CCEA GCSE MATHEMATICS (MODULAR)

MATHS



EXAM QUESTION PACK

MODULE N6 PAPER 2 (CALCULATOR) HIGHER TIER GMN62 PAPERS

STEMUP

These questions belong to CCEA, not to us.

The examination questions, mark schemes and examiner reports in this pack were written and published by CCEA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with CCEA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. CCEA has not endorsed, approved or been involved in the production of it. CCEA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

CCEA publishes its past papers, mark schemes and examiner reports free of charge. Always check the current specification at ccea.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics



Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 16 JANUARY
10.45 am–12.00 pm

GMN62

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 fifteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

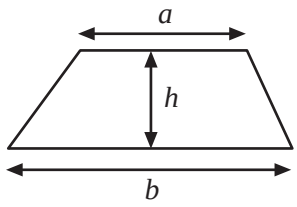
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
Total Marks	

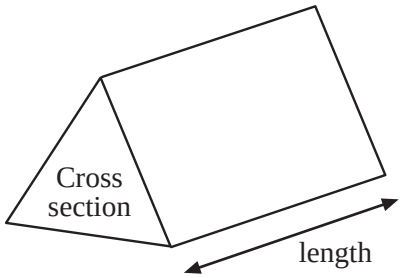
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

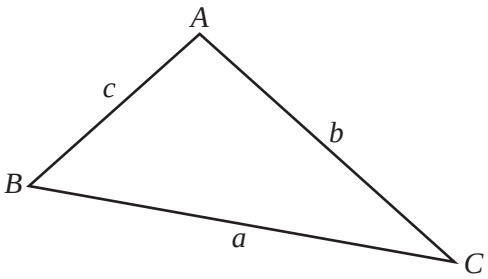


In any triangle *ABC*

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

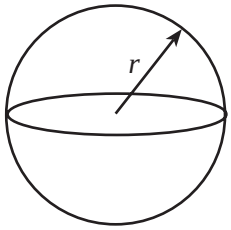
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



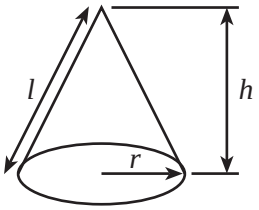
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

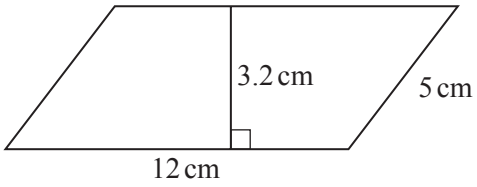
BLANK PAGE

(Questions start overleaf)

STEMUP.CO.UK

Examiner Only	
Marks	Remark

1 **(a)** Calculate the area of the parallelogram.



Answer _____ cm^2 [2]

(b) The area of the trapezium is 40.5 cm^2.

Find the height of the trapezium h.

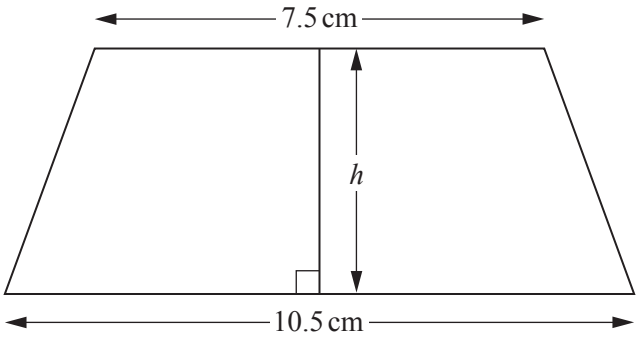
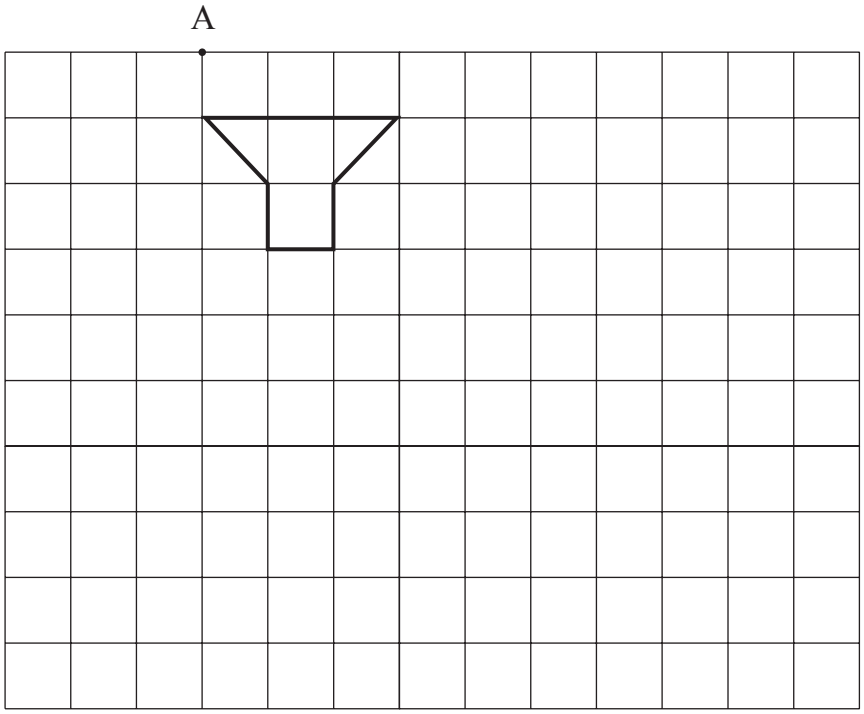


Diagram not drawn accurately

Answer _____ cm [3]

STEMUP.CO.UK

(c) Draw an enlargement of the shape below using a scale factor of 3 and centre A.



[3]

Examiner Only

Marks	Remark

2 For a credit card balance of £1 758, John must pay 3% or £5, whichever is the larger.

How much must he pay?

Answer £ _____ [2]

STEMUP.CO.UK

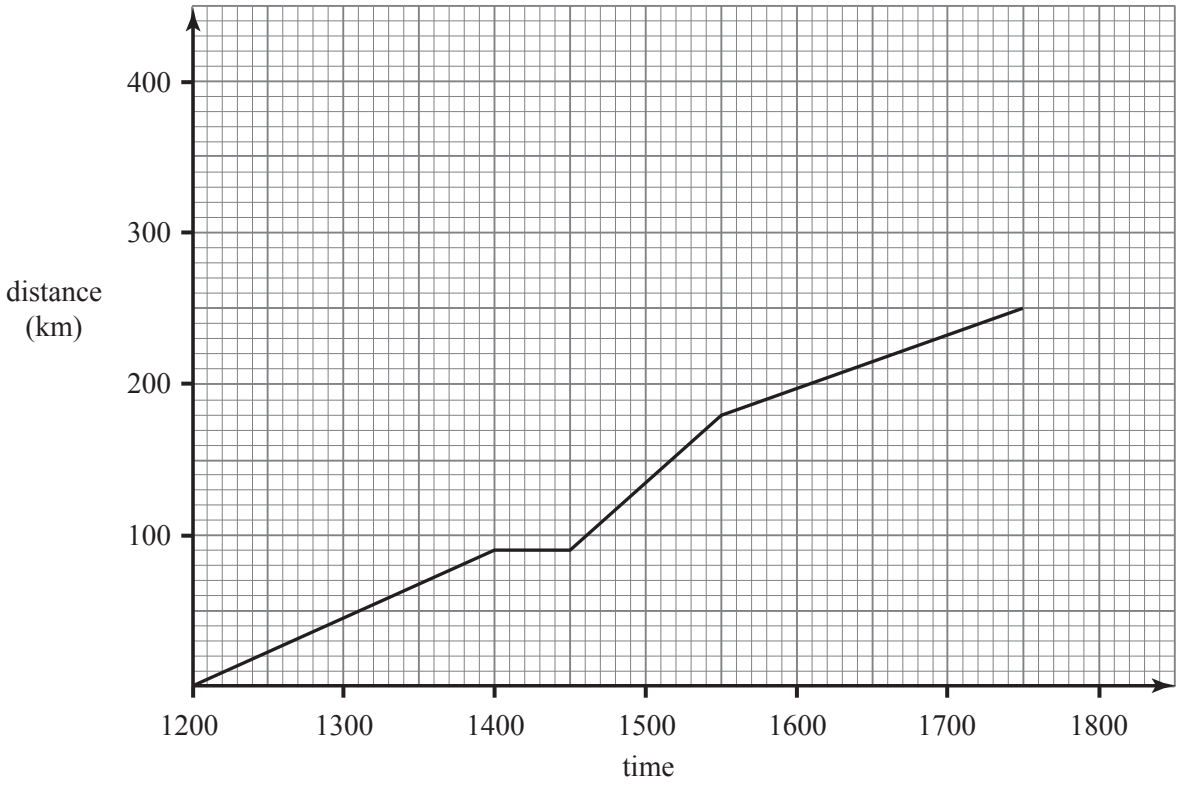
Examiner Only	
Marks	Remark

3 **(a)** Rewrite $5 + y = 11 - x$ to make x the subject.

Answer $x =$ _____ [2]

(b)

Truck driver's distance–time graph



(i) What was the average speed over the first two hours of the journey?

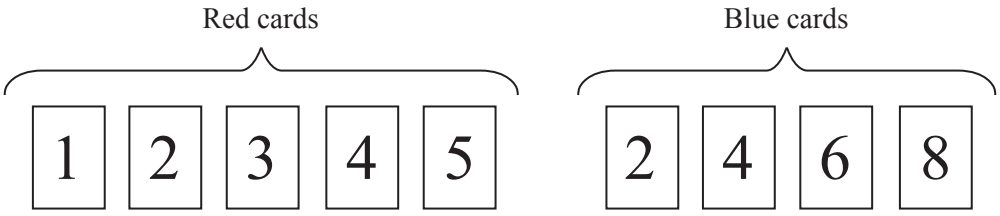
Answer _____ km/hr [2]

(ii) Between which times was the truck driver travelling at the greatest average speed?

Answer _____ to _____ [1]

STEMUP.CO.UK

4



There are two sets of cards on a table.

Both sets of cards are mixed together and one card is then taken at random.

What is the probability that this card will be a blue card or a card numbered 4 or both?

Answer _____ [2]

5 Which of "always even", "always odd", "could be odd or even" describes the number $3(5n + 7)$? (n is an integer.)

Explain your answer.

Answer _____ because _____

_____ [2]

Examiner Only

Marks	Remark

STEMUP.CO.UK

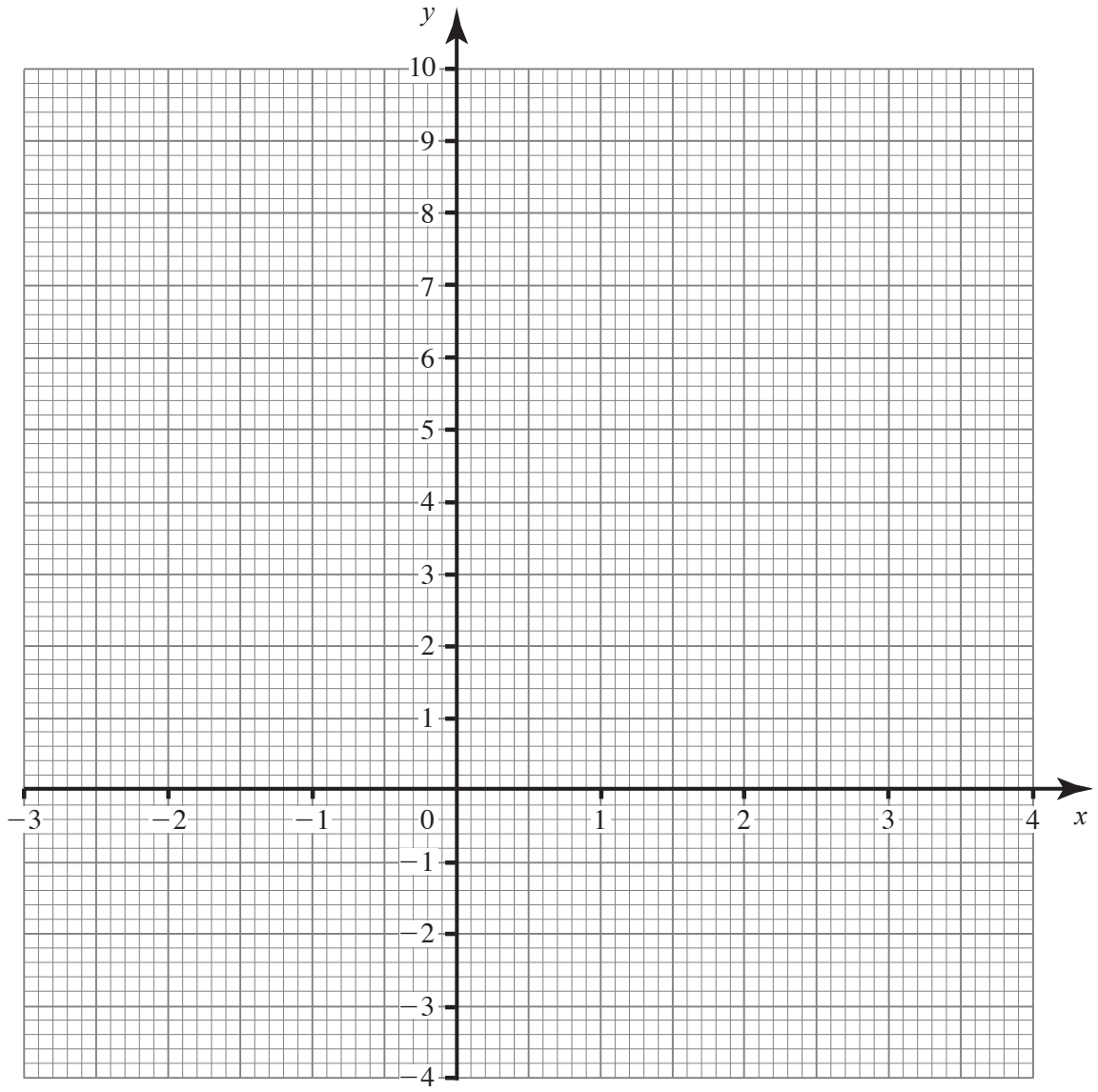
Examiner Only	
Marks	Remark

6 **(a)** Complete the table for $y = 2x^2 - 2x - 3$

x	-2	-1	0	1	2	3
y		1	-3	-3		9

[2]

(b) Draw the graph of $y = 2x^2 - 2x - 3$ for $x = -2$ to $x = 3$ on the grid.



[2]

(c) Draw the line $y = 3$ and find the x values of the points of intersection of the curve and the line.

Answer _____ [2]

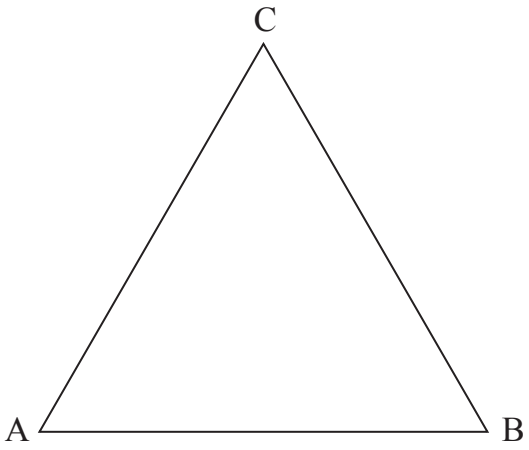
STEMUP.CO.UK

(d) Write down the equation in x with solutions as found in **(c)**.

Answer _____ [1]

Examiner Only	
Marks	Remark

7 ABC is a triangle.



(a) Use a ruler and compasses to construct the bisector of the angle ABC. [2]

(b) Shade the region inside the triangle which is more than 3 cm from B and closer to the side BC than to the side AB. [2]

8 Rebecca has a fair six-sided dice.

She throws it twice and adds both scores together.

(a) List the ways Rebecca can get a total of 7

Answer _____ [1]

(b) What is the probability that her total score will be 12?

Answer _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

9 Peter and Paul share a sum of money in the ratio 5 : 4

Peter gets £16 more than Paul.

How much money is shared between the boys?

