

Coimisiún na Scrúduithe Stáit State Examinations Commission

Junior Certificate Examination, 2012

Mathematics (Project Maths – Phase 2)

Paper 2

Higher Level

Monday 11 June Morning 9:30 to 12:00 300 marks

Examination number	

	Centre stamp	

Running total	
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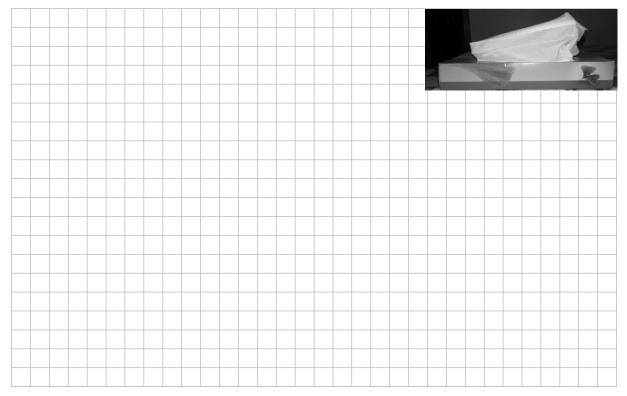
	For examiner										
Question	Mark	Question	Mark								
1		11									
2		12									
3		13									
4		14									
5		15									
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7											
8											
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10		Total									

Grade

Instructions
There are 15 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 <i>Formulae and Tables</i> . 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:

(Suggested maximum time: 5 minutes)

A tissue measures 300 mm \times 260 mm. There are 100 tissues in a box. Find the total area of tissue in the box in m^2 .

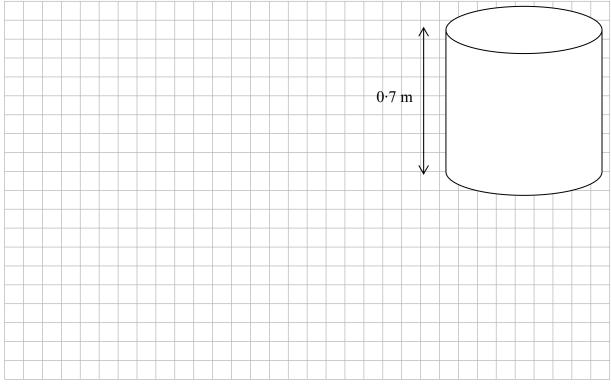


Question 2

(Suggested maximum time: 10 minutes)

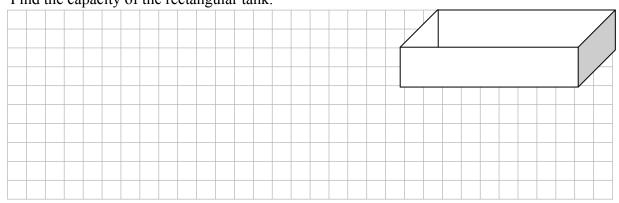
(a) A container in the shape of a cylinder has a capacity of 50 litres. The height of the cylinder is 0.7 m. Find the length of the diameter of the cylinder.

Give your answer correct to the nearest whole number.

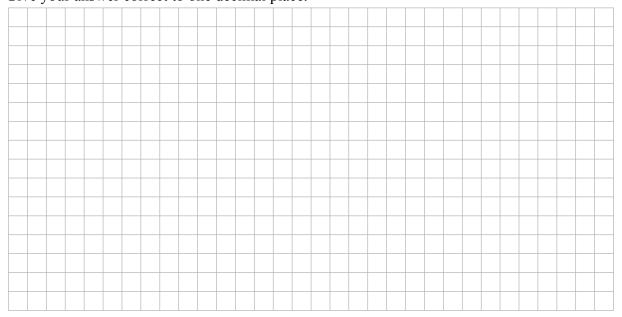


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(b) A rectangular tank has a length of 0.6 m, a width of 0.35 m and its height measures 15 cm. Find the capacity of the rectangular tank.



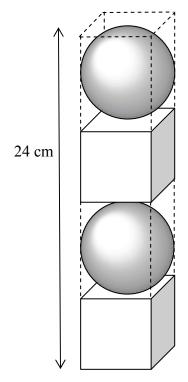
(c) The rectangular tank is full of water. This water is then poured into the cylindrical container in (a) above. Find the depth of water in the cylinder. Give your answer correct to one decimal place.



