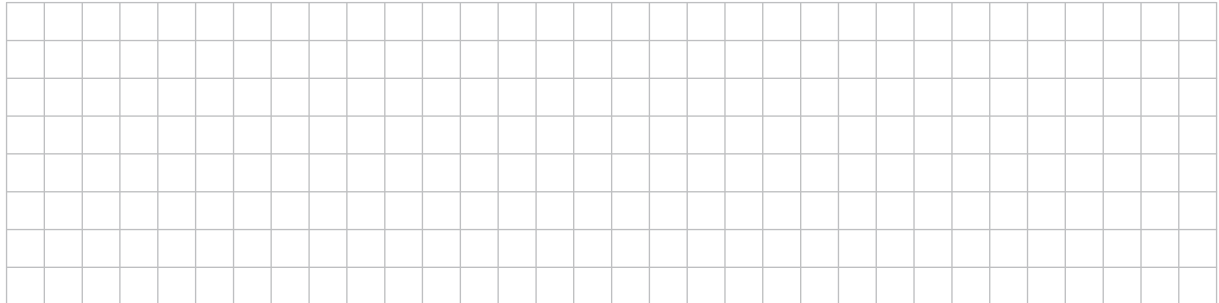


- (c) Write down the distance from  $O$  to  $A$  and the distance from  $O$  to  $B$ .

$|OA| =$ 


$|OB| =$ 

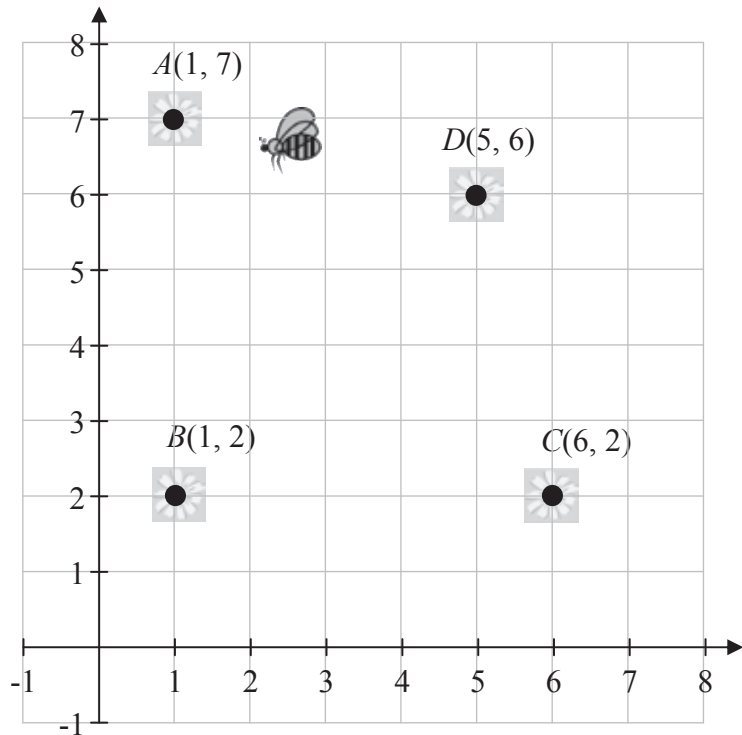

- (d) Use the theorem of Pythagoras to find the length of the hypotenuse of the triangle  $OAB$ .



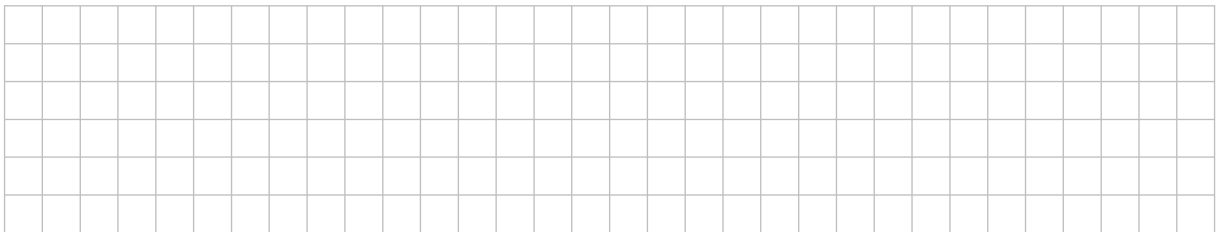
**Question 16**

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

A computer game shows the location of four flowers  $A(1, 7)$ ,  $B(1, 2)$ ,  $C(6, 2)$ , and  $D(5, 6)$  on a grid. The object of the game is to collect all the nectar from the flowers in the shortest time.



- (a) A bee found a hidden flower half way between flower  $B$  and flower  $D$ . Find the coordinates of this hidden flower.



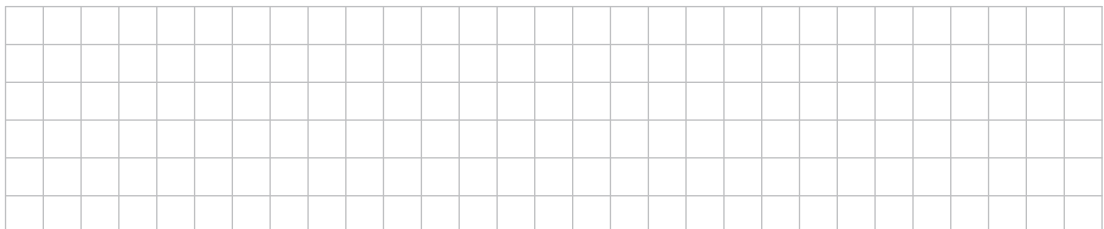
- (b) Another flower  $E$  can be located by completing the square  $ABCE$ . Write down the coordinates of the point  $E$ .

