NCCA

An Chomhairle Náisiúnta Curaclaim agus Measúnachta
National Council for Curriculum and Assessment

Project Maths
Tionscadal Mata

Pre-Leaving Certificate Examination

Mathematics (Project Maths)

Paper 2

Foundation Level (with solutions)

February 2010 2½ hours

300 marks

Examination number

Centre stamp

Running total	

For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

Grade

Instructions

There are **three** sections in this examination paper:

Section 0	Area and Volume (old syllabus)	100 marks	2 question
Section A	Concepts and Skills	100 marks	4 questions
Section B	Contexts and Applications	100 marks	2 questions

Answer **all eight** questions, as follows:

In Section 0, answer questions 1 and 2

In Section A, answer questions 3, 4, 5 and 6

In Section B, answer questions 7 and 8.

Answers should be written in the spaces provided in this booklet.
Extra paper may be used if needed.

The booklet *Formulae and Tables* may be used.
A sheet of formulae will be given to you by the superintendent.

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

Where relevant, answers should include the appropriate units of measurement, and numerical answers should be simplified and given in standard form.

Section 0	Area and Volume (old syllabus)	100 marks

Answer Question 1 and Question 2 from this section.

Question 1 **(50 marks)**

(a) The lengths of the four sides of a square add up to 60 cm.
Find the area of the square.

$$\frac{60}{4} = 15cm$$

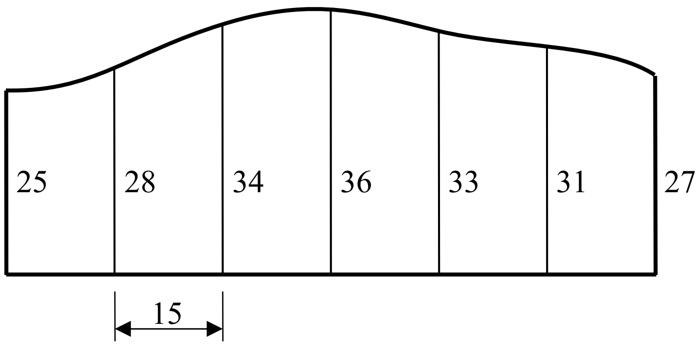
$$15^2 = 225cm^2$$

15 marks (Attempt 4) old syllabus

(b) A plot of land has one irregular side.

Offsets are measured from the irregular side to the opposite side, as shown.

The offsets are 15 metres apart.



Use Simpson's rule to estimate the area of the plot of land.

$$Area = \frac{15}{3}\left(25 + 27 + 2(34 + 33) + 4(28 + 336 + 3)\right)$$

$$Area = 5(52 + 134 + 380)$$

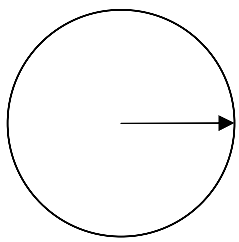
35 marks (Attempt 12) old syllabus

$$Area = 2830m^2$$

Question 2 **(50 marks)**

(a) A piece of wire is bent into the shape of a circle of length 62·8 cm.

Taking π = 3·14, find the radius of the circle.



Circumference = 2πr = 62.8

$$r = \frac{62.8}{2 \times 3.14} = 10cm$$

10 marks (Attempt 4) old syllabus

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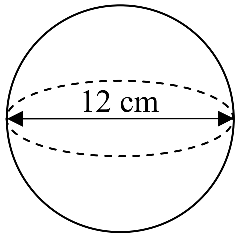
(b) A metal sphere has diameter 12 cm.



(i) Write down the radius of the sphere.

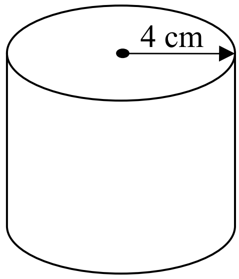
Answer: $\boxed{r = 6}$ 5 marks (Att 2) old syllabus

(ii) Find the volume of the sphere in terms of π.

$$\frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 6^3 = \frac{4}{3}\pi\, 216 = 288\pi$$

15 marks (Attempt 5) old syllabus

(c) The volume of a cylinder is 502·4 cm^3.
The radius of the cylinder is 4 cm.



Calculate h, the height of the cylinder.

Take π = 3·14.

$\pi r^2 h = 502.4$

$h = \dfrac{502.4}{3.14(4)^2}$

$h = 10$ cm

20 marks (Attempt 7) old syllabus

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Section A	Concepts and Skills	100 marks

Answer Question 3, Question 4, Question 5 and Question 6 from this section.