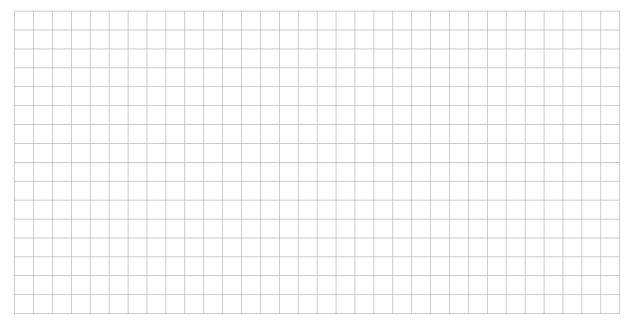
An ornament is carved from a rectangular block of wood which has a square base and a height of 24 cm. The ornament consists of two identical spheres and two identical cubes as illustrated in the diagram. The diameter of each sphere is equal to the length of the side of each cube. The ornament has the same width as the original block.

(a) Find the length of a side of one of the cubes.





(b) Find the volume of the ornament.



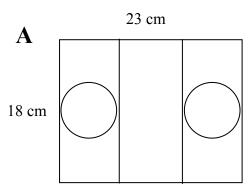
(c) In making the ornament, what percentage of the original block of wood is carved away?

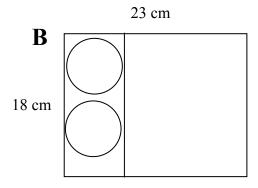


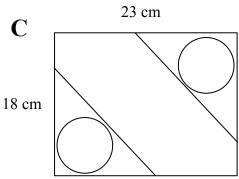
(Suggested maximum time: 10 minutes)

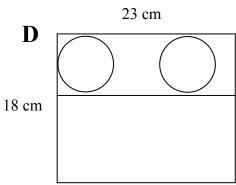
A soup tin in the form of a cylinder has a diameter of 7 cm and a height of 10 cm. The cylinder is constructed from pieces of metal cut from a thin sheet measuring 23 cm by 18 cm.

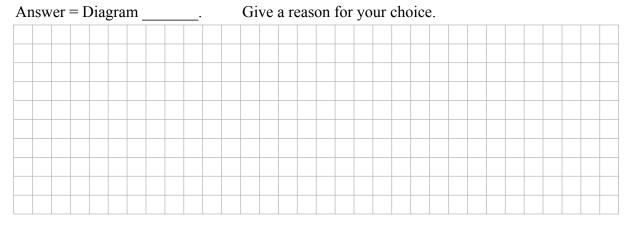
(a) Which one of the four diagrams A, B, C or D could represent the sheet of metal from which the cylinder has been cut?











(b) Find the area of metal which remains after the pieces have been cut out.

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(c,) Find the capacity of the soup	un.

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(Suggested maximum time: 5 minutes)

A, B, C, D and E represent the probabilities of certain events occurring.

(a) Write the probability of each of the events listed into the table below.

Event		Probability
A club is selected in a random draw from a pack of playing cards	A	
A tossed fair coin shows a tail on landing	В	
The sun will rise in the east tomorrow	С	
May will follow directly after June	D	
A randomly selected person was born on a Thursday	Е	

(b) Place each of the letters A, B, C, D and E at its correct position on the probability scale below.



(Suggested maximum time: 15 minutes)

The ages of the Academy Award winners for best male actor and best female actor (at the time they won the award) from 1992 to 2011 are as follows:

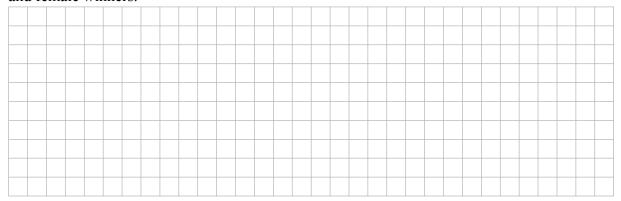
Male actor 54 52 37 38 32 45 60 46 40 36 47 29 43 37 38 45 50 48 60 50

Female actor 42 29 33 36 45 49 39 26 25 33 35 35 28 30 29 61 32 33 45 29

(a) Represent the data on a back-to-back stem-and-leaf diagram.

