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Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

FRIDAY 14 JANUARY

10.45 am – 12.00 pm

GMN62

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
Total Marks	

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all fourteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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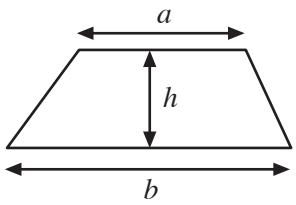
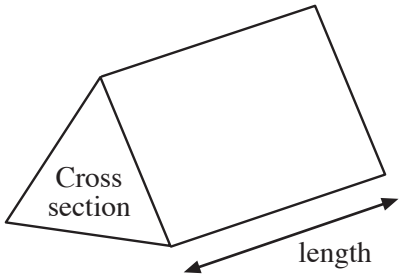
Formula Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross section × length

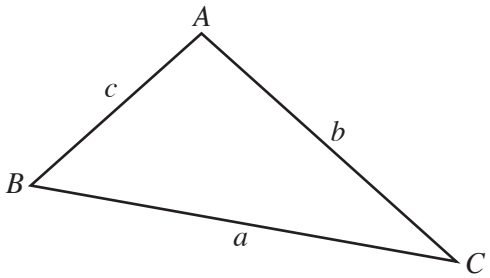


In any triangle ABC

Area of triangle $= \frac{1}{2}ab\sin C$

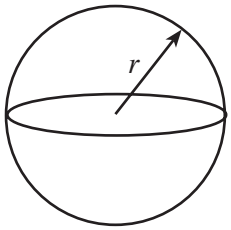
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



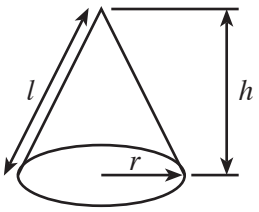
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



Quadratic equation:

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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Marks	Remark

1 1 euro = 135.457 yen and £1 = 1.09608 euro.

A motor car costs £12 000 in the UK.

The same car costs 1.5 million yen in Japan.

In which country is the car cheaper and by how much?

Give your answer to the nearest £.

Answer _____ by £ _____ [4]

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2 Which of "always even", "always odd", "could be odd or even", describes the number $5n + 2$? Explain your answer.