Answer £ _____ [3]

10 A grain of sand weighs 0.0005 g.

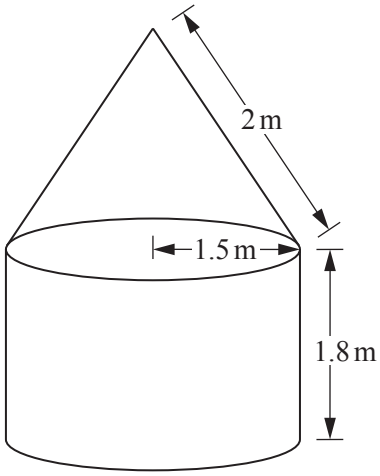
How many grains of sand would there be in a bag containing 7.2 kg of sand?

Give your answer in standard form.

Answer _____ [2]

STEMUP.CO.UK

11



A canvas tent has a cylindrical wall 1.8 m high and base radius 1.5 m.

The roof is cone shaped with a slant height 2 m.

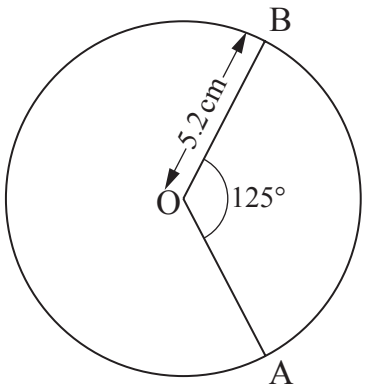
Calculate the total area of canvas forming the wall and the roof of the tent.

Give your answer correct to 3 significant figures.

Answer _____ m^2 [4]

Examiner Only	
Marks	Remark

12



In the circle centre O, the radius is 5.2 cm. The marked angle AOB is 125°.

Calculate the length of the **major arc** AB.

Give your answer to an appropriate degree of accuracy.

Answer _____ cm [4]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

13 Rationalise the denominator of $\frac{5}{\sqrt{10}}$ and simplify your answer.

Answer _____ [2]

14 A bag contains 7 blue stones and 2 green stones.

Zara takes 2 stones at random, without replacement, from the bag.

Then Norah takes 2 stones at random, without replacement, from the bag.

What is the probability that Zara and Norah both have one stone of each colour?

Answer _____ [4]

STEMUP.CO.UK

15 A solid cone of radius r and perpendicular height h has the same **total** surface area as a sphere of radius r. Find an expression for h in terms of r.

Examiner Only	
Marks	Remark

Answer $h =$ _____ [4]

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

112526

Rewarding Learning

General Certificate of Secondary Education
January 2012

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 16 JANUARY
10.45 am – 12.00 pm

MARK SCHEME

STEMUP.CO.UK

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right-hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

STEMUP.CO.UK

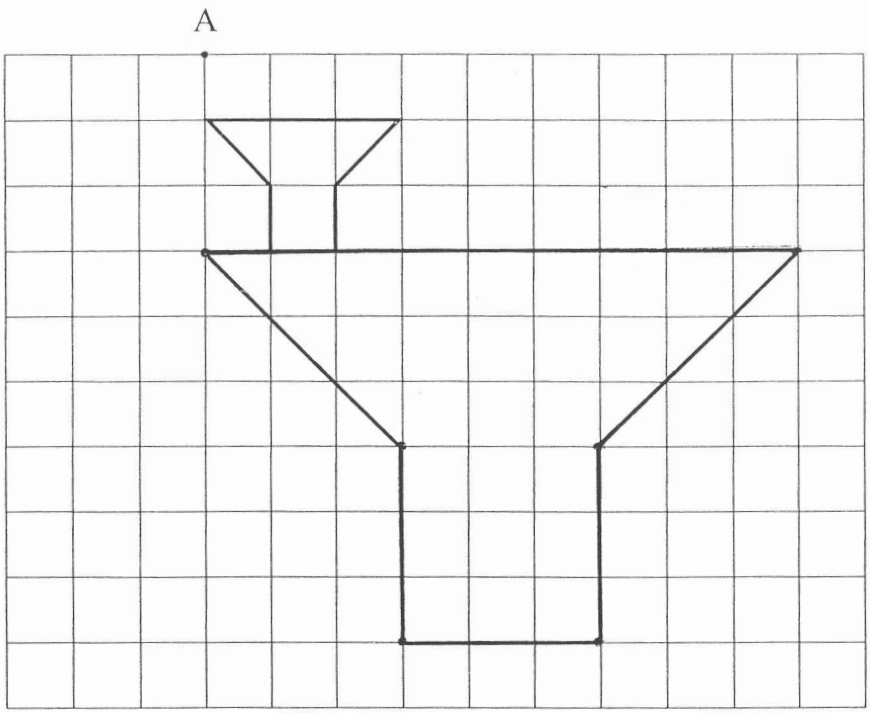
				AVAILABLE MARKS
1	**(a)**	$12 \times 3.2 = 38.4$	M1, A1	
	(b)	$\frac{1}{2}(10.5 + 7.5) \times h = 40.5$	MA1	
		$9 \times h = 40.5$	MA1	
		$h = 4.5$	A1	
	(c)	correct enlargement	A3	8
2		3% of 1758 = 52.74	M1, A1	2
3	**(a)**	$x = 6 - y$	M1, A1	
	(b)	**(i)** $90 \div 2 = 45$	M1, A1	
		(ii) 1430 to 1530	A1	5
4		Identifying 5 cards	MA1	
		$\frac{5}{9}$	A1	2
5		could be odd or even	A1	
		suitable examples e.g. $n = 1 \rightarrow 36$, $n = 2 \rightarrow 51$	A1	2
6	**(a)**	9, 1	A2	
	(b)	correct points	A1	
		smooth curve	A1	
	(c)	–1.3 and 2.3 (follow candidate's graph)	A2	
	(d)	$2x^2 - 2x - 6 = 0$ or equivalent	A1	7
7	**(a)**	Angle bisector of ABC drawn	MA2	
	(b)	Arc drawn 3 cm from B	A1	
		Correct shading	A1	4
8	**(a)**	(1, 6), (6, 1), (2, 5), (5, 2) (3, 4) (4, 3)	A1	
	(b)	$\frac{1}{6} \times \frac{1}{6}$	MA1	
		$\frac{1}{36}$	A1	3

STEMUP.CO.UK

					AVAILABLE MARKS
9	1 part represents 16 Peter = 80 Paul = 64 Total = 144	MA1 MA1 A1	**or** 1 part represents 16 9 parts = 9 × 16 = 144	MA1 M1, A1	3
10	$\frac{7.2\times1000}{0.0005}$ **or** 14 400 000 1.44×10^{7}			MA1 A1	2
11	Total surface area $= \pi\times1.5\times2+2\times\pi\times1.5\times1.8$ $= 26.389\ldots$ $= 26.4$			MA2 A1 A1	4
12	Arc Length $= 2\times\pi\times5.2\times\frac{235}{360}$ $= 21.3279\ldots$ $= 21$ (or 20)			MA2 A1 A1 acc.	4
13	$\frac{5\sqrt{10}}{10}$ $\frac{\sqrt{10}}{2}$			M1 A1	2
14	GBGB or GBBG or BGBG or BGGB $\frac{2}{9}\times\frac{7}{8}\times\frac{1}{7}\times1$ $\frac{1}{36}\times4$ $\frac{1}{9}$			MA1 MA1 MA1 A1	4
15	$\pi r\sqrt{(h^2+r^2)}+\pi r^2=4\pi r^2$ $\sqrt{(h^2+r^2)}=3r$ $h^2+r^2=9r^2$ $h^2=8r^2$ $h=\sqrt{8r^2}$ or $\sqrt{8}\,r$ or $2\sqrt{2}\,r$			M1, A1 A1 A1	4
				Total	**56**

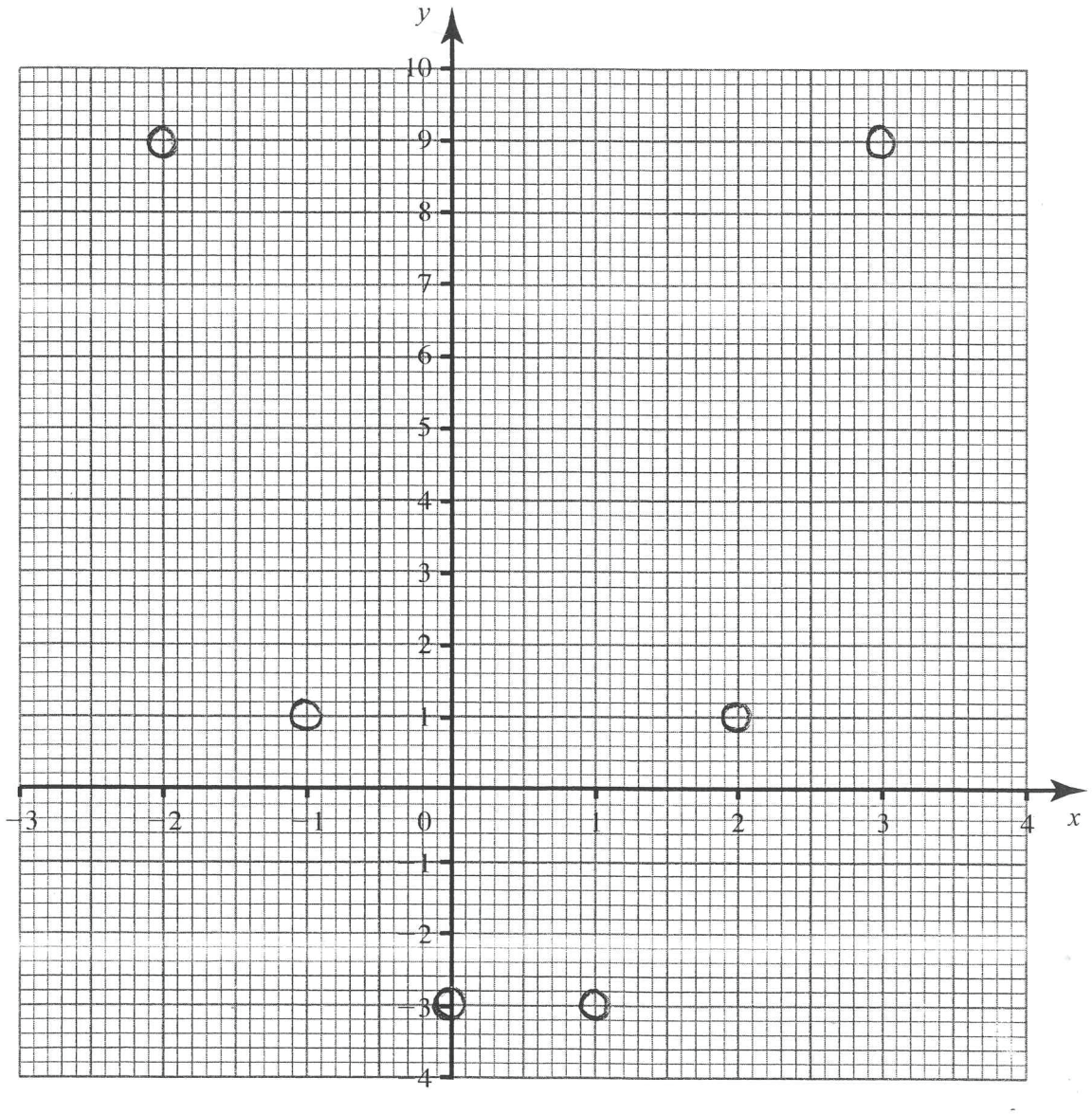
STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2012
MODULE N6–2
OVERLAY QUESTION 1 C



STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2012
MODULE N6–2
OVERLAY QUESTION 6



STEMUP.CO.UK

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier



GMN62

[GMN62]

MONDAY 6 JUNE

3.00 pm – 4.15 pm

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
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 fifteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

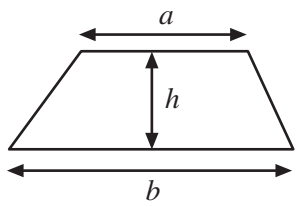
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

Examiner Number

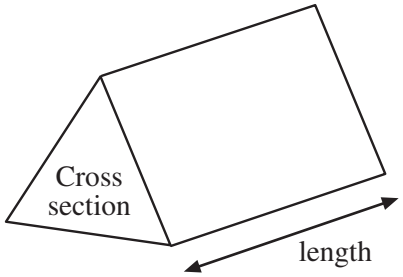
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

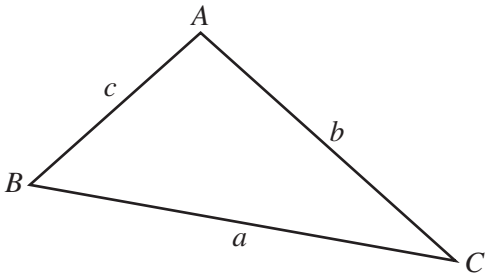


In any triangle ABC

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

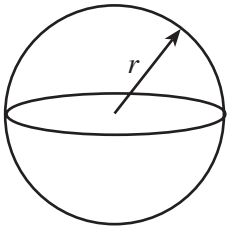
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



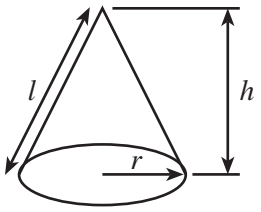
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

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

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

STEMUP.CO.UK

1 A hotel provides lunch for 120 people.
They make 288 sandwiches and 192 tray bakes.

How many sandwiches and tray bakes would they need to provide a similar lunch for 150 people?

Answer _____ sandwiches

_____ tray bakes [2]

Examiner Only	
Marks	Remark
Total Question 1	

[Turn over

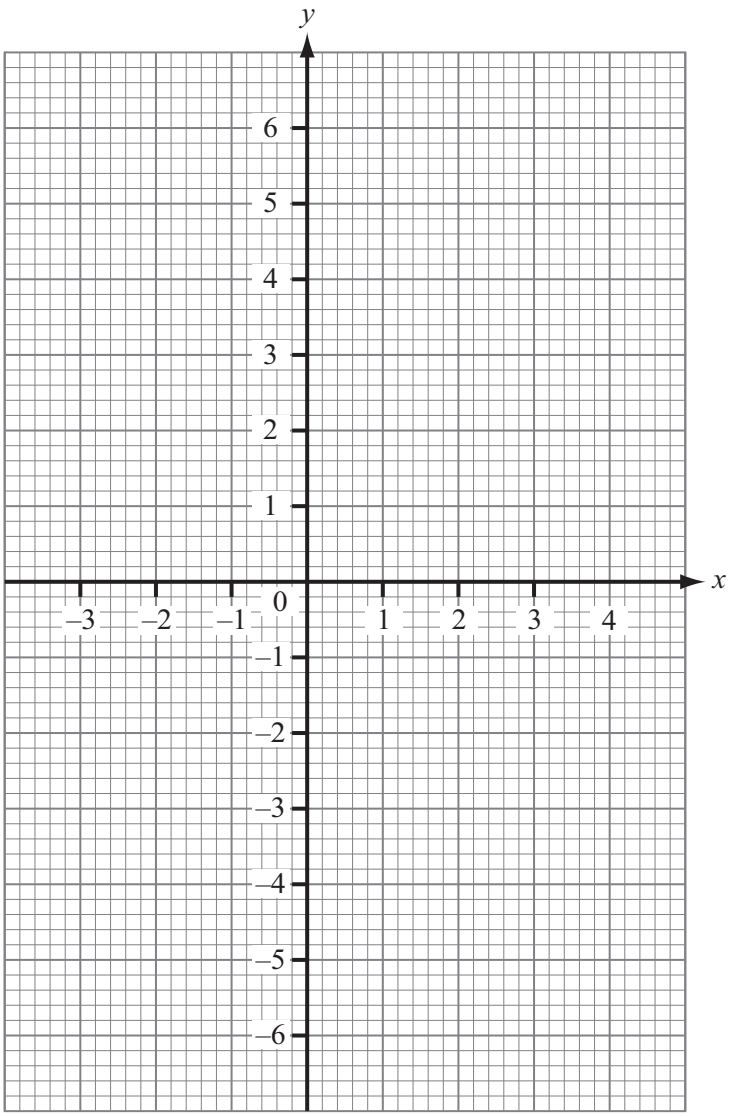
STEMUP.CO.UK

2 **(a)** Complete the table below for the curve $y = x^2 + x$

x	-3	-2	-1	0	1	2
y	6		0	0	2	6

[1]

(b) Hence draw the graph of $y = x^2 + x$ on the graph paper. [2]



Examiner Only	
Marks	Remark
Total Question 2	

3 The table below shows the amounts of money pupils spent in the school tuck shop one Monday. The probabilities for some of the amounts are given.