Male actors		Female actors
	2	
	3	
	4	
	5	
	6	
	K K	Key:

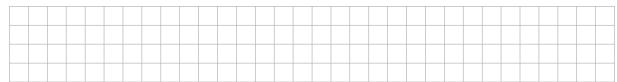
(b) State one similarity and one difference that can be observed between the ages of the male and female winners.



- (c) Mary says "The female winners were younger than the male winners." Investigate this statement in relation to:
 - (i) The mean age of the male winners and mean age of the female winners.

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d)	Find	the			art	ile	rai	nge	s o	f th	ne a	iges	s of	the	ma	le w		-	-	d of	the	fen	nal	le w	inr	ners	•	
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fai blou he s	r circu ared b spinne	ular lue a er is t is t	and spu the	one n an	e is nd bat	a fa	olou air ty o	recoi	d re	ed. s to	nne	ed. er la	and	ing	on a		are			sted	ma	xim	num	m ti	mes	::5 r	minu	u1
fai blou he s	wha	ular lue a er is t is t	and spu the	one n an	e is nd bat	a fa	olou air ty o	recoi	d re	ed. s to	nne	ed. er la	and	ing	on a		are			sted	ma	xim	num	m ti	me:	:: 5 r	minu	ut
fai blou he s	wha	ular lue a er is t is t	and spu the	one n an	e is nd bat	a fa	olou air ty o	recoi	d re	ed. s to	nne	ed. er la	and	ing	on a		are			sted	ma	axim	num	m ti	mes	:: 5 r	minu	
fai olou he s	wha	ular lue a er is t is t	and spu the	one n an	e is nd bat	a fa	olou air ty o	recoi	d re	ed. s to	nne	ed. er la	and	ing	on a		are			sted	ma	axim	num	m ti	mes	:: 5 m	minu	ut

(a) What is the probability of getting a 1 when a fair die is tossed?



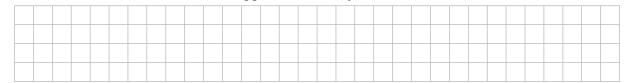
A fair die is tossed 500 times.

The results are partially recorded in the table below.

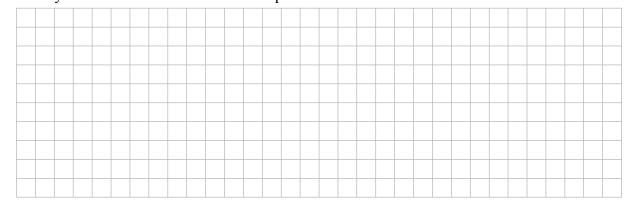
Number on die	1	2	3	4	5	6
Frequency	70	82		90	91	81
Relative Frequency						



(b) Calculate the number of times a 3 appeared. Write your answer in the table above.



(c) Calculate the relative frequency of each outcome and write it into the table above. Give your answers correct to 2 decimal places.

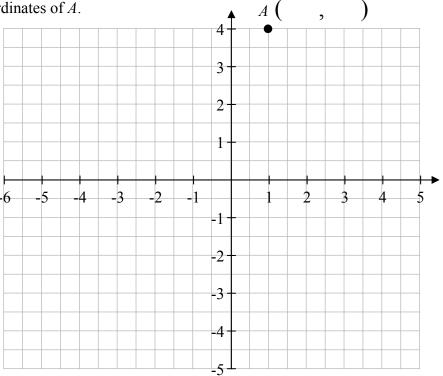


(d) Give a possible reason for the difference in value between the relative frequency for 1 in the table and your answer to part (a).



The point A is shown on the diagram.

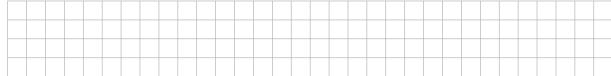
(a) Write down the co-ordinates of A.



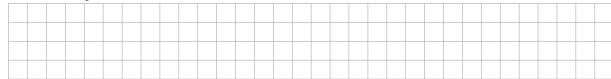
(b) Plot the following points on the diagram above.

В	С	D	E	F
(2, 0)	(-4, -4)	(0, 4)	(-6,0)	(4, -4)

(c) Calculate the midpoint of [DF].