Answer _____ because _____

_____ [2]

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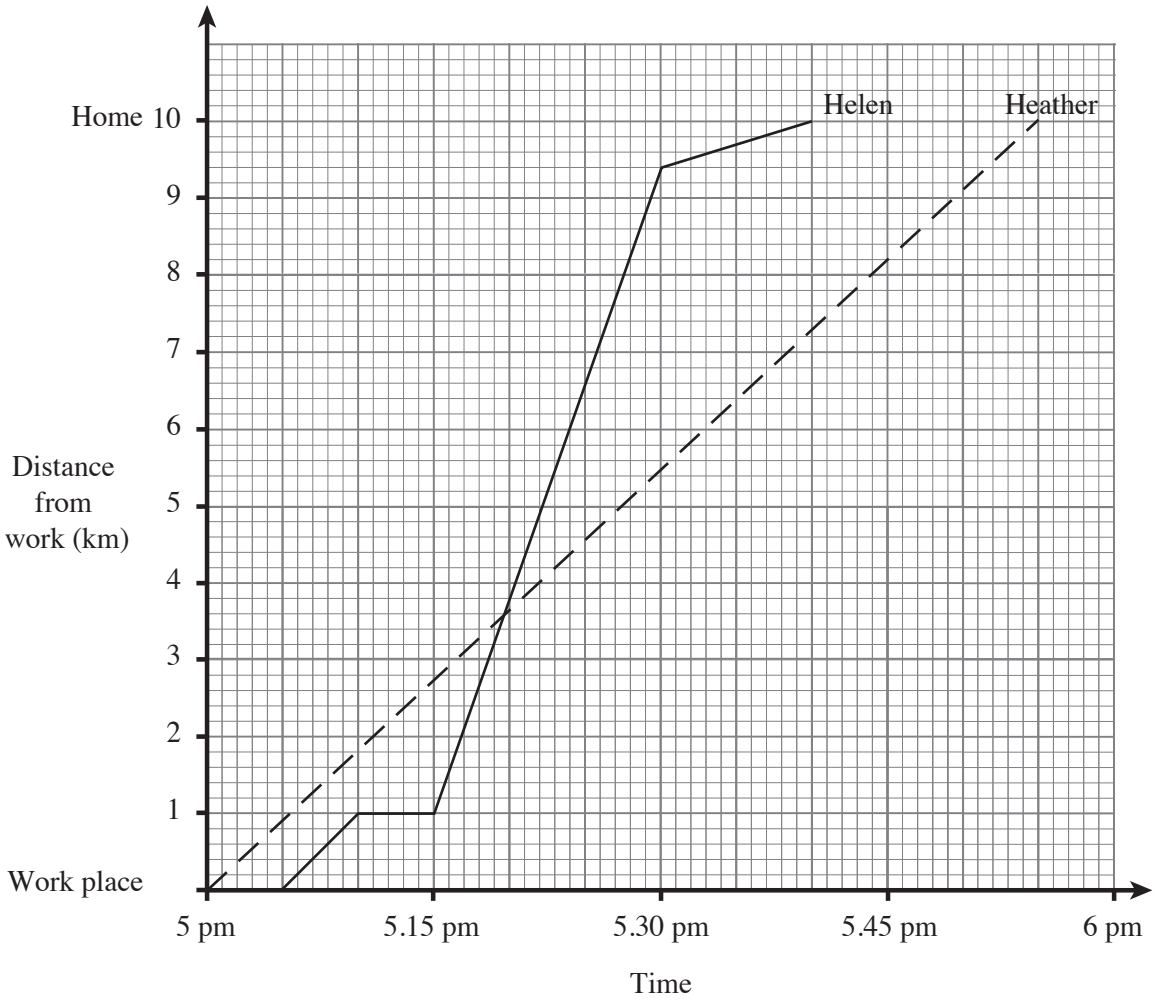
3 The distance/time graph shows Helen's journey home from work.

Part of the journey is by bus and the rest on foot.



(a) Between which times does Helen walk faster on average.

Answer _____ [1]

(b) How far does Helen have to walk in total on her trip home?

Answer _____ km [2]

(c) What is the average speed of the bus?

Answer _____ km/h [2]

(d) Helen and her sister Heather live at home and work in the same building.
The graph also shows Heather's journey by cycle.
How far apart are Helen and Heather at 5.25 pm?

Answer _____ km [2]

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4 The table below shows some of the probabilities of getting a colour on a spinner with four colours.

Colour	Red	Blue	Green	Black
Probability	0.3	0.5	0.14	

Calculate the probability of getting

(a) Black,

Answer _____ [2]

(b) Green or Blue.

Answer _____ [2]

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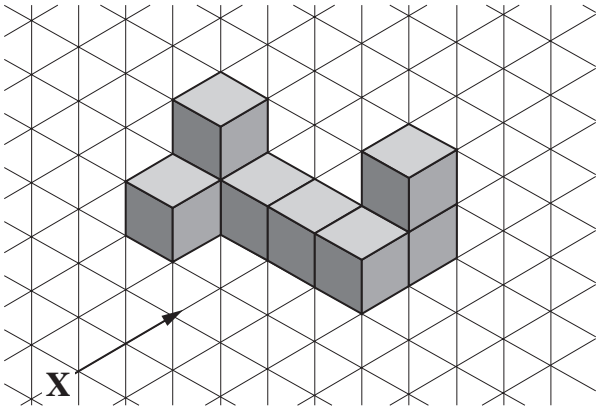
5 **(a)** The diagram represents a solid made from 1 cm cubes.