$E =$  \_\_\_\_\_

- (c) Bee 1 and Bee 2 are on flower  $A$ . Bee 1 flies directly from flower  $A$  to  $B$  and then on to  $C$ . Bee 2 flies from flower  $A$  directly to  $D$  and then on to  $C$ . Write down which bee has travelled the shortest total distance. Give a reason for your answer.

Answer: \_\_\_\_\_

Reason:





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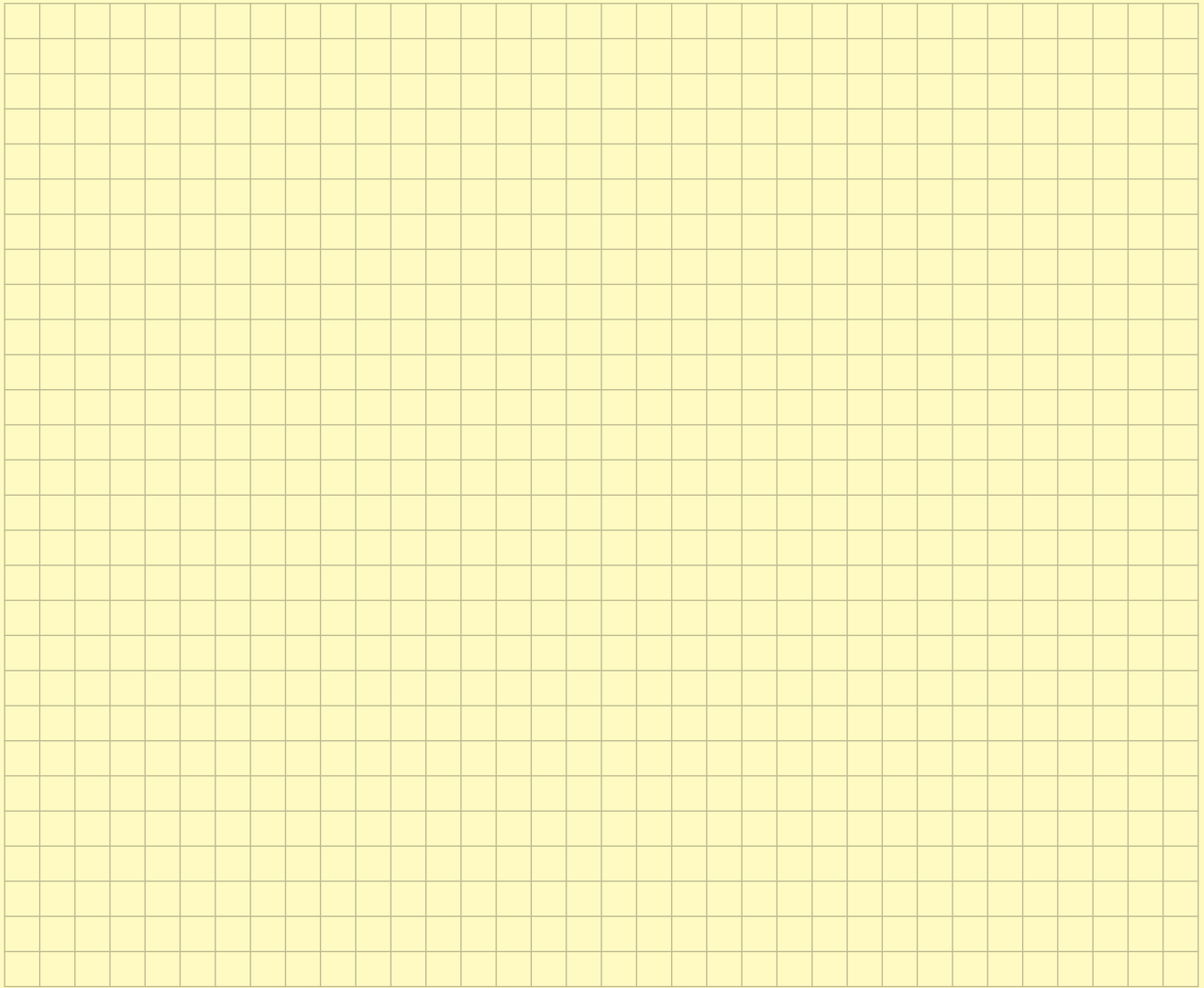
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*Note to readers of this document:*

This sample paper is intended to help teachers and candidates prepare for the June 2013 examination in Mathematics under Phase 1 of *Project Maths*. The content and structure do not necessarily reflect the 2014 or subsequent examinations.

The number of questions on the examination paper may vary somewhat from year to year.

For the examination of 2013, Paper 1 remains unchanged in both content and format.

Junior Certificate – Ordinary Level

# Mathematics (Project Maths – Phase 1) – Paper 2

Sample Paper, 2013

Time: 2 hours