Amount, m (£)	$0 < m \leq 1$	$1 < m \leq 2$	$2 < m \leq 3$	$3 < m \leq 4$	$4 < m \leq 5$	$m > 5$
Probability	0.25	0.35		0.15	0.05	0

(a) What is the missing probability?

Answer _____ [2]

(b) What is the probability that a pupil spent more than £3?

Answer _____ [2]

(c) The following Monday, 200 pupils spent money in the tuck shop. How many would you expect to have spent more than £4?

Answer _____ [2]

(d) What is the probability that a pupil spent more than £4 or not more than £1?

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 3	

4 To calculate the amount of income tax on his earnings, Tom used the following information.

Total earnings = £24,265
Tax free personal allowance = £5,895
10% tax on first £3,200 of taxable income
28% tax on taxable income from £3,201 to £42,600

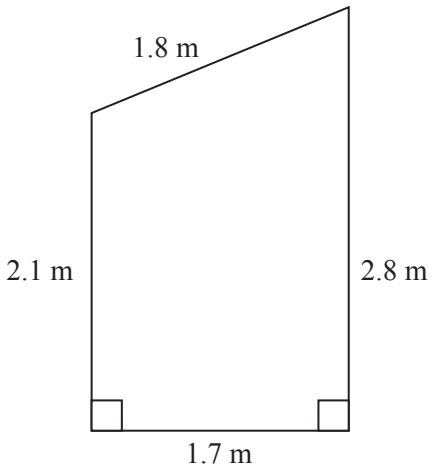
What amount of income tax should he have calculated?

Answer £ _____ [4]

Examiner Only	
Marks	Remark
Total Question 4	

STEMUP.CO.UK

5 (a)



The diagram represents the side view of a garden shed with a sloping roof.
Calculate the area of the side view of the shed.
Give your answer to an appropriate degree of accuracy.

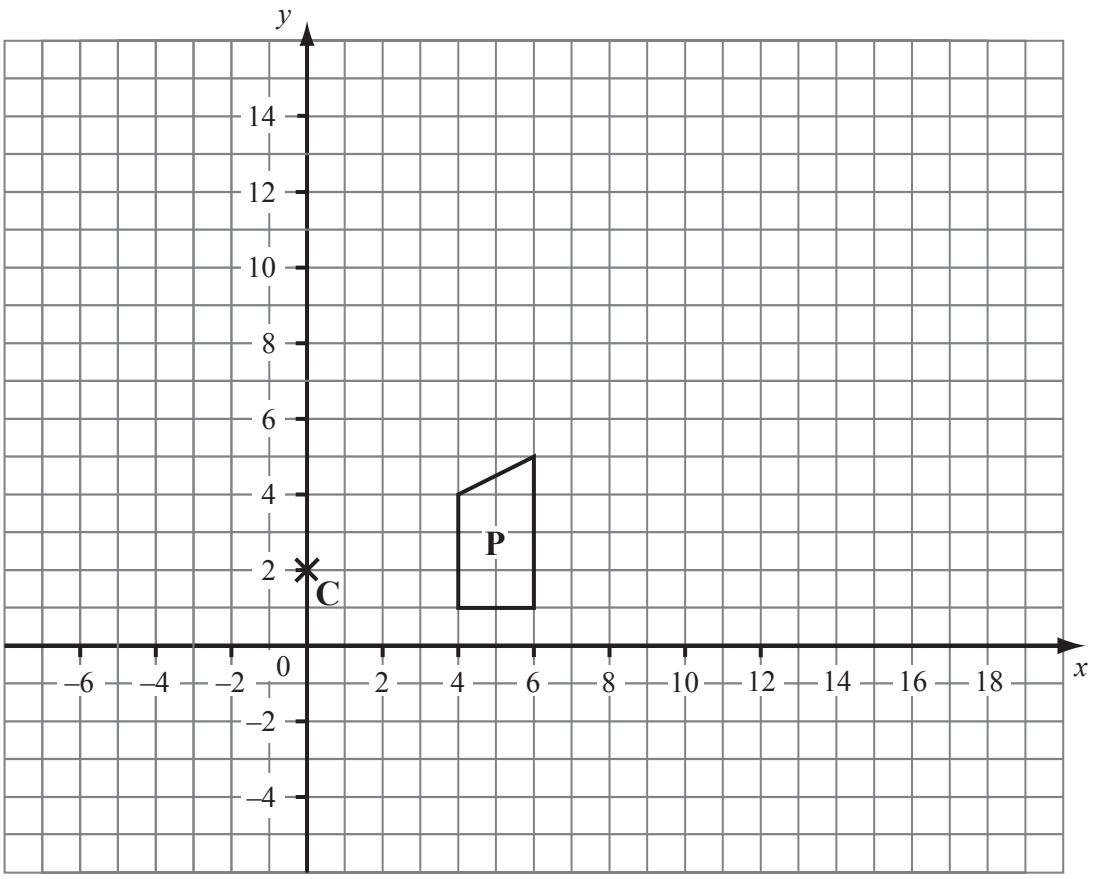
Answer _____ m^2 [3]

(b) The base for a statue is a prism with a cross-section whose area is 1.23 m^2.
The base is 1 metre in height and weighs 2268 kg.
Calculate the density of the prism.

Answer _____ kg/m^3 [3]

Examiner Only	
Marks	Remark
Total Question 5	

6



Shape P is shown on the grid.

(a) Draw the image of shape P under a translation $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$. [2]

(b) Enlarge shape P by a scale factor of 3 using the point C as the centre of enlargement. [3]

Examiner Only	
Marks	Remark
Total Question 6	

STEMUP.CO.UK

7 Solve $-7 < 3n - 1 \leq 8$ **where *n* is an integer**.

Examiner Only | Marks | Remark

Answer _____ [3]

Total Question 7

8 110 pupils audition for the school musical. 80 are girls.
The probability that a girl succeeds in getting a part is 0.45 and the probability that a boy succeeds is 0.7

How many pupils are in the school musical?

Answer _____ [4]

Total Question 8

9 Find, in standard form, the value of

$(3.58 \times 10^{-2}) \times (7.82 \times 10^{-3})$

Answer _____ [2]

Total Question 9

10 **(a)** Prove that $(n + 2)(n - 3) \equiv (n - 2)(n + 1) - 4$

[2]

(b) Rearrange the formula $W = \frac{\sqrt{X}}{Y}$ to make X the subject.

Answer X = _____ [2]

Total Question 10

11 Find the radius of a sphere which has a surface area of 1000 cm^2.

Answer _____ cm [2]

Total Question 11

Examiner Only

Marks | Remark

STEMUP.CO.UK

12 Simplify $\sqrt{x} \times \sqrt{x^3}$

Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 12	

13 A magnet is at a distance, d cm from a metal object.
The force, F newtons, exerted by the magnet on the metal object is inversely proportional to the square of the distance d.
When $d = 5$, $F = 8$

(a) Express F in terms of d.

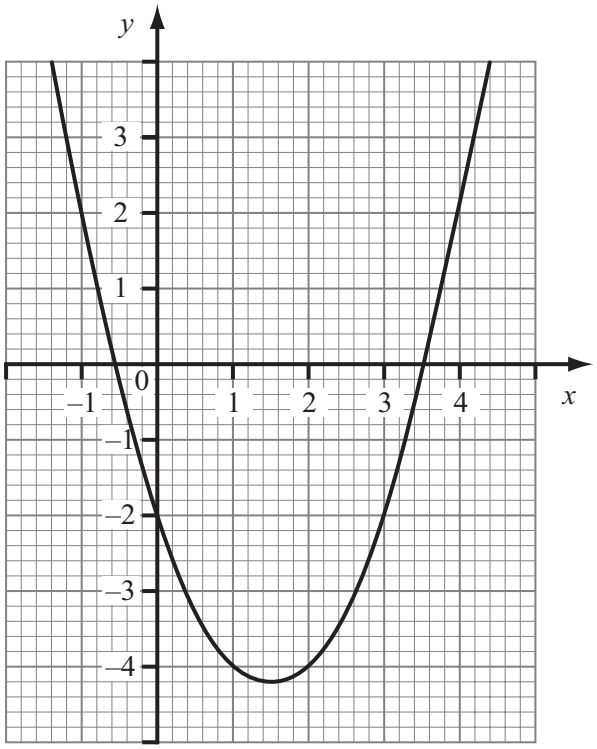
Answer _____ [3]

(b) Explain what happens to F when d is doubled.

Answer _____ [1]

Total Question 13	

14 The grid shows the graph of $y = x^2 - 3x - 2$



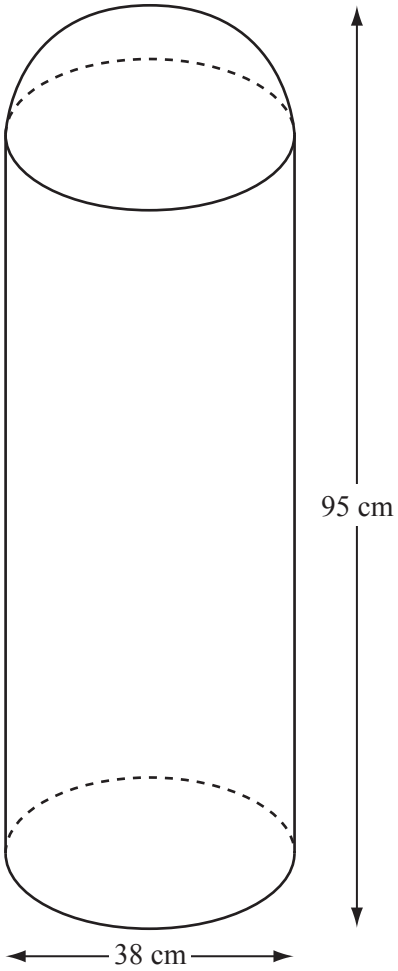
By drawing an appropriate straight line, solve the equation $x^2 - 4x + 1 = 0$

Answer $x =$ _____ [3]

Examiner Only	
Marks	Remark
Total Question 14	

STEMUP.CO.UK

15



The diagram shows a gas tank.
The tank is a hollow cylinder joined to a hollow hemisphere at the top.
The tank has a circular base.
Both the cylinder and the hemisphere have a diameter of 38 cm.
The height of the tank is 95 cm.
Work out the volume of the tank.

Answer _____ cm^3 [4]

Examiner Only	
Marks	Remark
Total Question 15	

STEMUP.CO.UK

THIS IS THE END OF THE QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

111337

Rewarding Learning

General Certificate of Secondary Education
2011

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 6 JUNE
3.00 pm – 4.15 pm

MARK SCHEME

STEMUP.CO.UK

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

STEMUP.CO.UK

General Marking Advice

(i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.

(ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.

(iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.

(iv) Work crossed out but not replaced should be marked.

(v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.

(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.

(viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen. E.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.

(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

(x) For any question, the range of answers given in the mark scheme is inclusive.

			AVAILABLE MARKS
1	360 (or 1.25) 240	MA1 MA1	2
2	**(a)** $y = 2$	A1	
	(b) curve + points	A1 A1	3
3	**(a)** $1 - (0.25 + 0.35 + 0.15 + 0.05)$ 0.2	M1 A1	
	(b) $0.15 + 0.05$ 0.2	M1 A1	
	(c) 0.05×200 10	M1 A1	
	(d) $0.05 + 0.25 = 0.3$	M1 A1	8
4	10% of $3200 = 320$ $24265 - 5895 - 3200 = 15170$ $0.28 \times 15170 = 4247.6$ 4567.60	MA1 MA1 MA1 MA1	4
5	**(a)** $\frac{1}{2}(2.1 + 2.8) \times 1.7$ 4.165 4.2	MA1 A1 A1	
	(b) Volume $= 1.23\,m^3$ and mass $= 2268\,kg$	A1	
	Density $= \dfrac{2268}{1.23}$	M1	
	$= 1840$	A1	6
6	**(a)** 3 left 5 up	A1 A1	
	(b) Correct enlargement (A2 for 3 vertices correct) (A1 for correct enlargement about wrong centre)	A3	5

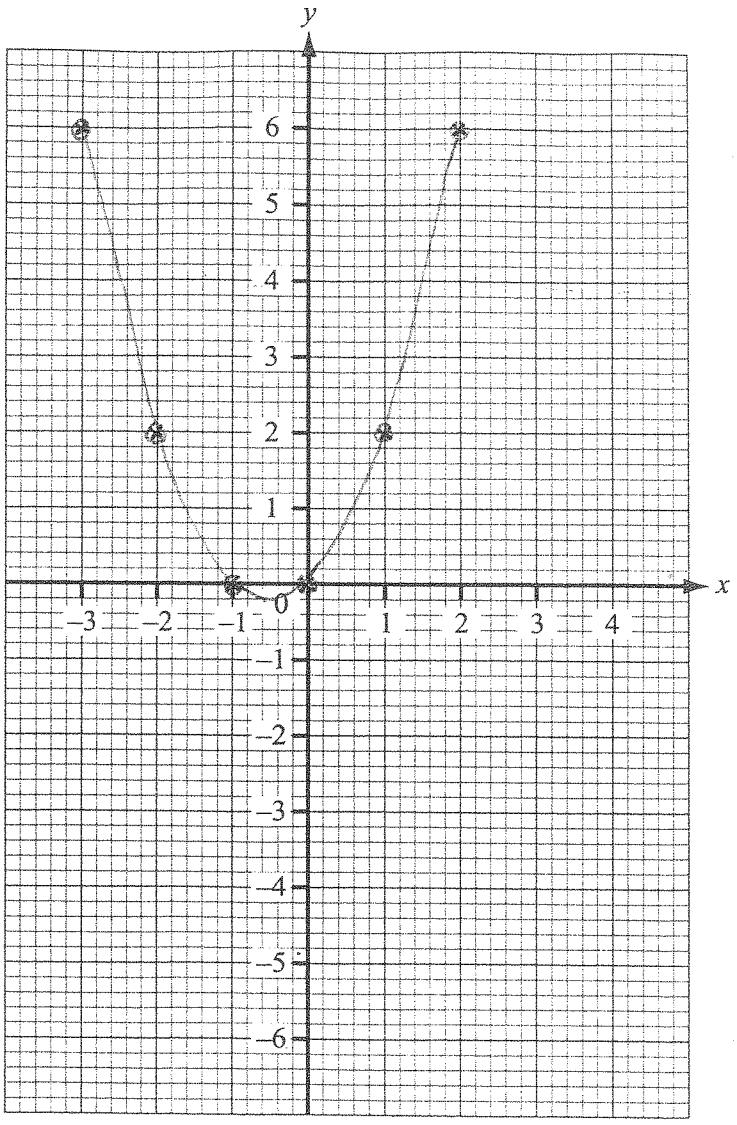
STEMUP.CO.UK

			AVAILABLE MARKS
7	$-6<3n\leq 9$	MA1	
	$-2<n\leq 3$	MA1	
	$n = -1,0,1,2,3$	A1	3
8	$110 - 80 = 30$	MA1	
	$80 \times 0.45 = 36$	MA1	
	$30 \times 0.7 = 21$	MA1	
	$36 + 21 = 57$	MA1	4
9	27.9956×10^{-5} or 0.000279956	MA1	
	2.79956×10^{-4}	MA1	2
10	**(a)** LHS $= n^2 - n - 6$	MA1	
	RHS $= n^2 - n - 2 - 4$		
	$= n^2 - n - 6$	MA1	
	(b) $\sqrt{X} = WY$	MA1	
	$X = (WY)^2$ or W^2Y^2	MA1	4
11	$r^2 = 79.577\ldots$ or $r^2 = \dfrac{1000}{4\pi}$	MA1	
	$r = 8.92$	A1	2
12	$\sqrt{x^4}$ or $x^{\frac{1}{2}} \times x^{\frac{3}{2}}$	MA1	
	x^2	MA1	2
13	**(a)** $F = k/d^2$		
	$8 = k/25$	MA1	
	$k = 200$	A1	
	$F = 200/d^2$	A1	
	(b) Force reduced to $\frac{1}{4}$ its original value	A1	4
14	$(x^2 - 3x - 2) - (x^2 - 4x + 1)$	MA1	
	Line $y = x - 3$	A1	
	$x = 0.3, x = 3.7$	A1	3
15	Volume of hemisphere $= \frac{2}{3}\pi \times 19^3$	MA1	
	$= 14365.456$	A1	
	Volume of cylinder $= \pi \times 19^2 \times 76 = 86192.736$	MA1	
	Total volume $= 100558.192$	A1	4
		Total	**56**