(d) Find the slope of BF.



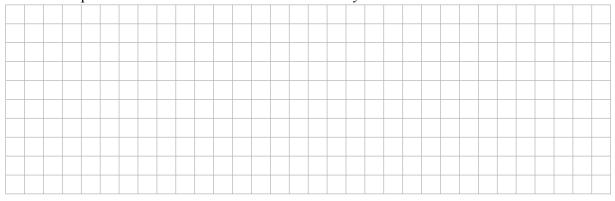
(e) Write down the equation of the line BF in the form y = mx + c.



(f) Find the slope of the line *CE*.



(g) Write the equation of the line CE in the form of ax + by + c = 0.



(h) What is the ratio of the area of the triangle BCE to the area of the triangle BCF?



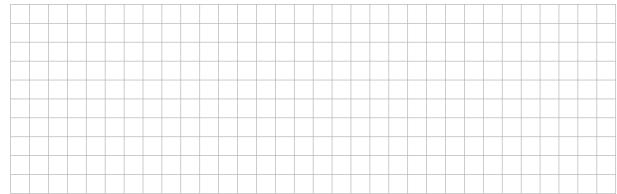
(i) State whether the two triangles in part (h) above are congruent. Give a reason for your answer.

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Re	asoı	1:															

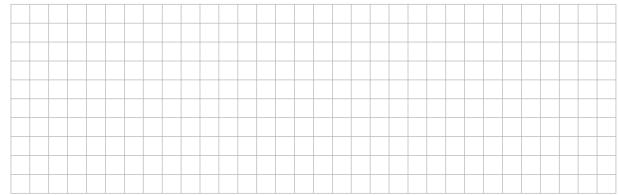
The table below gives the equations of six lines.

Line 1	y = 3x - 6
Line 2	y = 3x + 12
Line 3	y = 5x + 20
Line 4	y = x - 7
Line 5	y = -2x + 4
Line 6	y = 4x - 16

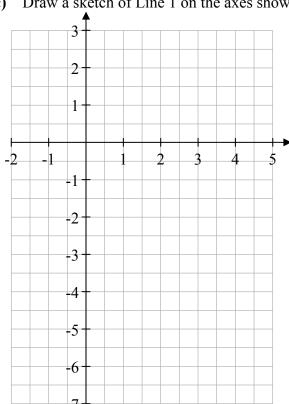
(a) Which line has the greatest slope? Give a reason for your answer.

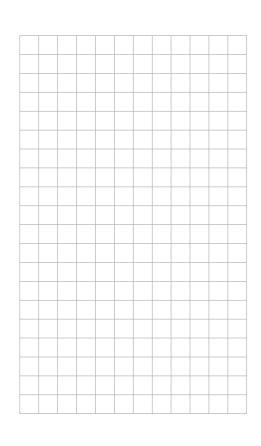


(b) Which lines are parallel? Give a reason for your answer.

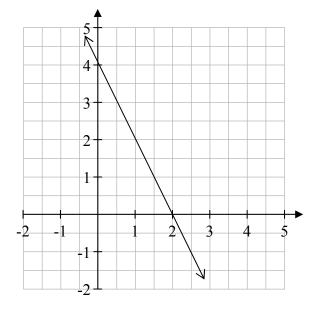


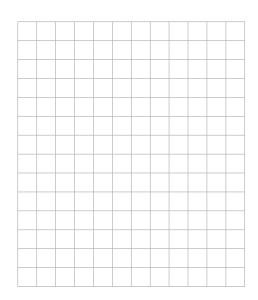
(c) Draw a sketch of Line 1 on the axes shown.





(d) The diagram below represents one of the given lines. Which line does it represent?