Question 3 **(25 marks)**

The faces of one cube are marked with the odd numbers 1, 3, 5, 7, 9 and 11.
The faces of another cube are marked with the even numbers 2, 4, 6, 8, 10 and 12.

The cubes are rolled and the scores are added.

(a) Complete the following table to show all the possible scores. 5 B (0,2,5)

		First cube					
		1	3	5	7	9	11
Second cube	2	3	*5*	*7*	*9*	*11*	*13*
	4	*5*	*7*	*9*	*11*	*13*	*15*
	6	*7*	*9*	*11*	13	*15*	*17*
	8	*9*	*11*	*13*	*15*	*17*	*19*
	10	*11*	*13*	*15*	*17*	*19*	*21*
	12	*13*	*15*	*17*	*19*	*21*	23

Use the table to answer the following questions:

(b) What is the highest possible score?

Answer: 23 5 A (0,5)

(c) What is the probability of getting the highest score?

Answer: $\frac{1}{36}$ 5 B (0,2,5)

(d) What is the probability of getting a score of 13?

Answer: $\frac{6}{36} = \frac{1}{6}$ 5 B (0,2,5)

(e) What is the probability of scoring an even number? 5 A (0,5)
Answer: 0

Question 4 **(25 marks)**

Sam wanted to see how well the people in his class could judge how long one minute is.
He asked each student to say *'Start'* and then to say *'Stop'* when they thought a minute had gone by.
Sam used a stop-watch to time each of them.
He recorded the results in the table below.

Times in seconds					
63	56	86	52	75	65
57	59	64	55	89	54
39	67	82	70	68	57
66	72	33	42	52	79
60	59				

(a) Display the data in a stem and leaf plot.

3	3 9
4	2
5	2 2 4 5 6 7 7 9 9
6	0 3 4 5 6 7 8
7	0 2 5 9
8	2 6 9

10 C (0,3,7,10)

(b) How many people did Sam time?

26

5 A (0,5)

(c) What is the median time?

$$\frac{60+63}{2} = 61.5$$

5 B (0,2,5)

(d) What percentage of the students **over-estimated** the length of a minute?

$$\frac{13}{26} \times 100 = 50\%$$

5 B (0,2,5)

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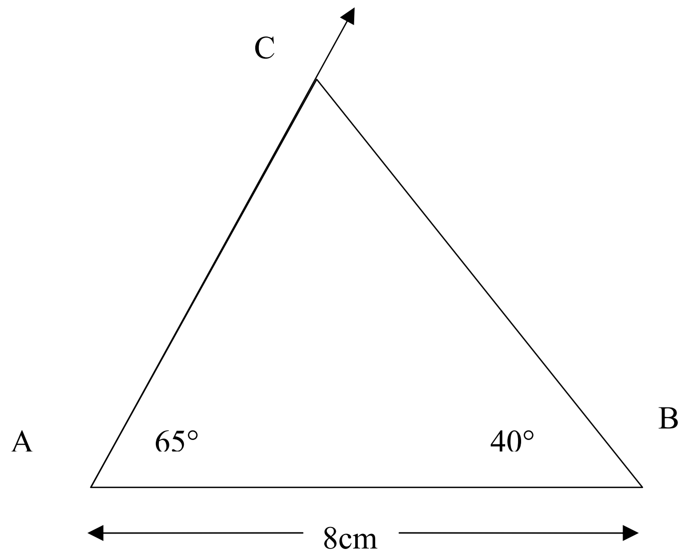
Question 5 (25 marks)

(a) Construct and label a triangle ABC with $|AB| = 8$ cm, $|\angle BAC| = 65^\circ$ and $|\angle ABC| = 40^\circ$
Show all construction lines clearly. 10 C (0,3,7,10)



(b) Use your protractor to find $|\angle ACB|$ in the triangle you have drawn.

Answer: $|\angle ACB| =$ 75° 5 A (0,5)

(c) Explain how you could use the measurement in part **(b)** to check the accuracy of your construction.

