Coimisiún na Scrúduithe Stáit
State Examinations Commission

Junior Certificate Examination
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 sixteen 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. 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 booklet of *Formulae and Tables*. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

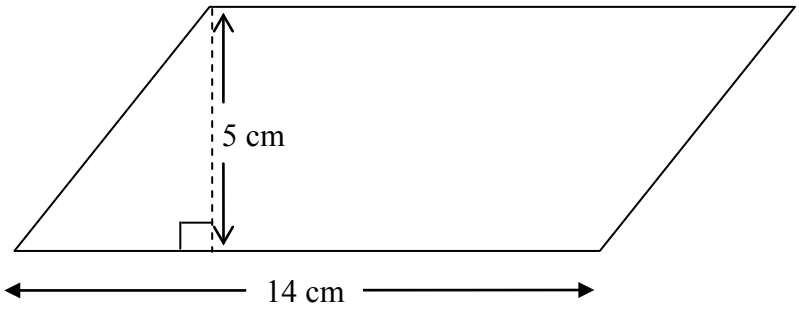
Marks will be lost if all necessary work is not clearly shown.

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

Answers should be given in simplest form, where relevant.

Question 1 **(suggested maximum time: 2 minutes)**

A parallelogram has dimensions as shown in the diagram.



Find, in cm^2, the area of the parallelogram.

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

(a) Dara left Lucan by car at 09:25 and arrived in Sligo at 11:55. How long did it take Dara to travel from Lucan to Sligo? Give your answer in hours and minutes.

(b) The distance from Lucan to Sligo is 195 km. Calculate Dara's average speed, in km/h.

(c) On the return journey from Sligo to Lucan, Dara's average speed was 60 km/h. How long, in hours and minutes, did the return journey take**?**

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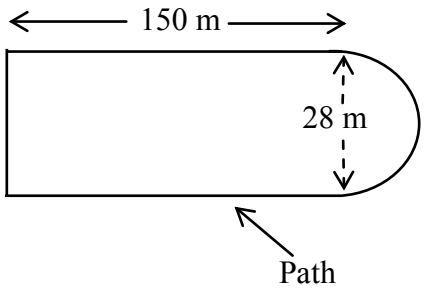
Question 3 **(suggested maximum time: 10 minutes)**

A park is in the shape of a rectangle with a semicircular end. The rectangle is 150 m long and 28 m wide. The diameter of the semicircular end is also 28 m. There is a path around the park which is used for walking and jogging.



(a) Taking π as 3·142, calculate the length of the semicircular end. Give your answer to the nearest metre.

(b) Calculate the total length of the path around the park.

(c) Barbara wishes to jog 2·5 km. How many laps of the path must she complete to ensure that she jogs this distance?

Question 4 **(suggested maximum time: 5 minutes)**

The answers to survey questions can be classified as

(i) Categorical data where the categories are not ordered
(ii) Ordered categorical data
(iii) Discrete numerical data
(iv) Continuous numerical data

In each row in the table below, write a short question that you could include in a survey and that will give the type of data stated.

Question:	Type of data:
Q1.	Categorical data where the categories are not ordered
Q2.	Ordered categorical data
Q3.	Discrete numerical data
Q4.	Continuous numerical data

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 _____

(b) Display the data in a way that allows you to compare the two samples.
(Use a separate display for each sample.)

(c) Based on your answer to part **(b)**, what similarities and differences are there between the two samples?

(d) Is it safe to say that there are differences between Irish and UK people regarding the time they spend on social networking sites? Explain your answer.

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

A bag contains red disks, blue disks and white disks. In an experiment, each student in a class of 24 takes out a disk, records the colour and replaces it. This is repeated ten times.
The results from the class are recorded in the table below.

Colour	Red	Blue	White	Total
Frequency	123	78	39	
Relative frequency: $\frac{\text{frequency}}{\text{total}}$				
% of total (Relative frequency × 100)				

(a) In your opinion, why is the number for red greater than for blue or white?

(b) Complete the table above.

(c) Use the results from the table above to estimate the probability of getting each colour when a disk is taken from the bag.

Colour	Red	Blue	White
Probability			

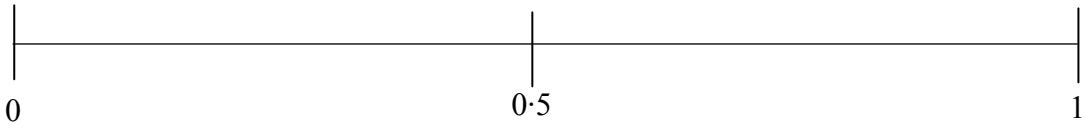
(d) Anne says that she thinks there are ten disks in the bag. Is this a reasonable suggestion? Explain your answer.