On the squared paper below, draw the front elevation of the solid viewed from **X**.

[2]

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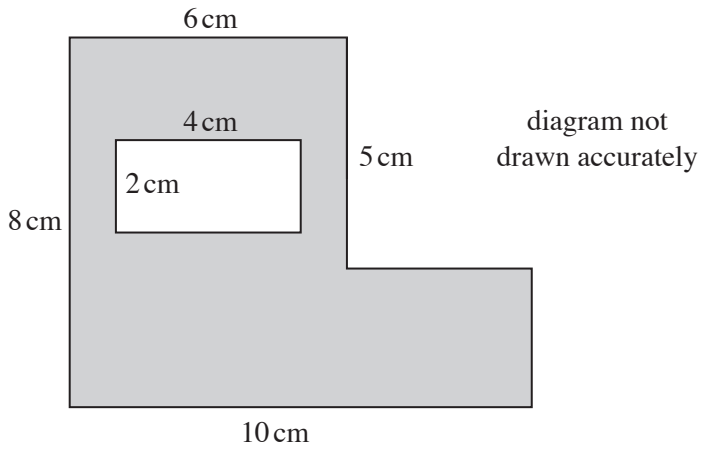
(b) An L-shaped piece of cardboard has a rectangular piece removed from it as shown in the diagram below.



(i) Calculate the area of the remaining piece of cardboard.

Answer _____ cm^2 [2]

(ii) **All** the edges of the remaining piece are to be trimmed with ribbon. What length of ribbon is needed?

Answer _____ cm [2]

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6 **(a)** Using ruler and compasses only, construct the perpendicular bisector of the line PQ.

Show your construction lines.

[2]

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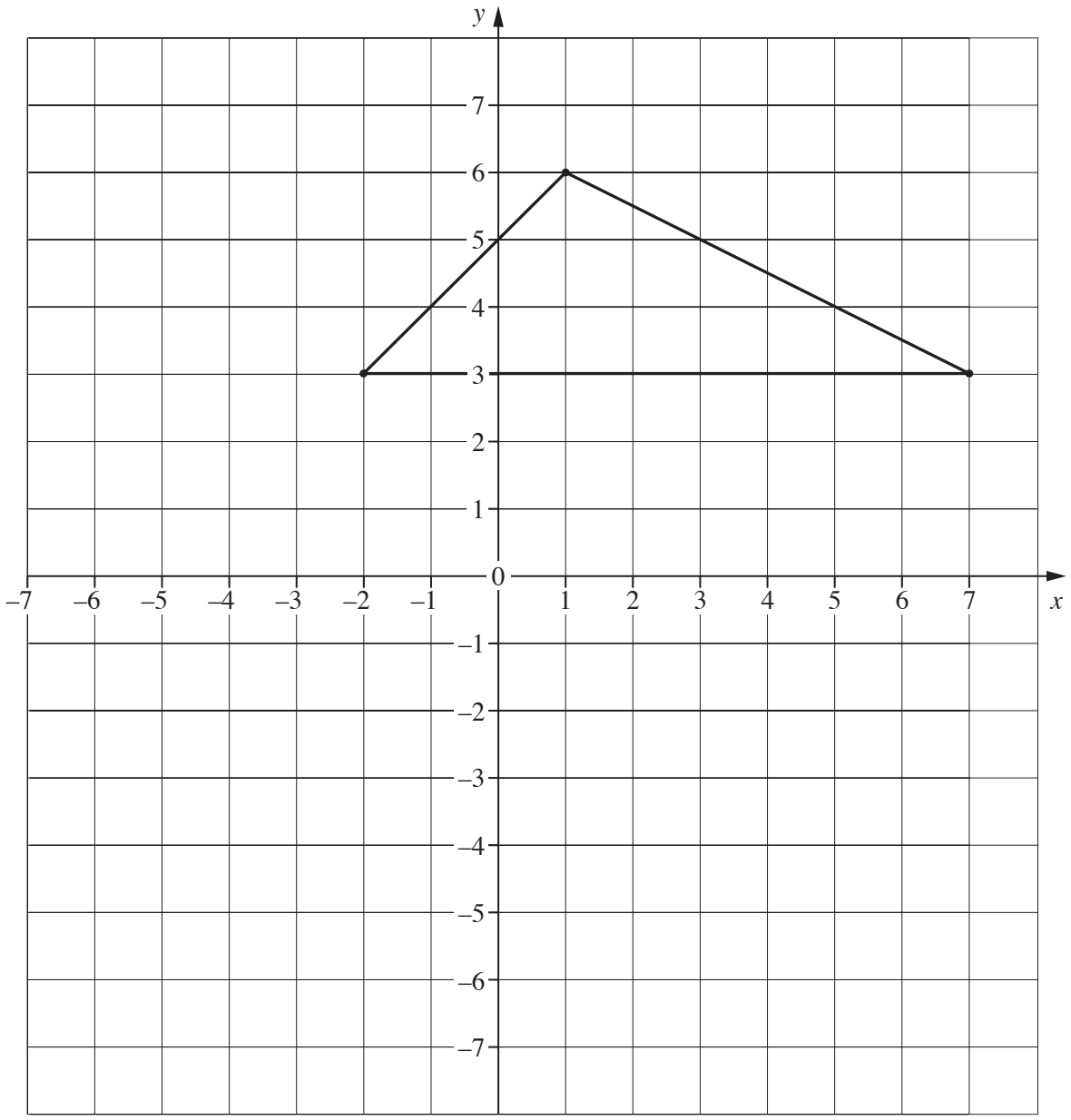
(b) Enlarge the triangle by scale factor –1, centre of enlargement (1, 0).