The sum of the angles in any triangle is 180° (theorem). Thus
65 + 40 + the angle at C = 180 5 B (0,2,5)

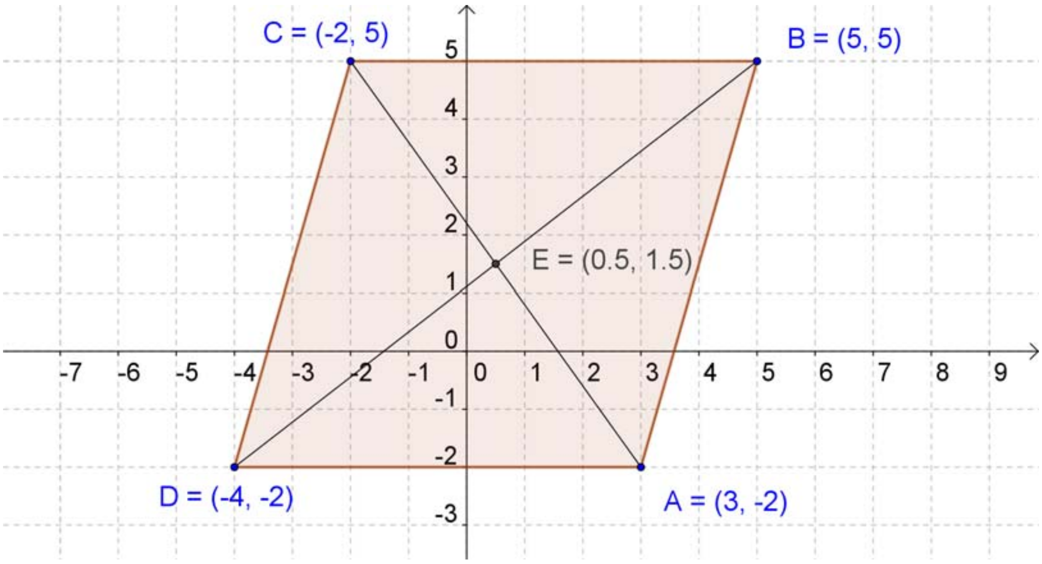
(d) Do the check that you described in part **(c)**.

180 –(65 +40) = 75.
My construction appears to be reasonably accurate. 5 B (0,2,5)

Question 6 **(25 marks)**

(a) Plot and label the points A (3,–2), B (5, 5) and C (–2, 5) on the diagram below.

5 B (0,2,5)



(b) **(i)** Plot and label the point D such that $ABCD$ is a parallelogram
(That is, the sides [DA] and [CB] are parallel, and the sides [AB] and [DC] are parallel.)

(ii) Write down the co-ordinates of D: D(-4 , -2) 5 B (0,2,5)

(c) Draw the diagonals [AC] and [BD].

5 B (0,2,5)

(d) From your diagram, write down the coordinates of E, the point of intersection of these diagonals. E(½ , 1½)

5 A (0,5)

(e) Show, using a formula, that E is the mid-point of [AC] and of [BD].

Midpoint of AC $= \left(\frac{3+(-2)}{2}, \frac{-2+5}{2}\right) = (\frac{1}{2}, 1\frac{1}{2})$

Midpoint of BD $= \left(\frac{5+(-4)}{2}, \frac{5-2}{2}\right) = (\frac{1}{2}, 1\frac{1}{2})$ 5 B (0,2,5)

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Section B	Contexts and Applications	100 marks

Answer Question 7 and Question 8 from this section.

Question 7 **Probability and Statistics** **(50 marks)**

Paul asked the 29 students in fifth year how many times they were late getting to school last term. The results are shown in the table below.

Unfortunately an ink-blot covers part of the table, so two numbers are missing.

Number of late days	0	1	2	3	4	5
Number of students	3	10	9			1

(a) For how many students is the information missing?

29-23 = 6 students

5 B (0,2,5)

(b) In the table below, fill in one possible pair of missing numbers.

Number of late days	0	1	2	3	4	5
Number of students	3	10	9	4	2	1

5 A (0,5)

(c) Using **your** completed table, write down the **mode** of the number of late days.

Answer: 1

5 A (0,5)

(d) Using **your** completed table, find the **median** number of late days.

The 15^{th} student is the 2 days absent.