(e) Based on the information in the table, how many disks of each colour do you think are in the bag?

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

(a) For each of the events **A**, **B**, **C**, **D** and **E** below, estimate its probability and place the letter at the most appropriate position on the probability scale below.

	Probability
A name is picked at random from a list of 50 girls and 50 boys. **A** = A girl's name is picked.	
A fair coin is tossed twice. **B** = A head is the outcome on each toss.	
One card is drawn at random from a pack of playing cards. **C** = The card is a diamond.	
A day is chosen at random from a list of the days of the week. **D** = The name of the day contains the letter **a**.	
One number is picked at random from the set {1, 2, 3, 4, 5, 7, 11, 13}. **E** = The number chosen is a prime number.	



(b) Write down another event that you think has a probability similar to that of **C** in the scale above.

(c) Write down another event that you think has a probability similar to that of **D** in the scale above.

(d) In a multiple choice quiz, three possible answers are given to a question. James does not know the answer and guesses which one is correct. Put an X on the scale above to show the probability that he has chosen the correct answer.

Question 8 **(suggested maximum time: 5 minutes)**

(a) The mean of a list of five numbers is 8.
Write down two different lists of numbers for which the above statement is true.

List 1:

List 2:

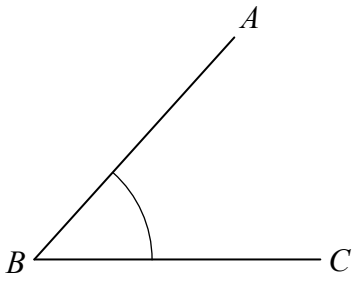
(b) The mode of a list of six numbers is 7.
Write down two different lists of numbers for which the above statement is true.

List 1:

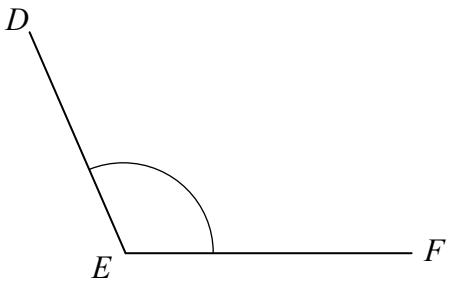
List 2:

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

(a) Use a protractor to measure the angles $\angle ABC$ and $\angle DEF$.

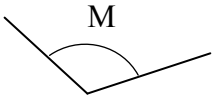


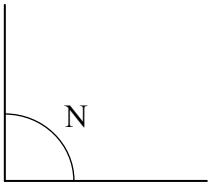
$|\angle ABC| =$ _____

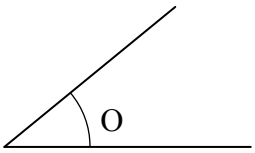


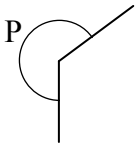
$|\angle DEF| =$ _____

(b) The four angles $\angle$M, $\angle$N, $\angle$O and $\angle$P are shown in the diagrams below.







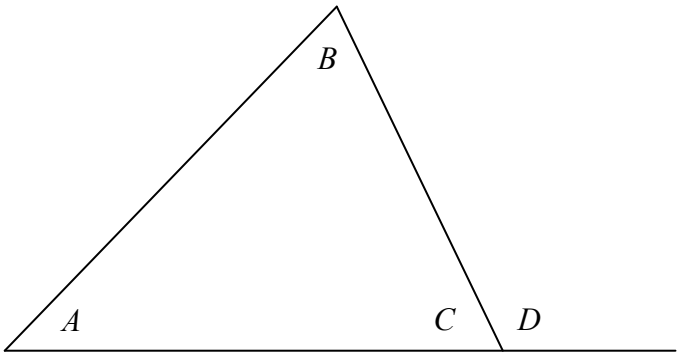


Starting with the smallest, put the four angles in order.

Question 10 **(suggested maximum time: 10 minutes)**

(a) From the diagram opposite write down three angles which together add up to $180°$.

$\square + \square + \square = 180°$

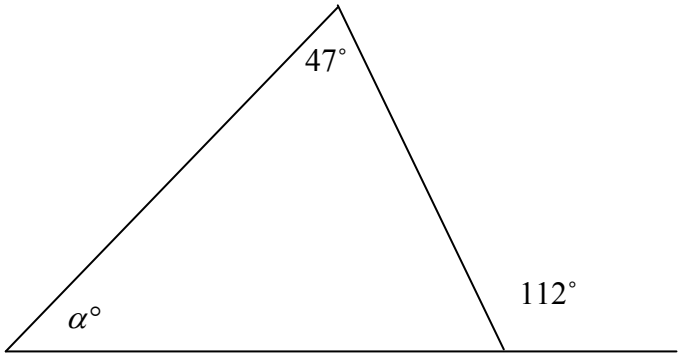


(b) From the diagram opposite write down two angles which together add up to $180°$.