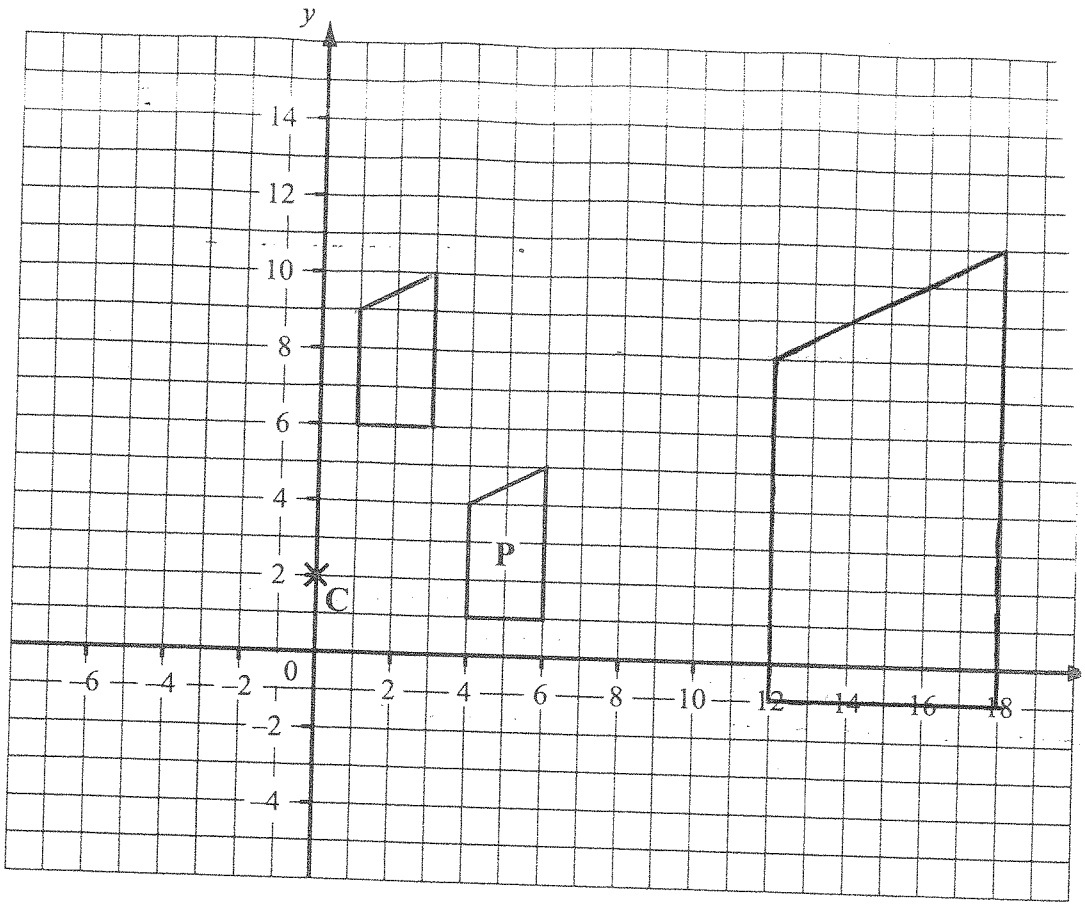
STEMUP.CO.UK

GCSE MATHEMATICS SUMMER 2011

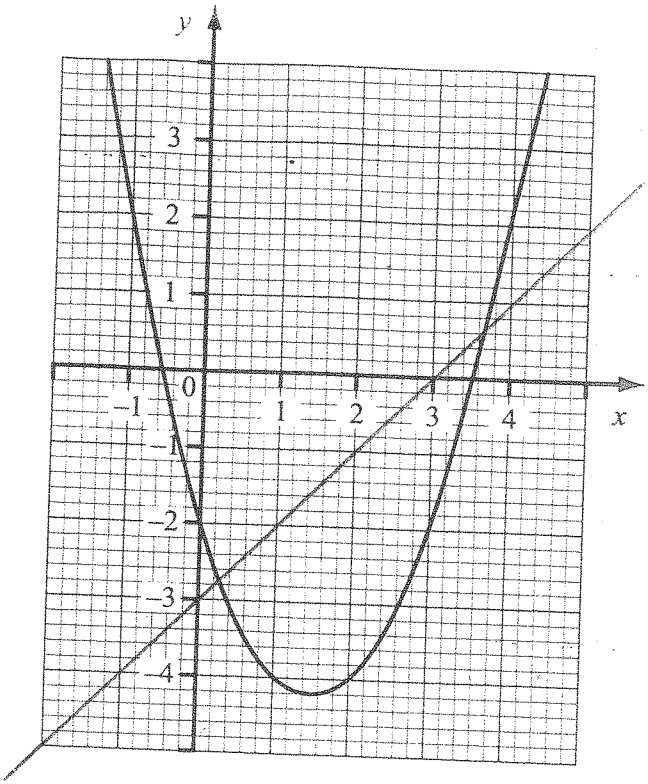
MODULE N6-2
OVERLAYS QUESTION 2



GCSE MATHEMATICS SUMMER 2011
MODULE N6-2
OVERLAYS QUESTION 6



GCSE MATHEMATICS SUMMER 2011
MODULE N6-2
OVERLAYS QUESTION 14



Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics



Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

GMN62

FRIDAY 14 JANUARY

10.45 am – 12.00 pm

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.

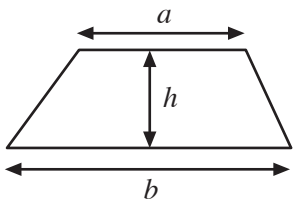
INFORMATION FOR CANDIDATES

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.

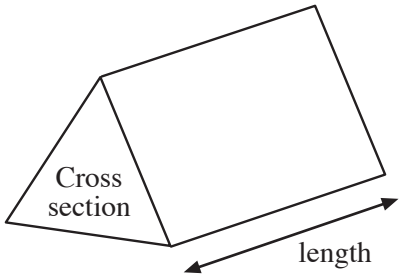
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

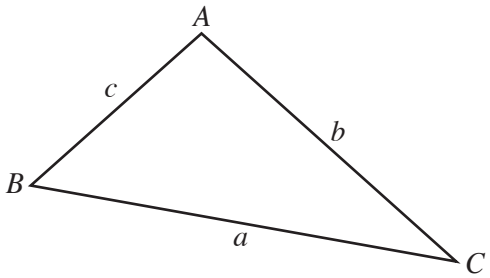


In any triangle ABC

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

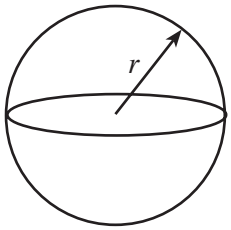
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



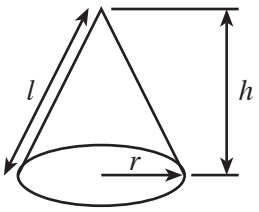
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

Examiner Only	
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]

---

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

Answer _____ because _____

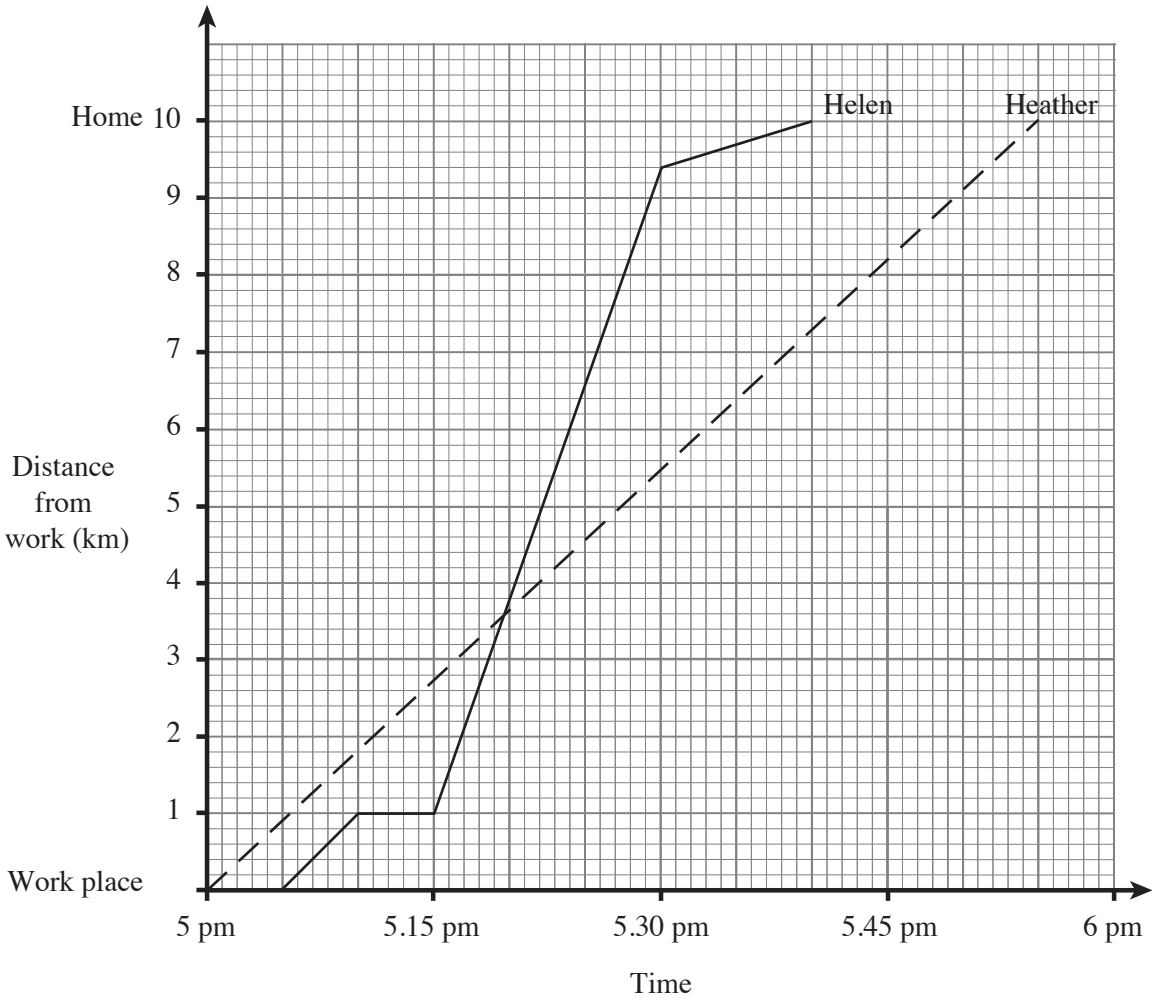
_____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

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]

STEMUP.CO.UK

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.

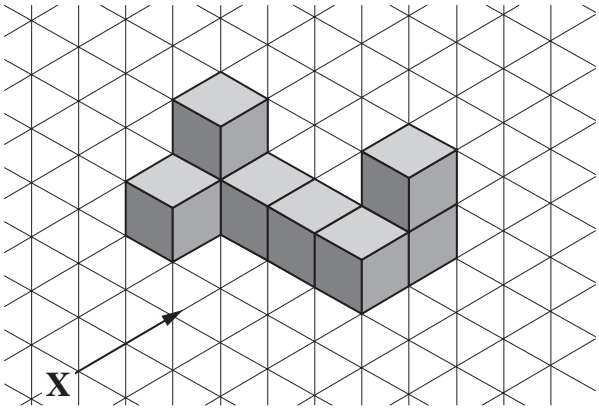
Answer _____ [2]

Examiner Only

Marks	Remark

STEMUP.CO.UK

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



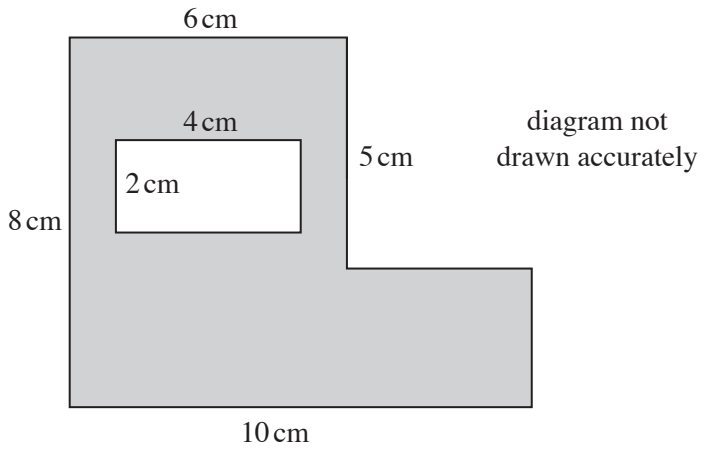
On the squared paper below, draw the front elevation of the solid viewed from **X**.

[2]

Examiner Only

Marks	Remark

(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]

Examiner Only

Marks	Remark

STEMUP.CO.UK

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

Show your construction lines.



[2]

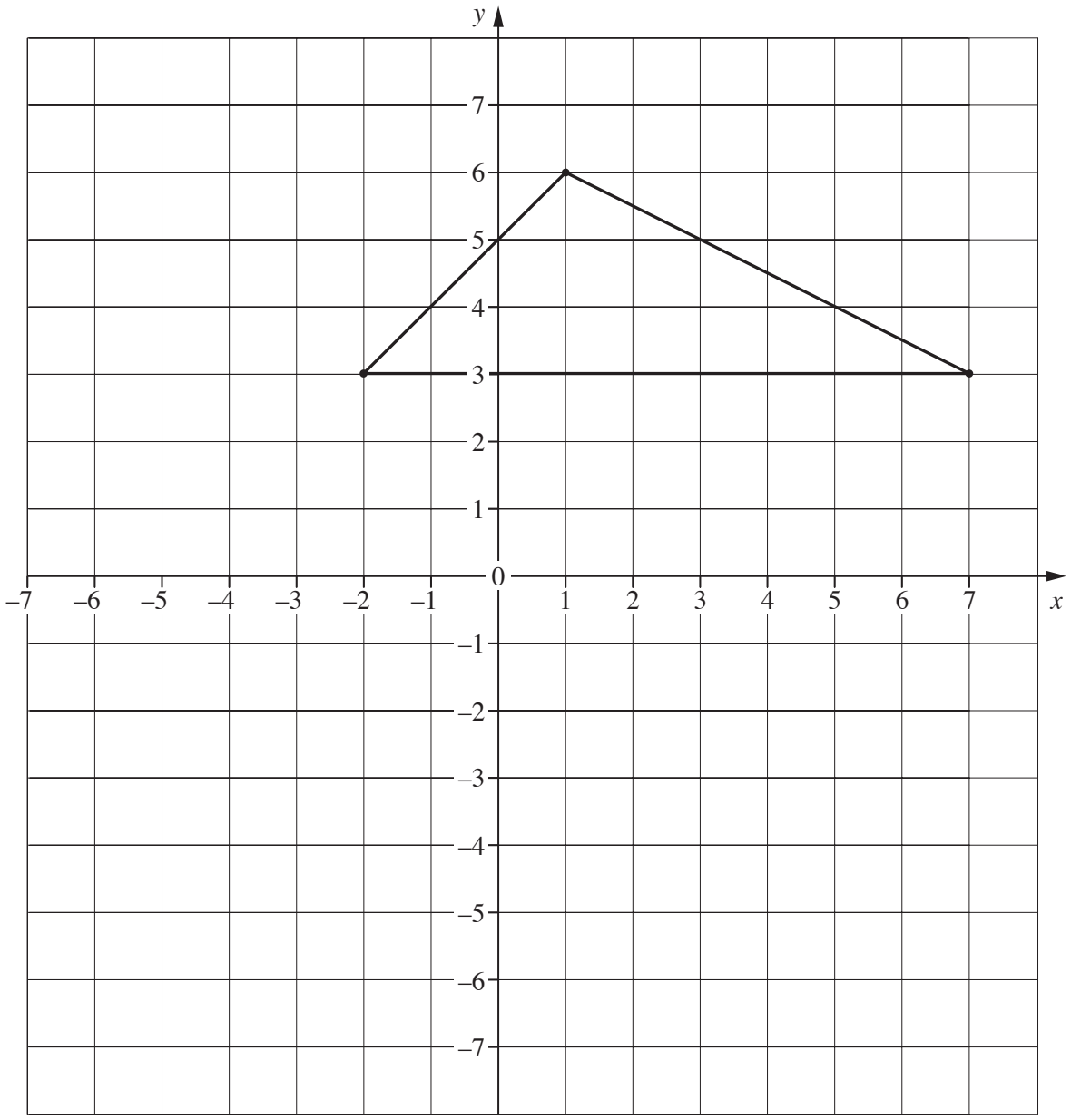
Examiner Only	
Marks	Remark

STEMUP.CO.UK

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

Examiner Only

Marks	Remark



[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]