5 B (0,2,5)

(e) Using **your** completed table, calculate the mean number of late days.

$$\left(\frac{(3\times 0)+(10\times 1)+(9\times 2)+(4\times 3)+(2\times 4)+(1\times 5)}{29}\right)$$

15 C (0,5,10,15)

$$\left(\frac{(0+10+18+12+8+5)}{29}\right)=\frac{53}{29}=1.83$$

1.83 days (correct to two decimal places was not asked)

(f) Suppose that you filled in a different two numbers in the table in part **(b)**.
Say whether the **mode**, the **median** and the **mean**, would change.
Give a reason for each answer. **15 C (0,5,10,15)**

	Tick (✓)		Reason
	Will change	Will not change	
Mode		√	10 must remain the largest frequency.
Median		√	The 15th person remains in the 2 days absent column.
Mean	√		The number of late days will vary with different 'missing numbers' inserted into the 3 and 4 column. If the total changes then the mean will change.

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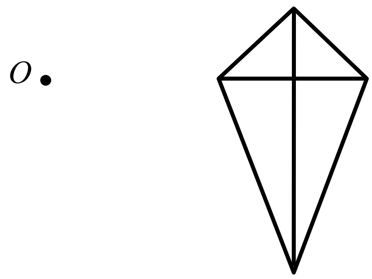
(a) Ciara has a small drawing of the outline of a kite.
She plans to build the kite.
She wants to enlarge the drawing so that the new area is **four times** the old area.

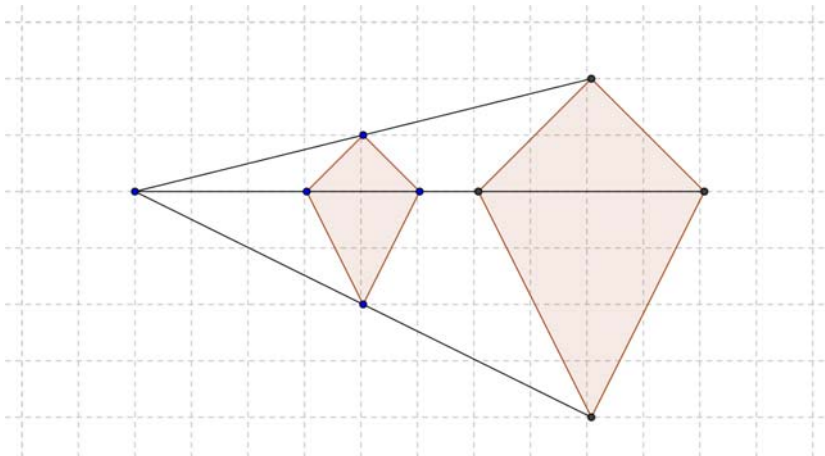
(i) What scale factor should she use?

$\sqrt{4} = 2$, the scale factor $k = 2$ 5 B (0,2,5)

(ii) Using the point O as the centre of enlargement below, draw the image of the kite, using the scale factor from part **(i)**.

20 C (0,7,13,20)





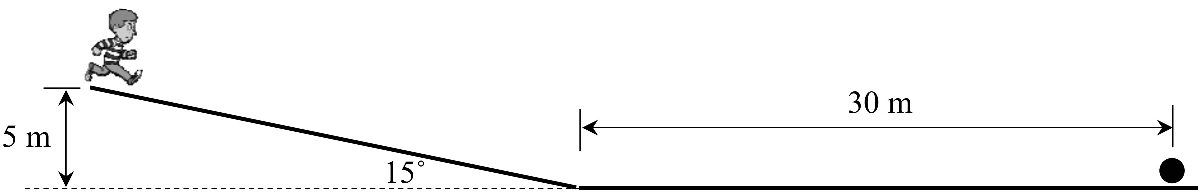
(b) Morgan is playing football for the school team.

The football rolls over the edge of a bank that is 5 metres high and sloped at an angle of 15° to the horizontal, as shown below.

The ball rolls on past the end of the bank and stops 30 metres farther on.

Morgan runs after the ball and brings it back.

✪



(i) Find the length of the sloped section, correct to the nearest metre.

$\text{Sin } 15° = \frac{5}{l}$ $\qquad l = \frac{5}{Sin 15°}$ $\qquad l = 19.318$

$l = 19$ m (to the nearest m) 10 C ✪ (0,3,7,10)

(ii) Find the total distance that the ball rolled.

$19 + 30 = 49$ m 5 B✪ (0,2,5)

(iii) Morgan took $1\frac{1}{2}$ minutes to get the ball and come back.
Find his average speed in metres per second, correct to one decimal place.

$1\frac{1}{2} = 90$ sec

$2 \times 49 = 98$ m $\qquad \frac{98}{90} = 1.0888 = 1.1$ m/s 10 C ✪ (0,3,7,10)

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