[3]

7 The angles in a triangle are in the ratio of 4 : 5 : 6

Work out the sum of the two smaller angles.

Answer _____ ° [3]

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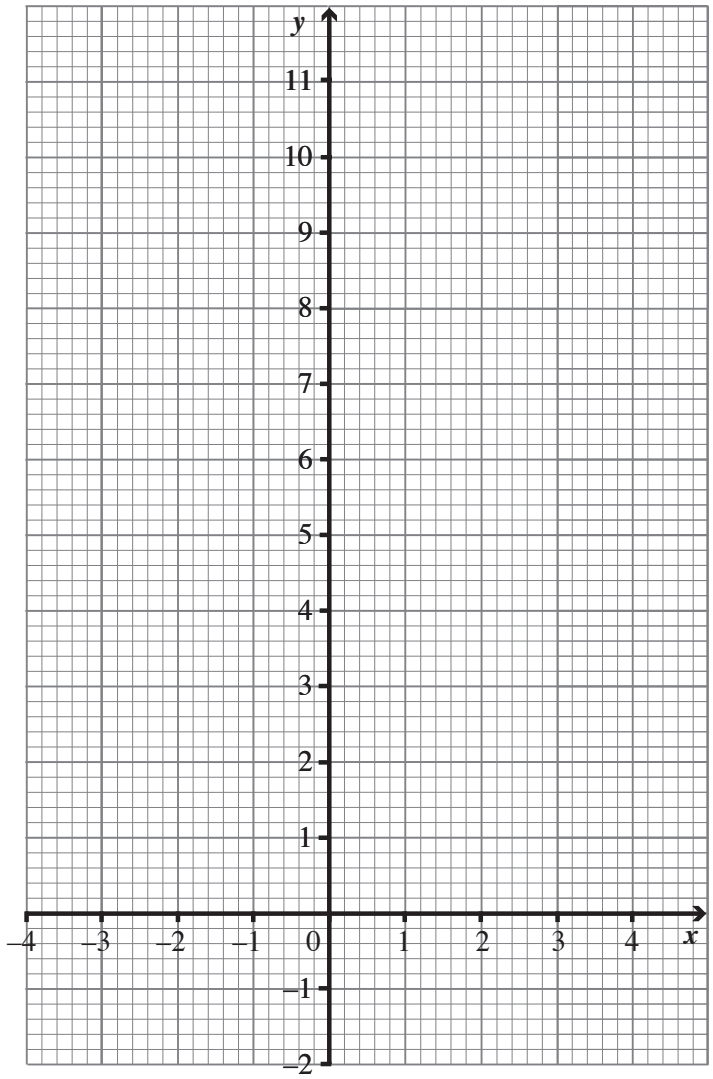
8 **(a)** Complete the table for