$\square + \square = 180°$

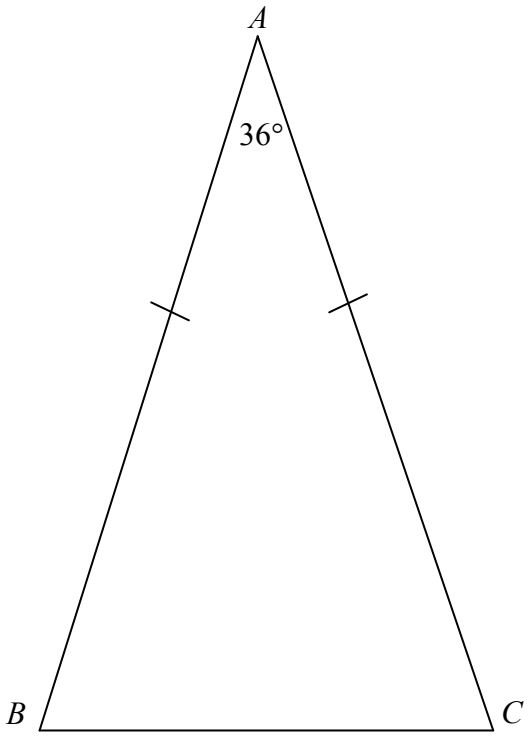
(c) What can you conclude from your two statements about the relationship between $|\angle D|$ and $(|\angle A| + |\angle B|)$

(d) Find α in the diagram.



Question 11 **(suggested maximum time: 15 minutes)**

The triangle ABC is isosceles.
$|\angle BAC| = 36°$.



(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.

(e) Measure $|AC|$ and $|BC|$.

$|AC|$ = _____cm $|BC|$ = _____cm

(f) Calculate the ratio $\frac{|AC|}{|BC|}$ correct to three places of decimals. $\frac{|AC|}{|BC|}$ = _____

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 $25°$ and $50°$.

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

$\sin 25° =$	$\cos 25° =$	$\tan 25° =$
$\sin 50° =$	$\cos 50° =$	$\tan 50° =$

(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 value from any of these trigonometric functions will also double." Was Sharon correct? Give a reason for your answer.

Answer:

Reason:

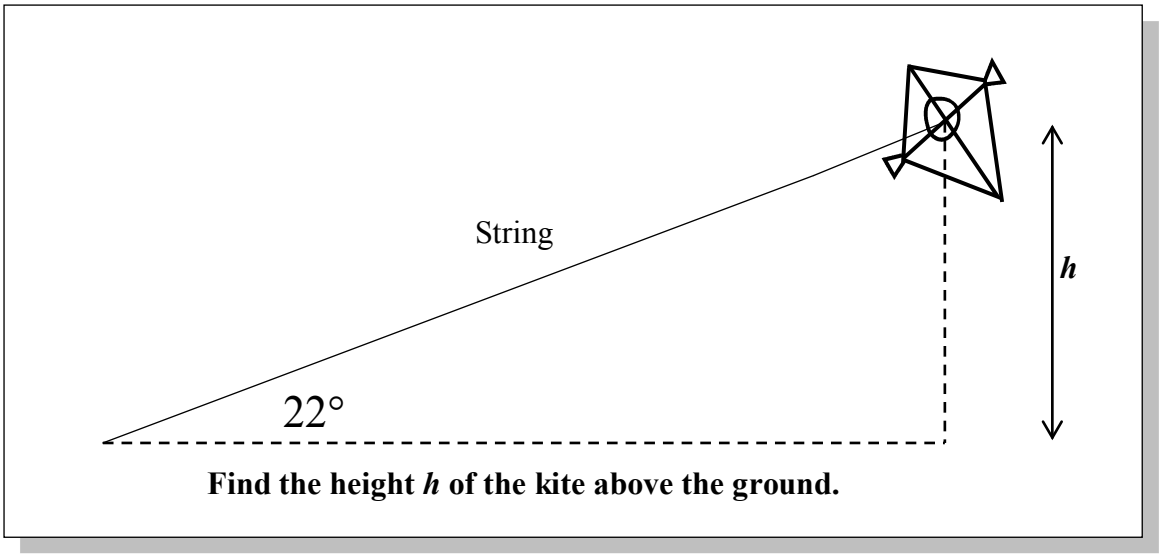
(iii) James had said "The value from all of these trigonometric functions will increase if the size of the angle is increased." Was James correct? Give a reason for your answer.