STEMUP.CO.UK

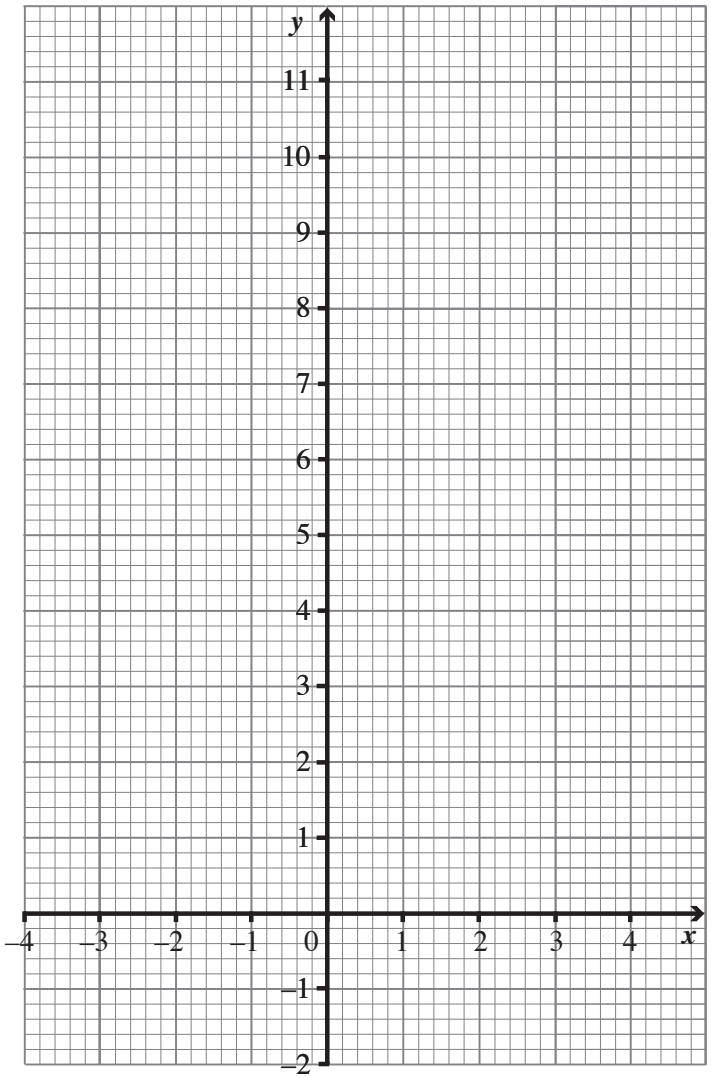
8 **(a)** Complete the table for

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

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]

Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

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]

---

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?

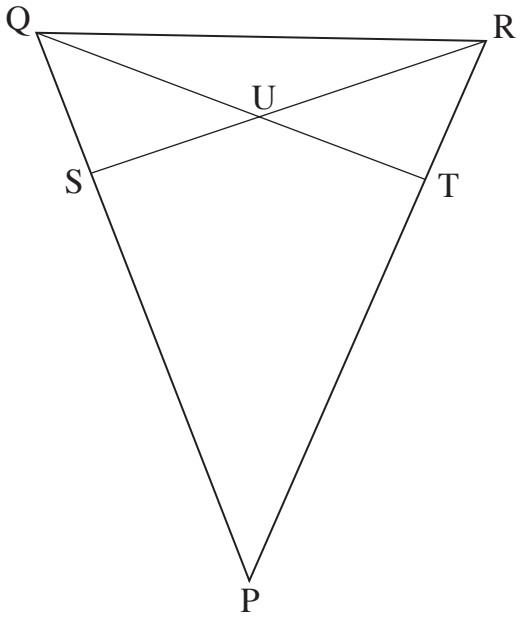
Answer _____ % [2]

STEMUP.CO.UK

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]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

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

You must show all your working.

Answer _____ [2]

Examiner Only	
Marks	Remark

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]

STEMUP.CO.UK

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]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

111526

Rewarding Learning

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

MARK SCHEME

STEMUP.CO.UK

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

STEMUP.CO.UK

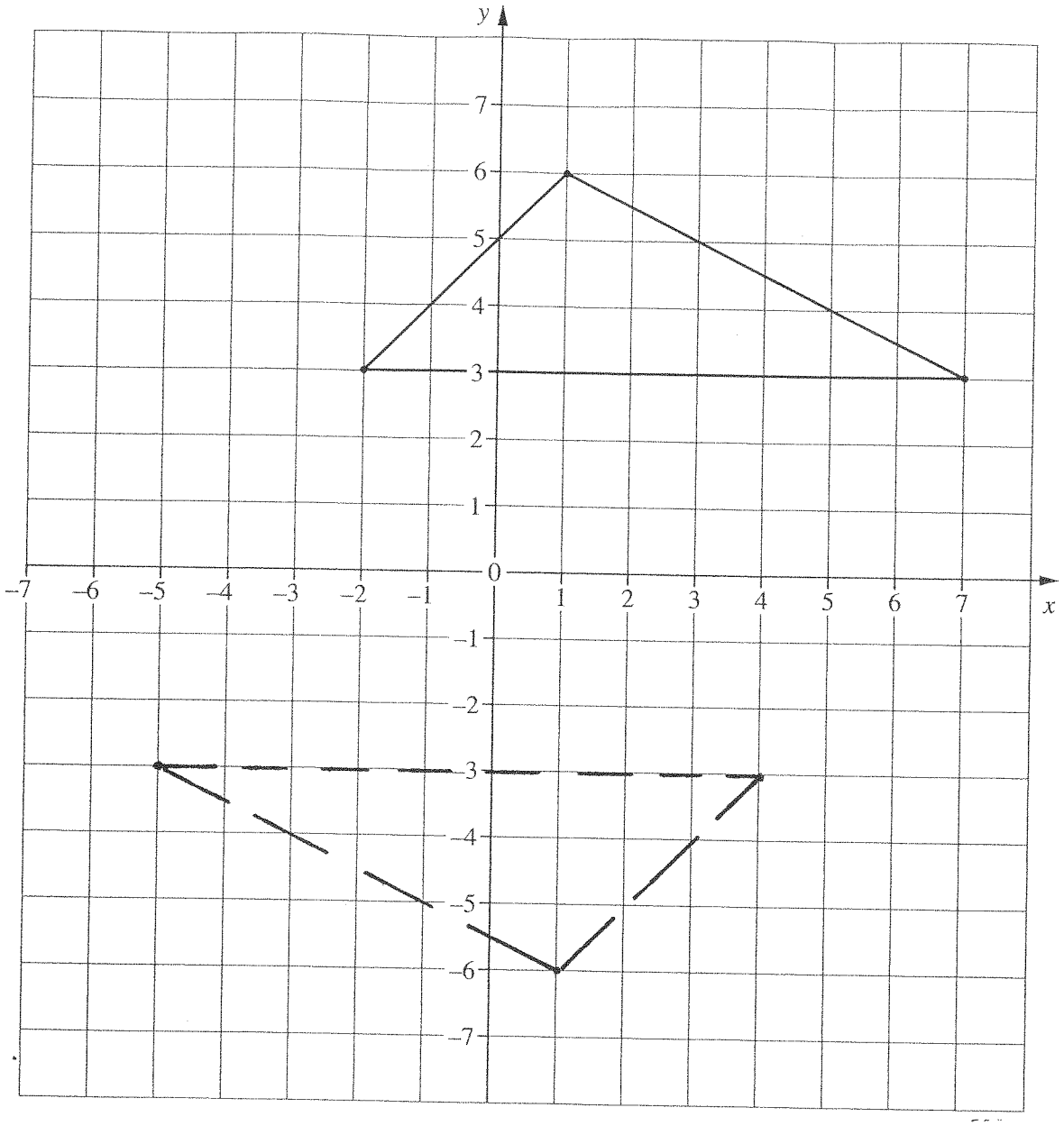
			AVAILABLE MARKS
1	1500000 ÷ 135.457 = 11074 11074 ÷ 1.09608 = 10103 12000 –10103 = 1897 Japan, 1897	MA1 MA1 MA1 A1	4
2	Could be odd or even because (suitable examples)	MA1 A1	2
3	**(a)** 5.05 to 5.10	MA1	
	(b) 1.0 + 0.6 = 1.6 km	M1 A1	
	(c) 8.4 km in 15 mins = 33.6 km/h	M1 A1	
	(d) 2 km	M1 A1	7
4	**(a)** P(Black) = 1 – (0.3 + 0.5 + 0.14) = 0.06	MA1 A1	
	(b) P(Green or Blue) = 0.14 + 0.5 = 0.64	M1 A1	4
5	**(a)** 4 horizontal cubes on base 2 end cubes on 2nd layer	A1 A1	
	(b) **(i)** $8 \times 6 + 3 \times 4 - 4 \times 2 = 52\,cm^2$	M1 A1	
	(ii) 8 + 10 + 3 + 4 + 5 + 6 + (2 + 4 + 2 + 4) = 48 cm	M1 A1	6
6	**(a)** Perpendicular bisector constructed	M1 A1	
	(b) Correct Enlargement (−5,−3), (4,−3), (1,−6)	M1 A2	5
7	180 ÷ 15 = 12 48 + 60 = 108	MA1 M1 A1	3
8	**(a)** 10 4	A1 A1	
	(b) Correct graph to include – correct points plotted/max point/curve	A2	
	(c) x values of –3.3 and 0.3	A2	6

STEMUP.CO.UK

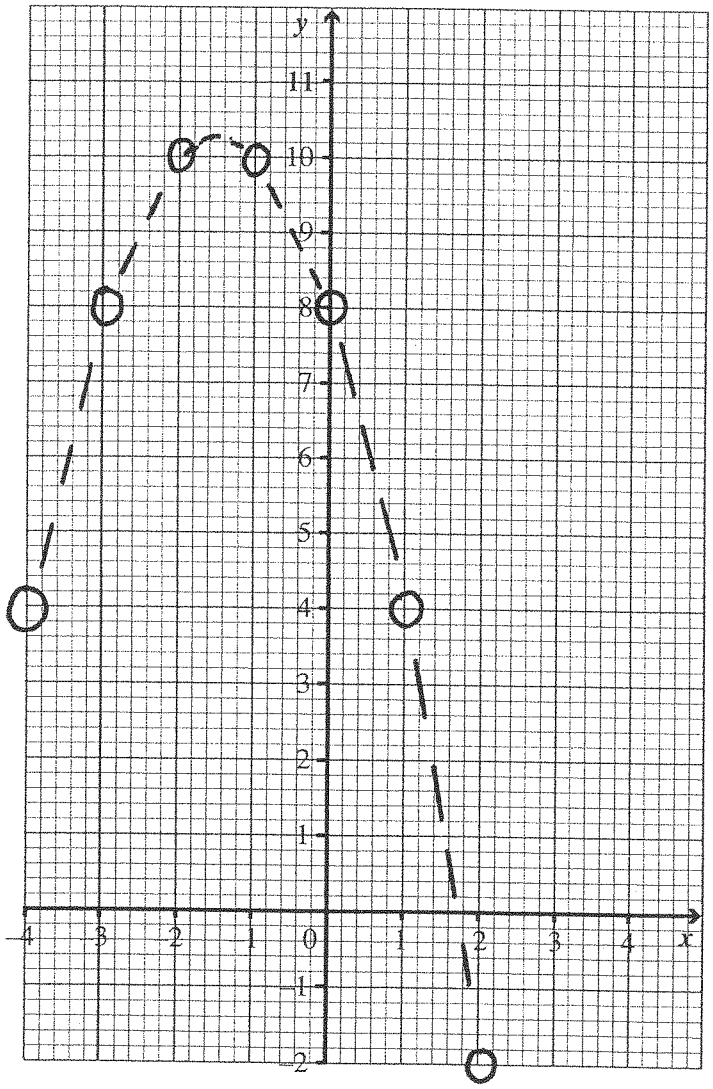
			AVAILABLE MARKS
9	Curved surface area = $2 \times \pi \times 4 \times 12$	M1	
	$= 301.6$	A1	
	Approp. acc. 300	A1	3
10	$\frac{2.675 \times 10^5}{1.775 \times 10^6} \times 100$	MA1	
	15.07	A1	2
11	$PQ = PR$ (isosceles triangle given) $PT = PS$ (given in question) Angle P same in both	A1	
	By *SAS* triangles *PQT* and *PRS* are congruent	A1	
	Angle *PQT* = angle *PRS* by previous congruency, therefore since angle Q = angle R in original triangle, by subtraction, angle *UQR* = angle *URQ*. Hence triangle *QUR* must be isosceles.	M1 A1	4
12	$x = 0.83333....$ $10x = 8.3333....$ $100x = 83.3333....$ $90x = 75$ or equivalent	MA1	
	$x = \frac{75}{90}\left(= \frac{5}{6}\right)$	A1	2
13	**(a)** $0.5 \times 0.7 = 0.35$	A1	
	(b) P (Mark fails) $= 0.5 \times 0.8$ P (Julie fails) $= 0.2 \times 0.7$	MA1	
	0.4×0.14	M1	
	0.056	A1	4
14	**(a)** $\frac{x-2}{x} = \frac{3(x-2+1)}{x+15}$	MA1	
	$\frac{x-2}{x} = \frac{3(x-1)}{x+15}$ $(x-2)(x+15) = 3x(x-1)$ $x^2 + 13x - 30 = 3x^2 - 3x$ $2x^2 - 16x + 30 = 0$ $x^2 - 8x + 15 = 0$	MA1	
	(b) $(x-3)(x-5) = 0$ $x = 3$ or 5	MA1	
	Original Fraction = $\frac{3}{5}, \frac{1}{3}$	A1	4
		Total	**56**

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2011
MODULE N6-2
OVERLAYS QUESTION 6B



GCSE MATHEMATICS JANUARY 2011
MODULE N6-2
OVERLAYS QUESTION 8B



Rewarding Learning

General Certificate of Secondary Education
2010

Centre Number

7	1			

Candidate Number

Mathematics



Module N6 Paper 2
(Calculator)
Higher Tier

[GMN62]

GMN62

MONDAY 7 JUNE

3.00 p.m. – 4.15 p.m.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
Total Marks	

Examiner Number

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.
Complete in blue or black ink. Pencil may be used in diagrams only.
Do not write with a gel pen.
Do not use correction fluid to correct errors in your answers.
Answer **all eighteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

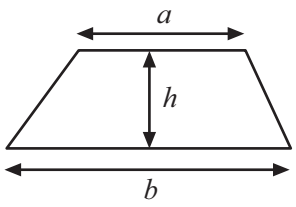
INFORMATION FOR CANDIDATES

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.

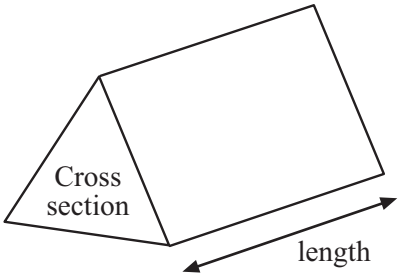
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

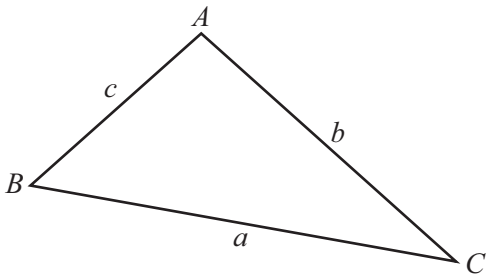


In any triangle ABC

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

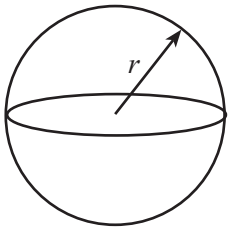
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



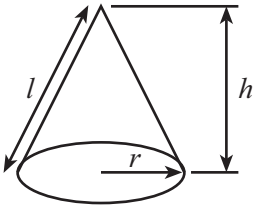
Volume of sphere $= \frac{4}{3}\pi r^3$

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:

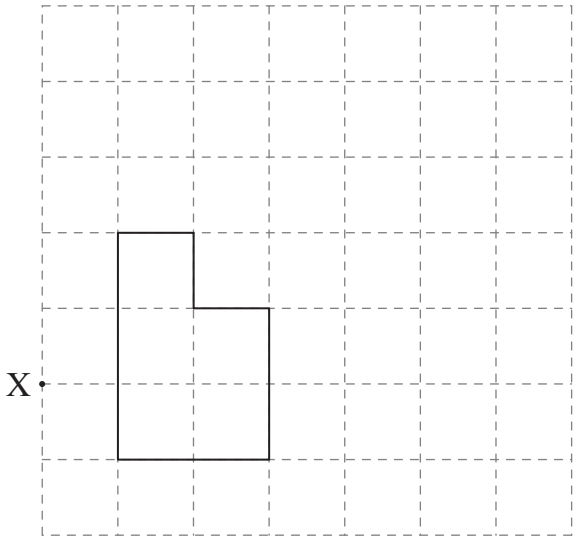
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Question 1

Examiner Only	
Marks	Remark

(a) Enlarge the shape in the diagram below by a scale factor of 2 with centre X. [3]



(b) A car travels a distance of 210 km at an average speed of 60 km/h. Calculate the time taken in hours and minutes.