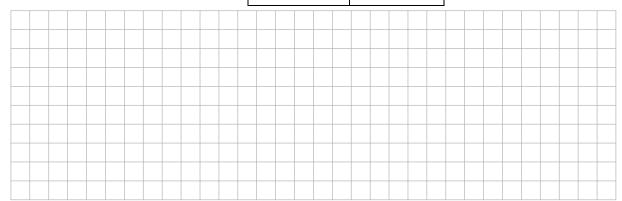




Answer = Line _____

(e) The table shows some values of x and y for the equation of one of the lines. Which equation do they satisfy?

x	у
7	12
9	20
10	24

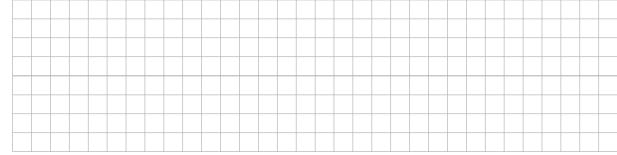


Answer = Line ____

(f) There is one value of x which will give the same value of y for Line 4 as it will for Line 6. Find, using algebra, this value of x and the corresponding value of y.



(g) Verify your answer to **(f)** above.



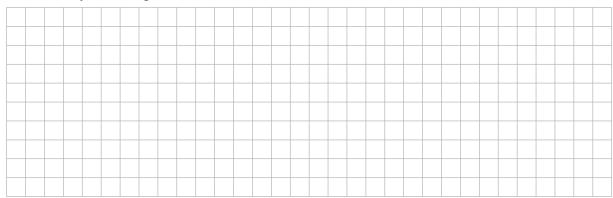
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(Suggested maximum time: 5 minutes)

(a) Construct a right-angled triangle containing an angle A such that $\sin A = 0.4$.



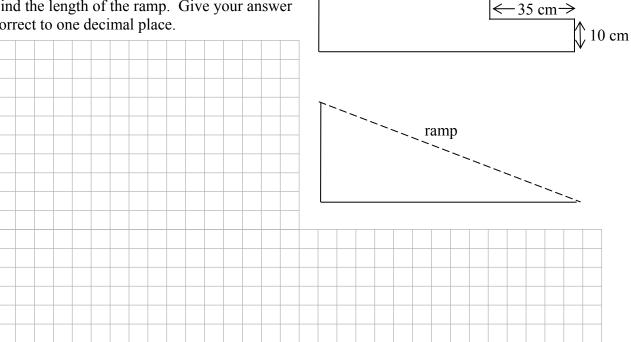
(b) Find, from your triangle, $\cos A$ in surd form.



Question 12

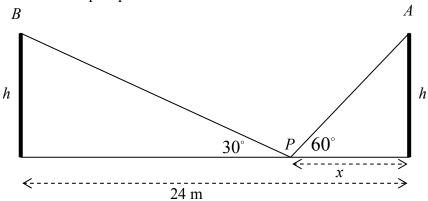
A homeowner wishes to replace the three identical steps leading to her front door with a ramp. Each step is 10 cm high and 35 cm long. Find the length of the ramp. Give your answer correct to one decimal place.

(Suggested maximum time: 5 minutes)



(Suggested maximum time: 10 minutes)

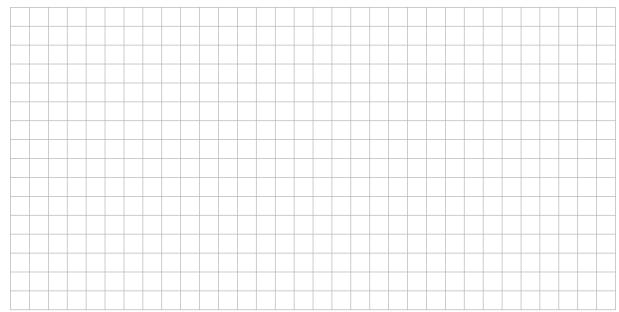
Two vertical poles A and B, each of height h, are standing on opposite sides of a level road. They are 24 m apart. The point P, on the road directly between the two poles, is a distance x from pole A. The angle of elevation from P to the top of pole A is 60° .



(a) Write h in terms of x.



(b) From P the angle of elevation to the top of pole B is 30° . Find h, the height of the two poles.