Answer:

Reason:

Question 13 **(suggested maximum time: 5 minutes)**

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



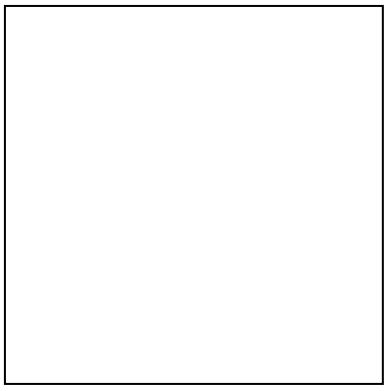
Find the height *h* of the kite above the ground.

(a) Anne has not given 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.

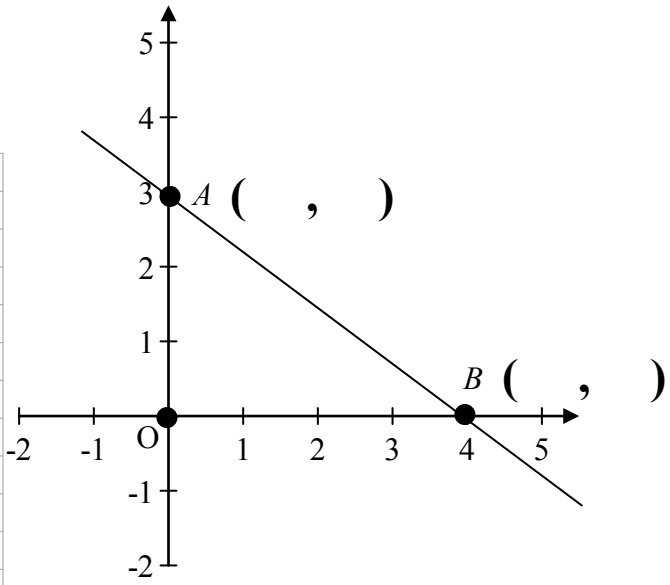
Question 14 **(suggested maximum time: 2 minutes)**

The following diagram shows a square.
Draw in all its axes of symmetry.



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.

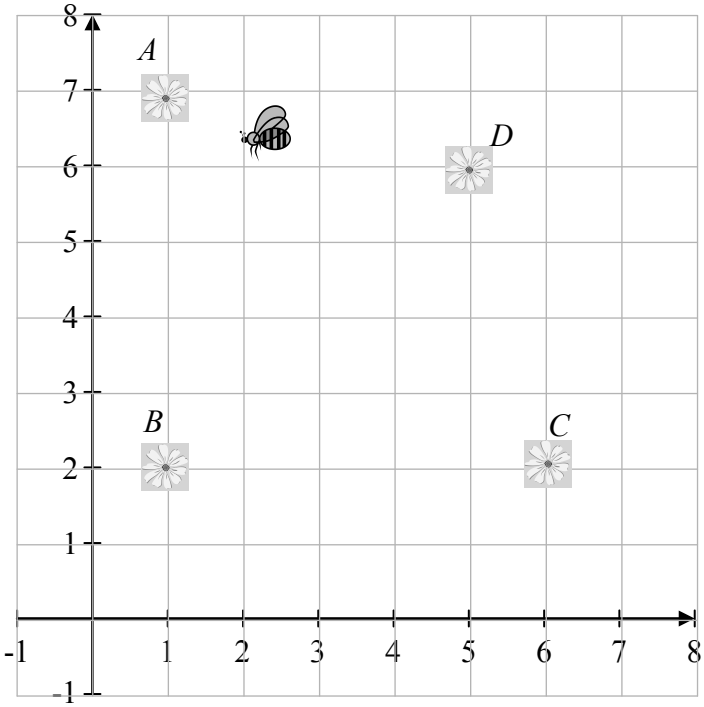
$|OA| =$

$|OB| =$

(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 some flowers 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*. Bee1 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 distance, giving a reason for your answer.

Answer: _____

Reason:

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Note to readers of this document:

This sample paper is intended to help teachers and candidates prepare for the June 2011 examination in the *Project Maths* initial schools. The content and structure do not necessarily reflect the 2012 or subsequent examinations in the initial schools or in all other schools.

In the 2011 examination, the material in some questions will be compiled from questions 1 and 2 on the examination for candidates who are not in the initial schools. On this sample paper, portions of questions from the 2010 examination have been inserted to illustrate.

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

Junior Certificate 2011 – Ordinary Level

Mathematics (Project Maths – Phase 1) – Paper 2

Sample Paper
Time: 2 hours