Answer _____ hours _____ minutes [3]

Question 2

Examiner Only	
Marks	Remark

(a) Write the number 0.3204204204204 … as a recurring decimal.

Answer _____ [1]

(b) Write down the two numbers which are the square roots of 0.25

Answer _____ and _____ [1]

(c) Which of 'always even', 'always odd', 'could be odd or even' describes the number $5(2n + 3)$? (n is an integer).
Explain your answer.

Answer _____

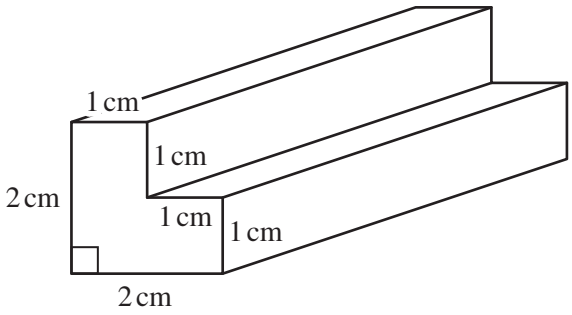
because _____

_____ [2]

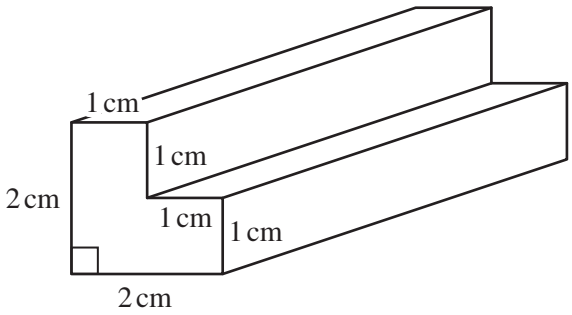
Question 3

Examiner Only	
Marks	Remark

(a) Draw a plane of symmetry on this solid. [1]



(b) Draw a different plane of symmetry on this solid. [1]



Question 4

Examiner Only	
Marks	Remark

Julie earns £42 000 per year. Her tax free allowance is £5000
She pays 22% of the remaining salary in tax.
How much is left after tax has been deducted?

Answer £ _____ [3]

Question 5

Examiner Only

Marks	Remark

Handbags in a shop come in five colours. The table shows the probability of buying a particular colour of handbag.

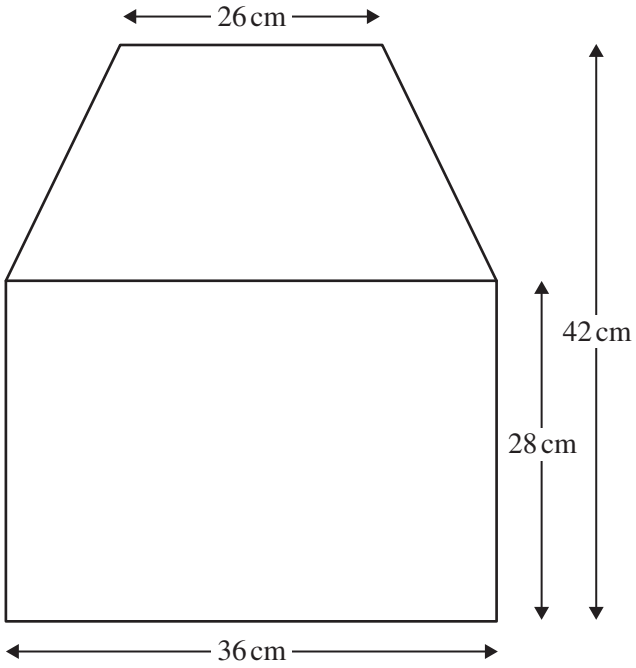
Black	Red	White	Silver	Blue
45%	4%	25%	20%	12%

The shopkeeper's mathematics is not good.
How can you tell there is a mistake in the table?

_____

_____ [1]

Question 6



The diagram above shows the cross-section of a doll's house.
The diagram shows a rectangle and a trapezium.
Find the total area of the cross-section.

Answer _____ cm^2 [3]

Examiner Only	
Marks	Remark

Question 7

Examiner Only	
Marks	Remark

S and T are two points 80 metres apart on a straight road.
Shade clearly the region in which each point is less than 50 metres from S and is further from S than it is from T.
(The scale on the diagram is 1 cm = 10 m).



[3]

Question 8

Examiner Only

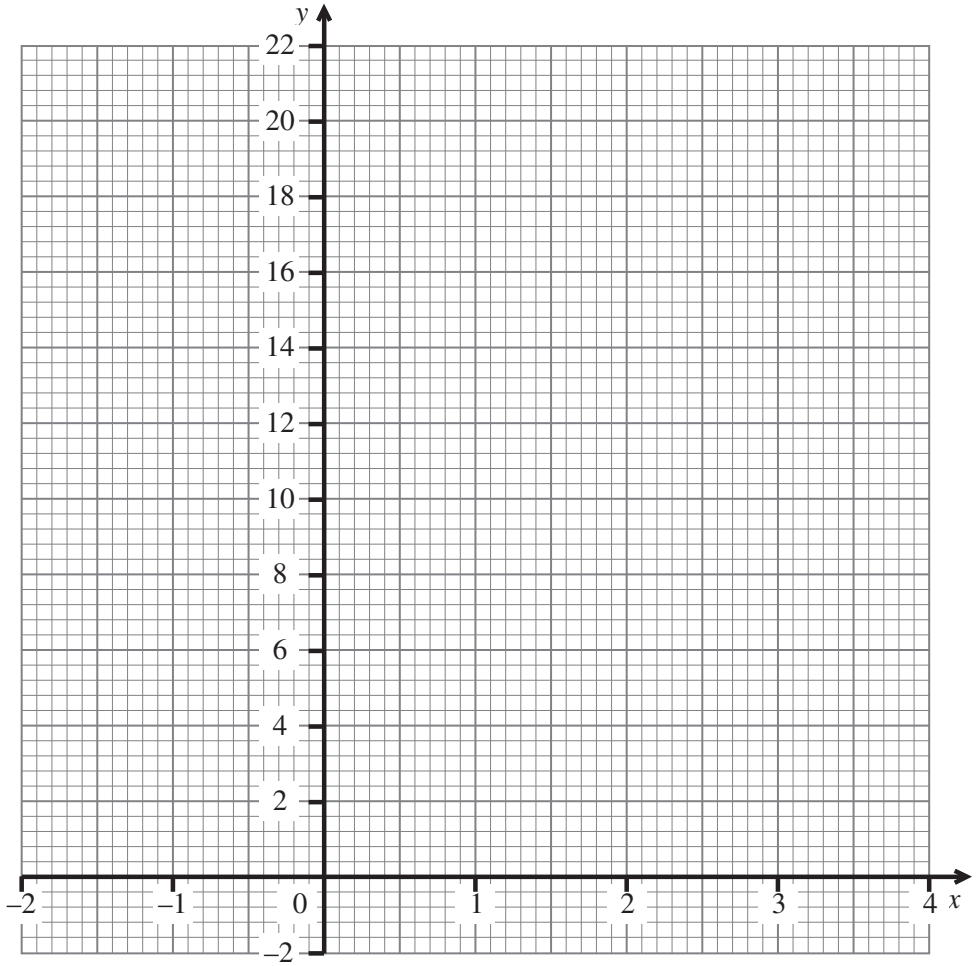
Marks	Remark

(a) Complete the table for $y = 2x^2 - 5x + 3$

x	–2	–1	0	1	2	3	4
y		10	3	0	1		15

[2]

(b) Draw the graph of $y = 2x^2 - 5x + 3$ for $x = -2$ to $x = 4$ on the axes below.



[2]

5573

STEMUP.CO.UK

Question 9

Examiner Only	
Marks	Remark

Maurice travels 99 km.
His journey is split between train and taxi in the ratio 11 : 4
How far does he travel by taxi?

Answer _____ km [2]

Question 10

Examiner Only	
Marks	Remark

Solve $7x \leqslant 3x + 5$

Answer _____ [2]

STEMUP.CO.UK

Question 11

Examiner Only	
Marks	Remark

A solid prism of wood has a cross-sectional area of 60 cm^2
The length of the prism is 43 cm and the mass of the prism is 1400 g.
Calculate the density of the wood, **giving your answer to a suitable degree of accuracy**.

Answer _____ g/cm^3 [3]

Question 12

Examiner Only

Marks	Remark

(a) In an experiment to calculate the probability of throwing a head with a coin, four friends throw it a different number of times and record the number of heads.

(i) Complete the table.

Name	Number of throws	Number of heads	Relative frequency
John	20	9	
Paul	100	53	
George	500	210	
Ringo	1000		0.502

[2]

(ii) One of the friends lost count of the number of heads he threw and just made up a number.
Which friend do you think this was?

Explain your answer.

Answer _____ because _____

_____ [1]



STEMUP.CO.UK

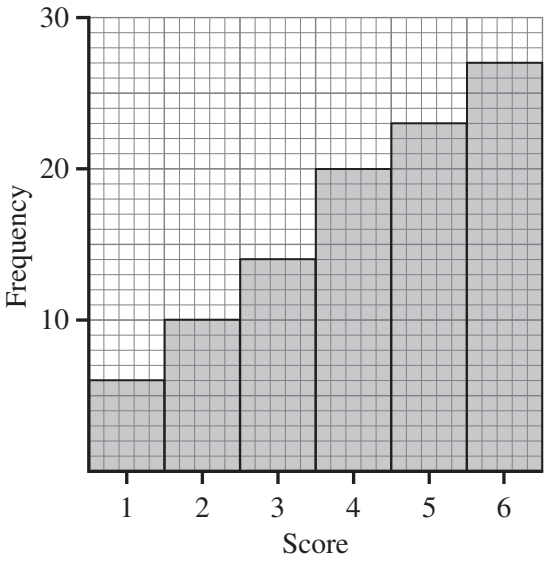
Question 12 continued

Examiner Only

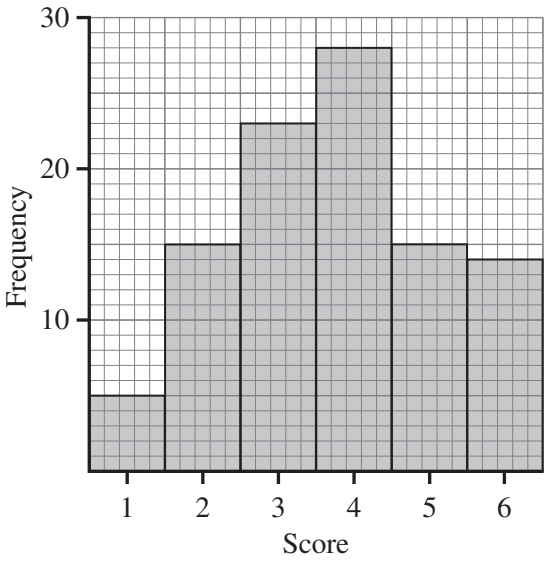
Marks	Remark

(b) Pete decides to carry out an experiment with a regular dice. He rolls it 100 times and records his results in a frequency diagram.
Which of these is it most likely to be?

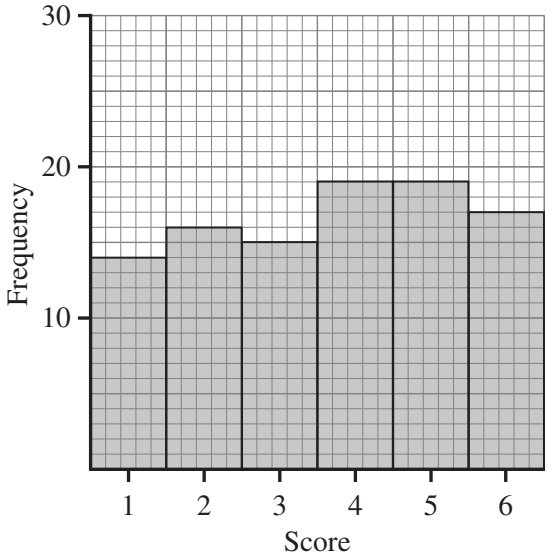
A



B



C



Answer _____ [1]

Question 13

Examiner Only	
Marks	Remark

S is proportional to the cube of T and $S = 54$ when $T = 6$

(a) Express S in terms of T.

Answer _____ [2]

(b) Hence find the value of T when $S = 128$

Answer _____ [2]

Question 14

Calculate the curved surface area of a cylinder with a base radius of 7 cm and a height of 32 cm.

Answer _____ cm^2 [2]

Examiner Only	
Marks	Remark

Question 15

Examiner Only	
Marks	Remark

Rearrange $7(xy - 2) = 5y + 2x$ to make x the subject.

Answer $x =$ _____ [4]

Question 16

Rationalise the denominator of $\frac{12}{\sqrt{3}}$ and simplify your answer.

Answer _____ [2]

Examiner Only	
Marks	Remark

Question 17

Examiner Only	
Marks	Remark

Mrs Gump is given a box of chocolates by her husband.
There are 18 chocolates in the box.
There are equal numbers of dark, milk and white chocolates.
She takes two chocolates at random.
What is the probability that there are now more dark chocolates in the box than either milk or white?

Answer _____ [3]

STEMUP.CO.UK

Question 18

Examiner Only	
Marks	Remark

A solid cylinder of radius x and height $3x$ has the same surface area as a sphere of radius r.
Find an expression for r in terms of x.