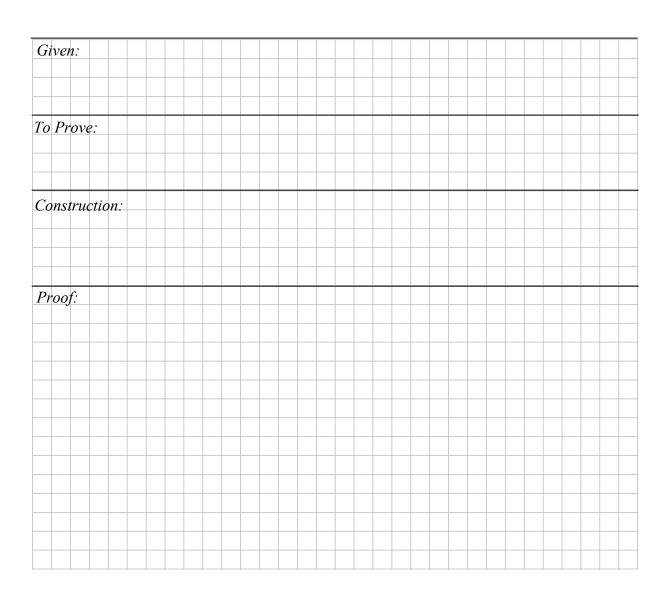


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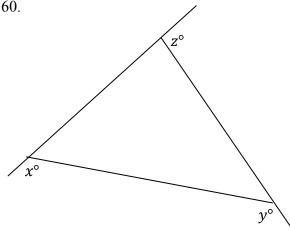
(Suggested maximum time: 10 minutes)

Prove that the angle at the centre of a circle standing on a given arc is twice the angle at any point of the circle standing on the same arc.

Diagram:

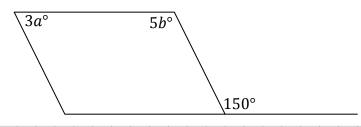


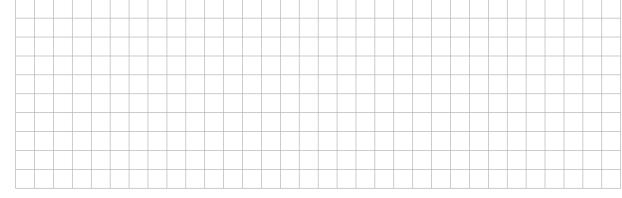
(a) Prove that x + y + z = 360.

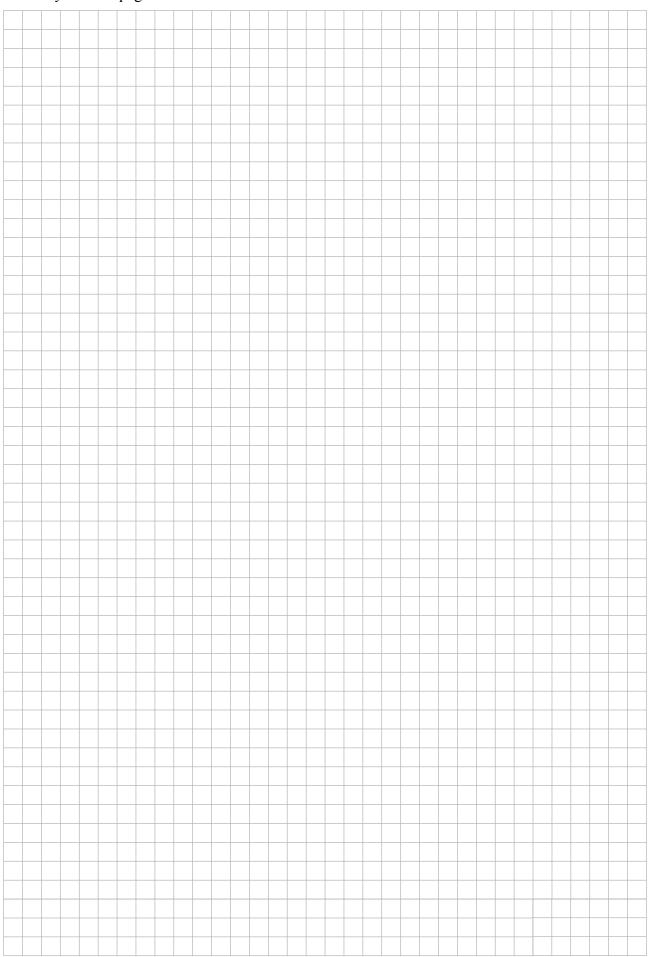




(b) The diagram below shows a parallelogram and one exterior angle. Find the value of a and the value of b.