$$y = 8 - 3x - x^2$$

x	–4	–3	–2	–1	0	1	2
y	4	8		10	8		–2

[2]

(b) Draw the graph for $y = 8 - 3x - x^2$



[2]

(c) Use your graph to find the solutions to the equation

$7 = 8 - 3x - x^2$

Answer $x =$ _____ [2]

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9 Calculate the **curved surface area** of a cylinder of length 12 cm and diameter 8 cm.

Give your answer to an appropriate degree of accuracy.

Answer _____ cm^2 [3]

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10 The population of Northern Ireland is 1.775×10^6

The number of people who live in Belfast is 2.675×10^5

What percentage of the population of Northern Ireland live in Belfast?

Answer _____ % [2]

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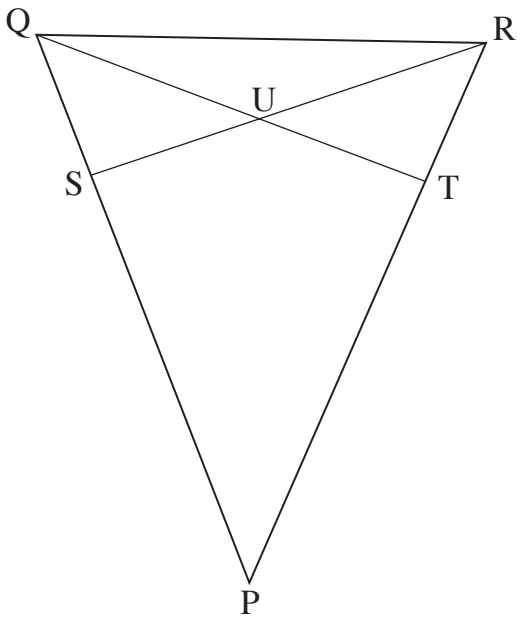
11 PQR is an isosceles triangle in which PQ = PR.

S and T are points on PQ and PR such that PS = PT.

U is the point of intersection of TQ and RS.



By first proving that PQT and PRS are congruent, prove that triangle QUR is isosceles.

Show all your working clearly.

[4]

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12 Change the recurring decimal $0.8\dot{3}$ to a fraction.

You must show all your working.

Answer _____ [2]

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Marks	Remark

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13 The probability that Mark passes his Maths exam is 0.5 and the probability that Julie passes her Maths exam is 0.8

If Mark passes Maths then the probability that he passes Physics is 0.7

If he fails Maths then the probability of passing Physics is 0.2

If Julie passes Maths then she has a probability of 0.9 of passing Physics.

If she fails Maths then she has a probability of 0.3 of passing Physics.

Find

(a) the probability that Mark passes both Maths and Physics,

Answer _____ [1]

(b) the probability that they both fail both exams.

Answer _____ [3]

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14 The numerator of a fraction is two less than the denominator.

When 1 is added to the numerator and 15 to the denominator, the value of the new fraction is now one third of the original fraction.

Let the denominator of the first fraction be x

(a) Show that x satisfies the quadratic equation

$x^2 - 8x + 15 = 0$

[2]

(b) Hence find the possible values of the original fraction.

Answer _____ , _____ [2]

THIS IS THE END OF THE QUESTION PAPER

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