Answer $r =$ _____ [4]

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

GCSE

Mathematics (Modular)

Summer 2010

Mark Schemes

Issued: October 2010

STEMUP.CO.UK

General Certificate of Secondary Education
2010

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 7 JUNE

3.00 pm – 4.15 pm

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 2010

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M, A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

				AVAILABLE MARKS
1	**(a)**	See overlay Correct scale factor 6 points correct	 MA1 A2	
	(b)	210/60 = 3.5 3 hours 30 minutes	M1, A1 A1	6
2	**(a)**	0.3204	A1	
	(b)	0.5, − 0.5	A1	
	(c)	always odd $2n$ is always even, therefore $2n + 3$ is always odd and 5 (or an odd) times an odd number is always odd **or** $10n + 15$, $10n$ is even and even +15 is always odd	A1 A1	4
3	**(a)**	one plane drawn	A1	
	(b)	second plane drawn	A1	2
4		42000 – 5000 = 37000 22% of 37000 = £8140 42000 – 8140 = £33860	MA1 MA1 MA1	3
5		The total percentage is 106% instead of 100%	A1	1
6		Area of trapezium = $\frac{1}{2}$ (26 + 36) × 14 = 434 cm^2 Area of rectangle = 36 × 28 = 1008 Total area = 1442	M1, A1 MA1	3
7		See overlay Circle radius 5 cm centre S Bisector of ST drawn Correct region shaded	 MA1 MA1 MA1	3
8	**(a)**	21, 6	A1, A1	
	(b)	See overlay correct points smooth curve	 A1 A1	4

STEMUP.CO.UK

			AVAILABLE MARKS
9	$99 \div 15 = 6.6$ $6.6 \times 4 = 26.4$ km	MA1 MA1	2
10	$4x \leq 5$	MA1	
	$x \leq \frac{5}{4}$	MA1	2
11	Volume $= 60 \times 43 = 2580$	MA1	
	Density $= \frac{1400}{2580}$ **or** 0.542635....	MA1	
	$= 0.54$ **or** 0.543 **or** 0.5	A1	3
12	**(a)** **(i)**		

	0.45
	0.53
	0.42
502	

MA2

(ii) George because his relative frequency is furthest away from 0.5 — A1

(b) C — A1 — 4

13 **(a)** $S = kT^3$

$54 = k \times 6^3$ — MA1

$k = \frac{54}{216} = \frac{1}{4}$

$S = \frac{T^3}{4}$ — MA1

(b) $128 = \frac{T^3}{4}$ — MA1

$T = 8$ — MA1 — 4

14 Curved Area $= \pi dh = \pi \times 14 \times 32$ — MA1

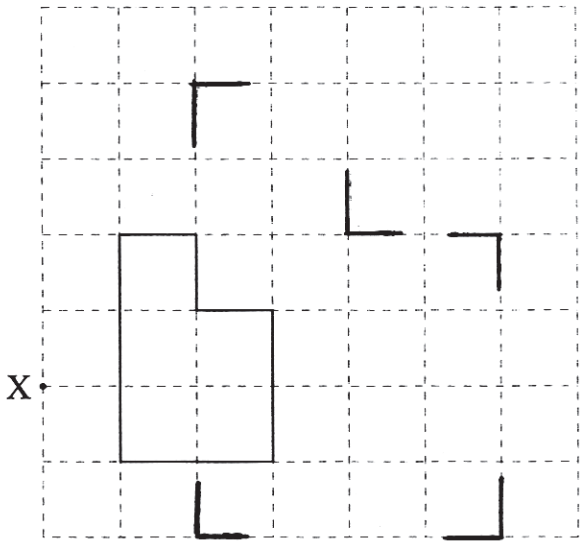
$= 1407.433(509...)\,\text{cm}^2$ — MA1 — 2

STEMUP.CO.UK

			AVAILABLE MARKS
15	$7xy - 14 = 5y + 2x$	MA1	
	$7xy - 2x = 5y + 14$	MA1	
	$x(7y - 2) = 5y + 14$	MA1	
	$x = \frac{5y + 14}{7y - 2}$	A1	4
16	$\frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 4\sqrt{3}$	M1, A1	2
17	$\frac{6}{18} \times \frac{6}{17} + \frac{6}{18} \times \frac{6}{17}$	MA1, MA1	
	$= \frac{4}{17}$	A1	3
18	$2\pi x^2 + 2\pi x \times 3x = 4\pi r^2$	M1, A1	
	$8\pi x^2 = 4\pi r^2$ **or** $2x^2 = r^2$	A1	
	$r = \sqrt{2}x$ **or** $\sqrt{2x^2}$	A1	4
		Total	**56**

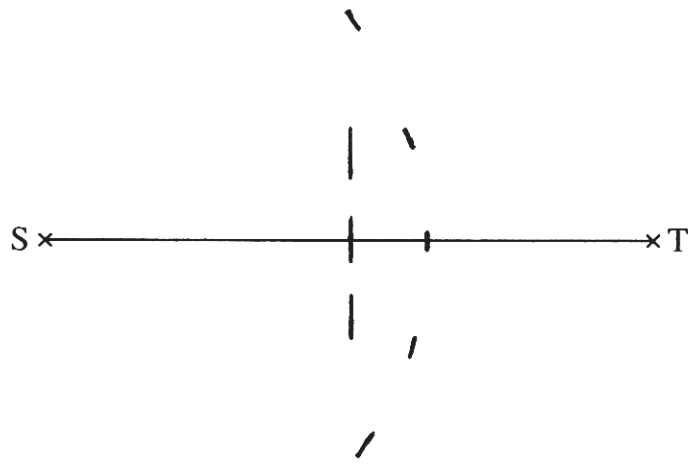
STEMUP.CO.UK

GCSE MATHEMATICS SUMMER 2010
MODULE N6-2
OVERLAY QUESTION 1



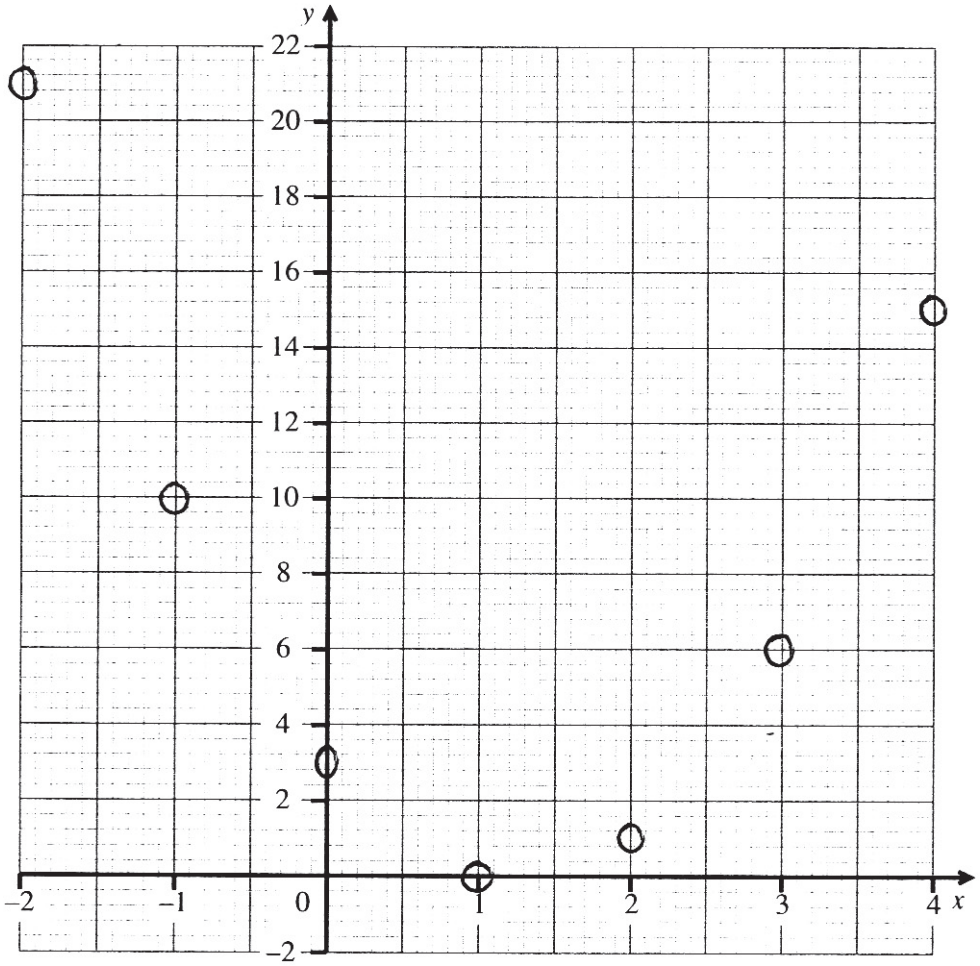
STEMUP.CO.UK

GCSE MATHEMATICS SUMMER 2010
MODULE N6-2
OVERLAY QUESTION 7



STEMUP.CO.UK

GCSE MATHEMATICS SUMMER 2010
MODULE N6-2
OVERLAY QUESTION 8



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics



Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

GMN62

FRIDAY 15 JANUARY

10.45 am – 12.00 pm

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 sixteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

INFORMATION FOR CANDIDATES

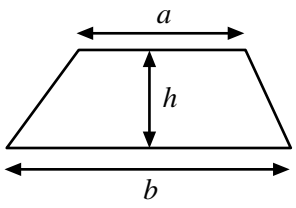
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
Total Marks	

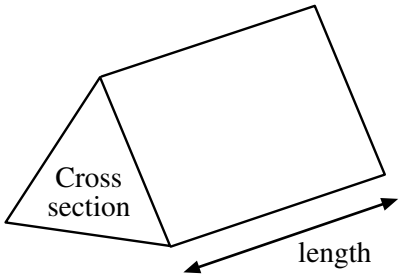
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

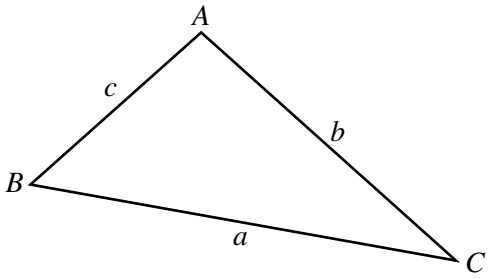


In any triangle ABC

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

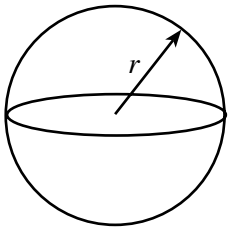
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



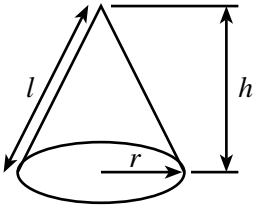
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



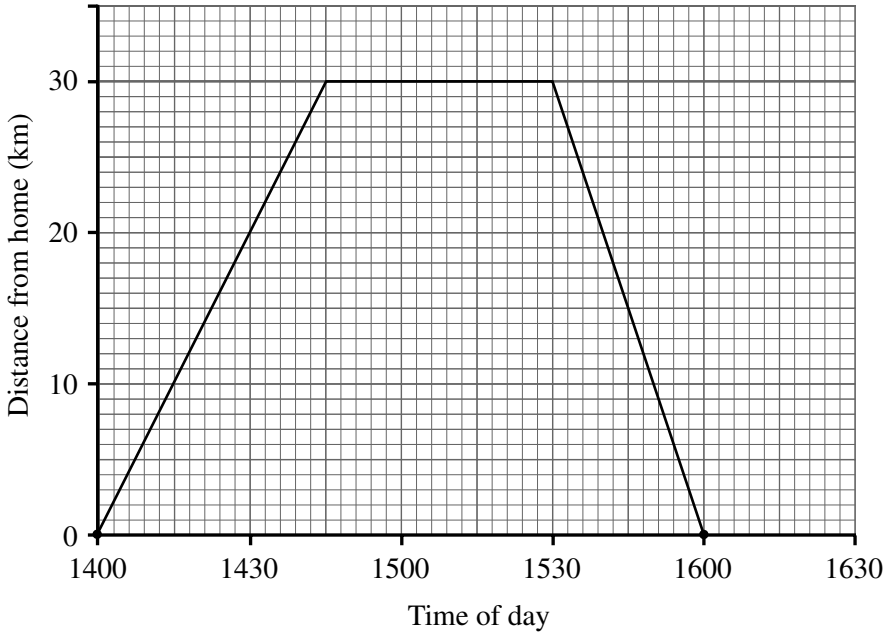
Quadratic equation:

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

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

Examiner Only	
Marks	Remark

1 Jim drove from his home to the airport to collect his daughter.
He waited for her to arrive and then he drove home.
Here is a distance–time graph for Jim's complete journey.



(a) Work out Jim's average speed on his journey home from the airport, giving your answer in kilometres per hour.

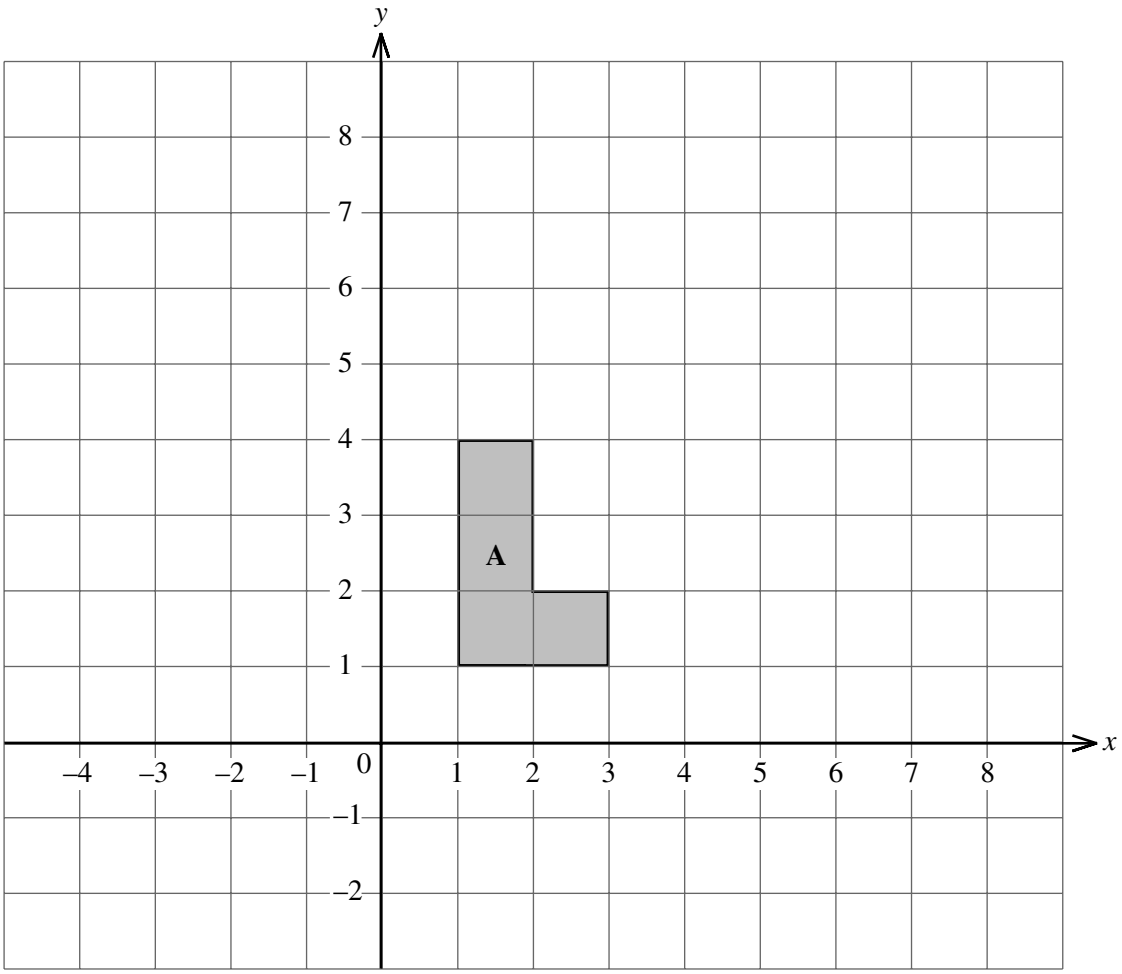
Answer _____ km/h [2]

(b) Between what two times was he travelling at his fastest average speed?

Answer between _____ and _____ [1]

STEMUP.CO.UK

2 Enlarge the shape A, by scale factor 2, from the centre C (–1, 2).



[3]

3 96p is shared in the ratio 5 : 1
Calculate each share.

Answer _____ p, _____ p [2]

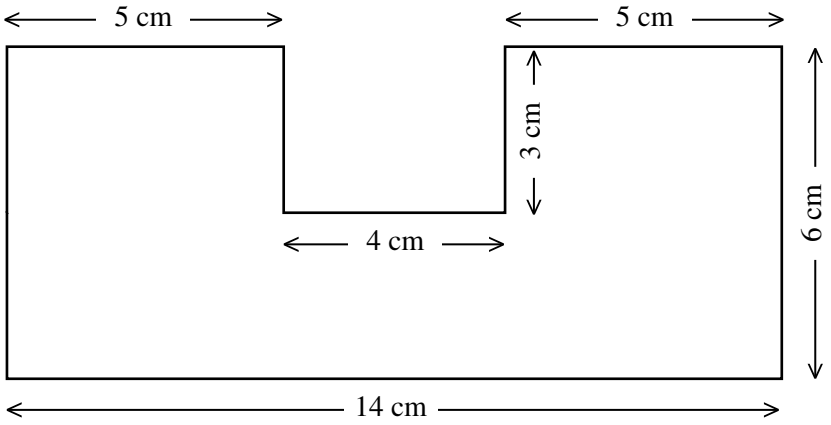
Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

4 **(a)**



For the shape above calculate

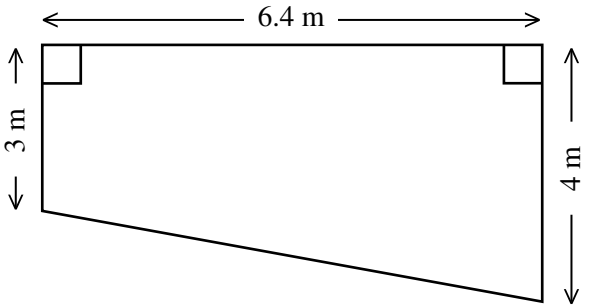
(i) the perimeter,

Answer _____ cm [1]

(ii) the area.