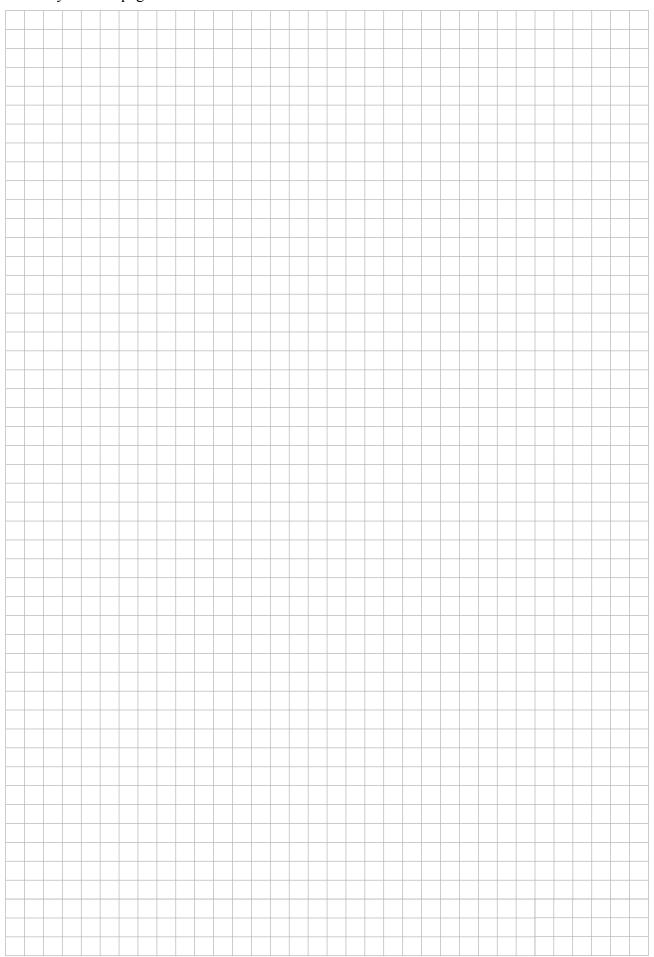






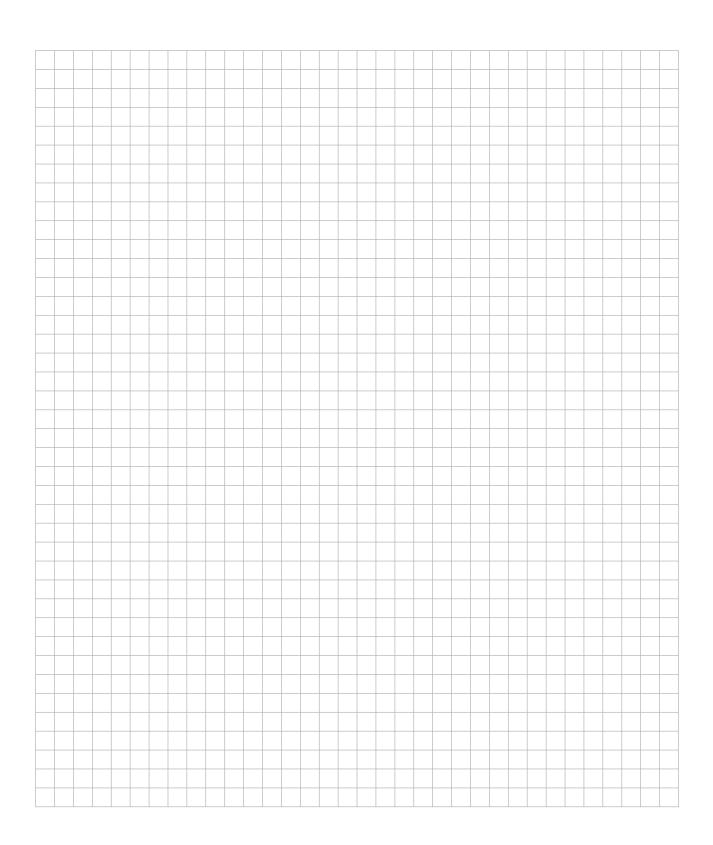
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Junior Certificate 2012 – Higher Level

Mathematics (Project Maths – Phase 2) – Paper 2

Monday 11 June Morning 9:30 to 12:00