Answer _____ cm^2 [2]

(b) Calculate the area of the trapezium.



Answer _____ m^2 [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

5 Which of "always odd", "always even", "could be odd or even" describes the number $5n - 1$? (n is an integer.)

Explain your answer.

Answer _____

because _____

_____ [2]

6 Kim always buys one of the following items from the shop when she visits the cinema. The table shows some of the probabilities for the item she buys.

Item	Crisps	Drink	Popcorn	Ice-cream	Chocolate
Probability	0.18		0.3	0.28	0.02

(a) What is the probability that she buys a drink?

Answer _____ [2]

(b) What is the probability that she buys crisps or popcorn?

Answer _____ [2]

7



© Oceania Cruise Line

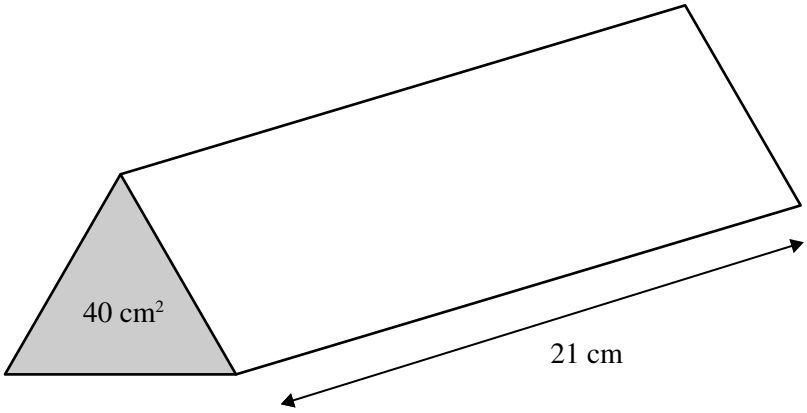
A cruise ship carries fuel in three tanks whose capacities are in the ratio 3 : 5 : 6 The capacity of the smallest tank is 162 000 gallons. Calculate the total capacity of the three tanks.

Answer _____ gallons [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

8 **(a)** A solid triangular prism of mass 7900 g has a cross-section area of 40 cm^2 and length 21 cm.



Calculate the density of the prism.

Give your answer to an appropriate degree of accuracy.

Answer _____ g/cm^3 [4]

(b) How many planes of symmetry has the prism in **(a)** if

(i) the triangular face is equilateral,

Answer _____ [1]

(ii) the triangular face is isosceles?

Answer _____ [1]

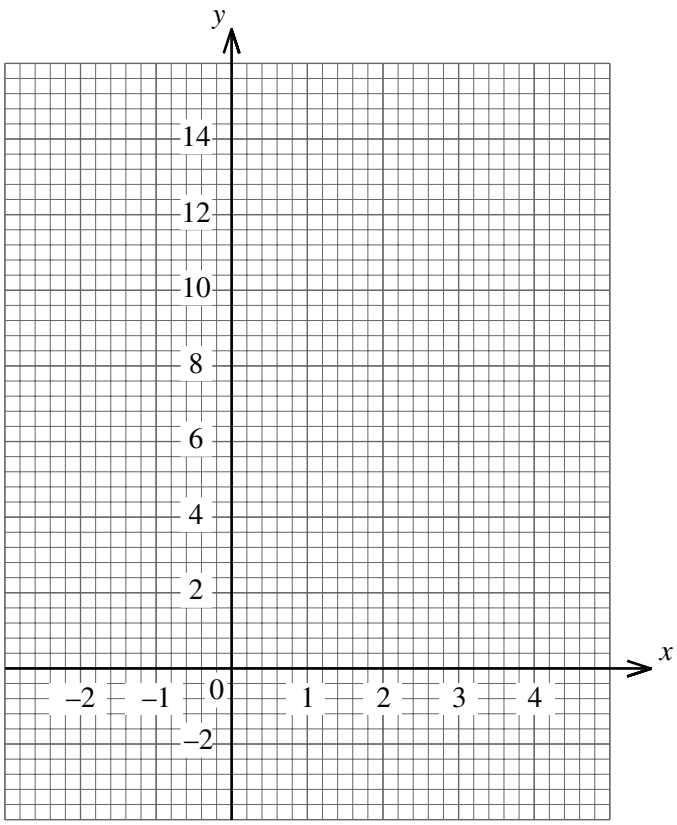
STEMUP.CO.UK

9 **(a)** Complete the table of values for $y = 2x^2 - 3x$

x	–2	–1	0	1	2	3
y	14		0	–1		9

[2]

(b) Hence draw the graph of $y = 2x^2 - 3x$ on the grid below.



[2]

(c) Draw the line $y = 8$ on the grid above and find the x co-ordinates of the points of intersection of the line with the graph of $y = 2x^2 - 3x$

Answer $x =$ _____ and $x =$ _____ [2]

(d) Write down the equation in x whose solutions are the x-values found in part **(c)**.

Answer _____ [1]

Examiner Only

Marks	Remark

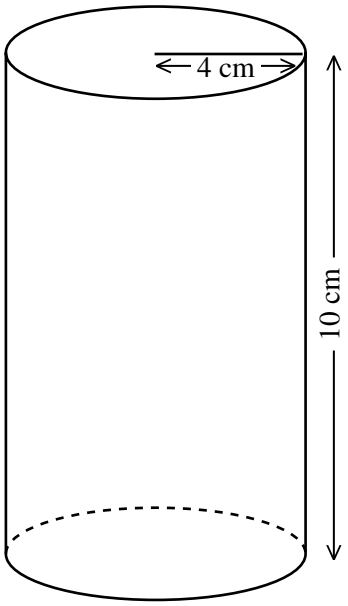
STEMUP.CO.UK

Examiner Only	
Marks	Remark

10 Solve the inequality $9 - 3x \geqslant 1 - 7x$

Answer _____ [2]

11 Find the curved surface area of a cylinder with radius 4 cm and height 10 cm.



Answer _____ cm^2 [2]

12 The star Betelgeuse has a diameter of 610 million miles.
Its diameter is approximately 700 times bigger than the Sun's diameter.
Calculate the diameter of the Sun giving your answer in standard form.

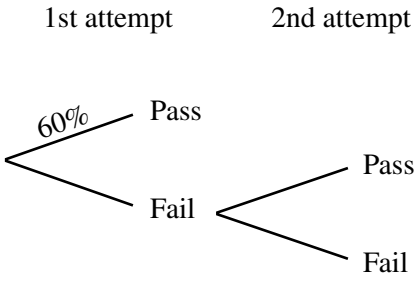
Answer _____ miles [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

13 The probability of a student passing their driving test on the first attempt is 60%.
The probability of a student passing their driving test on the second attempt is 75%.

(a) Complete the tree diagram to show all possible outcomes



[2]

(b) Calculate the probability that a student will take no more than two attempts to pass their test.

Answer _____ [3]

---

14 t is inversely proportional to w and $t = 27$ when $w = 12$

Find the value of t when $w = t$.

Answer t = _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

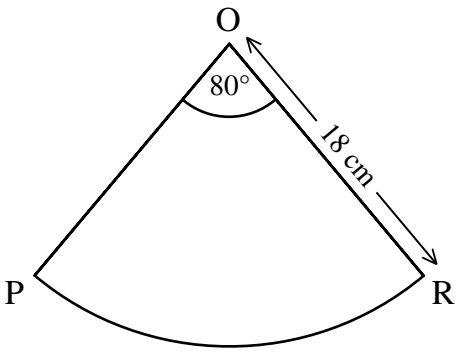
15 Solve the equation

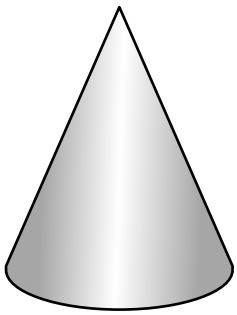
$$\sqrt{(x-9)} = 5 - \sqrt{x}$$

Show all working.

Answer $x =$ _____ [3]

16 A sector of a circle of radius 18 cm is shown with angle POR = 80°
The sector is folded to form a cone.





Calculate the volume of the cone.

Answer _____ cm^3 [6]

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

FRIDAY 15 JANUARY

10.45am – 12.00am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 2010

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M, A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

			AVAILABLE MARKS
1	**(a)** $30 \div \frac{1}{2} = 60$	M1, A1	
	(b) 1530, 1600	A1	3
2	Correct centre Correct enlargement (Award 1 mark for 3 points correct)	A1 A2	3
3	$96 \div 6 = 16$	MA1	
	80, 16	A1	2
4	**(a)** **(i)** 46	A1	
	(ii) $14 \times 6 - 3 \times 4$	MA1	
	72	A1	
	(b) $6.4(3 + 4)/2$	MA1	
	22.4	A1	5
5	odd or even with suitable examples	MA2	2
6	**(a)** $0.18 + 0.3 + 0.28 + 0.02 = 0.78$	MA1	
	$1 - 0.78 = 0.22$	MA1	
	(b) $0.18 + 0.3$	M1	
	$= 0.48$	A1	4
7	$162\,000 \div 3 = 54\,000$	MA1	
	$54\,000 \times 14 = 756\,000$	MA1	2

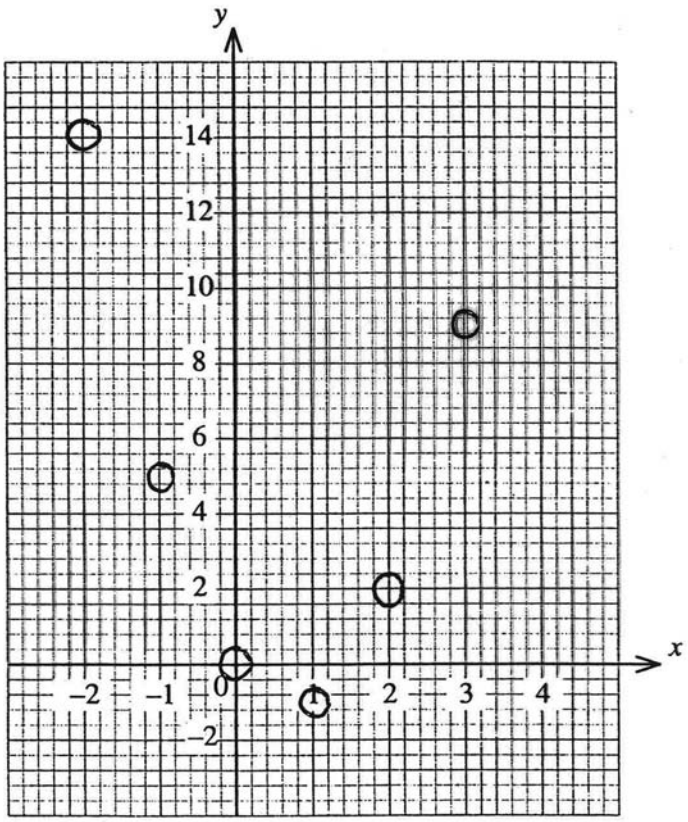
				AVAILABLE MARKS
8	**(a)**	$40 \times 21 = 840$	A1	
		$7900 \div 840 = 9.40476$	M1, A1	
		9.4 or 9	A1	
	(b)	**(i)** 4	A1	
		(ii) 2	A1	6
9	**(a)**	5, 2	A1, A1	
	(b)	all points correct smooth curve	A1 A1	
	(c)	readings	A1, A1	
	(d)	$2x^2 - 3x = 8$	A1	7
10		$7x - 3x \geq 1 - 9$	MA1	
		$4x \geq -8$		
		$x \geq -2$	A1	2
11		$8\pi \times 10$	MA1	
		251 (.3274123)	A1	2
12		$6.1 \times 10^8 \div 700$	MA1	
		$= 8.7 \times 10^5$	A1	2
13	**(a)**	1st branch completed with fail = 40%	MA1	
		2nd branch completed with 75%, 25% (should **not** be a branch from first attempt as pass)	MA1	
	(b)	0.4×0.75	MA1	
		30% or 0.3	A1	
		Answer 90% or 0.9	MA1	5

STEMUP.CO.UK

			AVAILABLE MARKS
14	$t = \frac{k}{w}$		
	$27 = \frac{k}{12}$		
	$k = 324$	MA1	
	$t = \frac{324}{w}$		
	$t = \frac{324}{t}$		
	$t^2 = 324$		
	$t = 18$	MA1	2
15	$x - 9 = (5 - \sqrt{x})^2$	M1	
	$x - 9 = 25 - 10\sqrt{x} + x$	MA1	
	$10\sqrt{x} = 34$		
	$\sqrt{x} = 3.4$		
	$x = 11.56$	A1	3
16	Arc PR = $36\pi \times \frac{80}{360} = 8\pi$ or 25.13274123	MA1	
	$8\pi = \pi d \longrightarrow r = 4$	MA1	
	$h^2 + 4^2 = 18^2$	MA1	
	$h = \sqrt{308} = 17.54992877$	MA1	
	$\frac{1}{3} \times \pi \times 4^2 \times 17.54992877$	MA1	
	294(.051879)	A1	6
		Total	**56**

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2010
MODULE N6-2
OVERLAY QUESTION 9



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education

2009

Mathematics



Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

GMN62

MONDAY 1 JUNE

10.45 am – 12.00 noon

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
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 sixteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

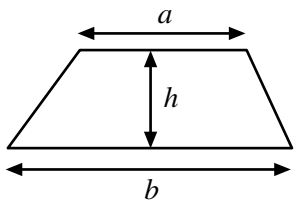
INFORMATION FOR CANDIDATES

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.

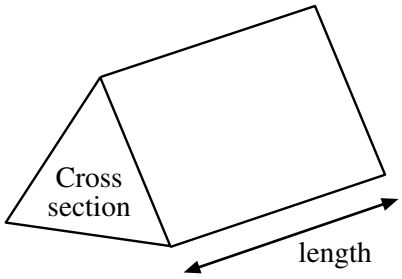
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

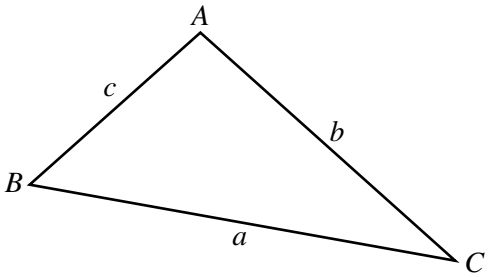


In any triangle ABC

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

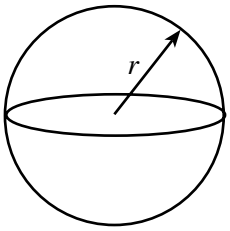
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



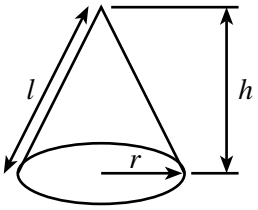
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

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

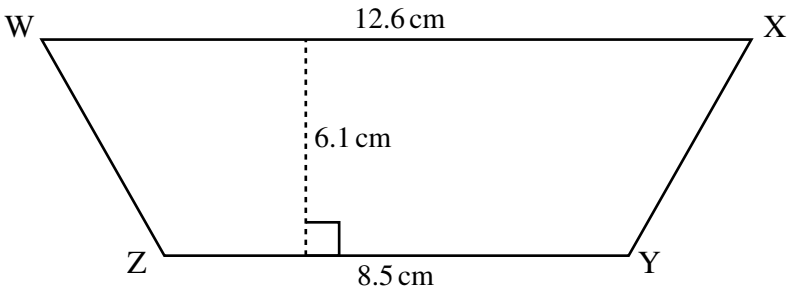
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Examiner Only	
Marks	Remark

1 A bag of 25 potatoes selected at random in a store has 4 bad potatoes. How many potatoes are expected to be bad out of a bag of 200 potatoes?

Answer _____ [2]

2 WXYZ is a trapezium.



Calculate the area of the trapezium.
Give your answer to an appropriate degree of accuracy.

Answer _____ cm^2 [3]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

3 **(a)** To feed 30 people John makes

20 beef sandwiches
36 cheese sandwiches
52 ham sandwiches

How many of each would he need to make for 45 people?

Answer _____ beef

Answer _____ cheese

Answer _____ ham

[3]

(b) £1 = $2 and $5 = €3

Which is cheaper, a camera bought for £36 or another bought for €42?
Show your working.

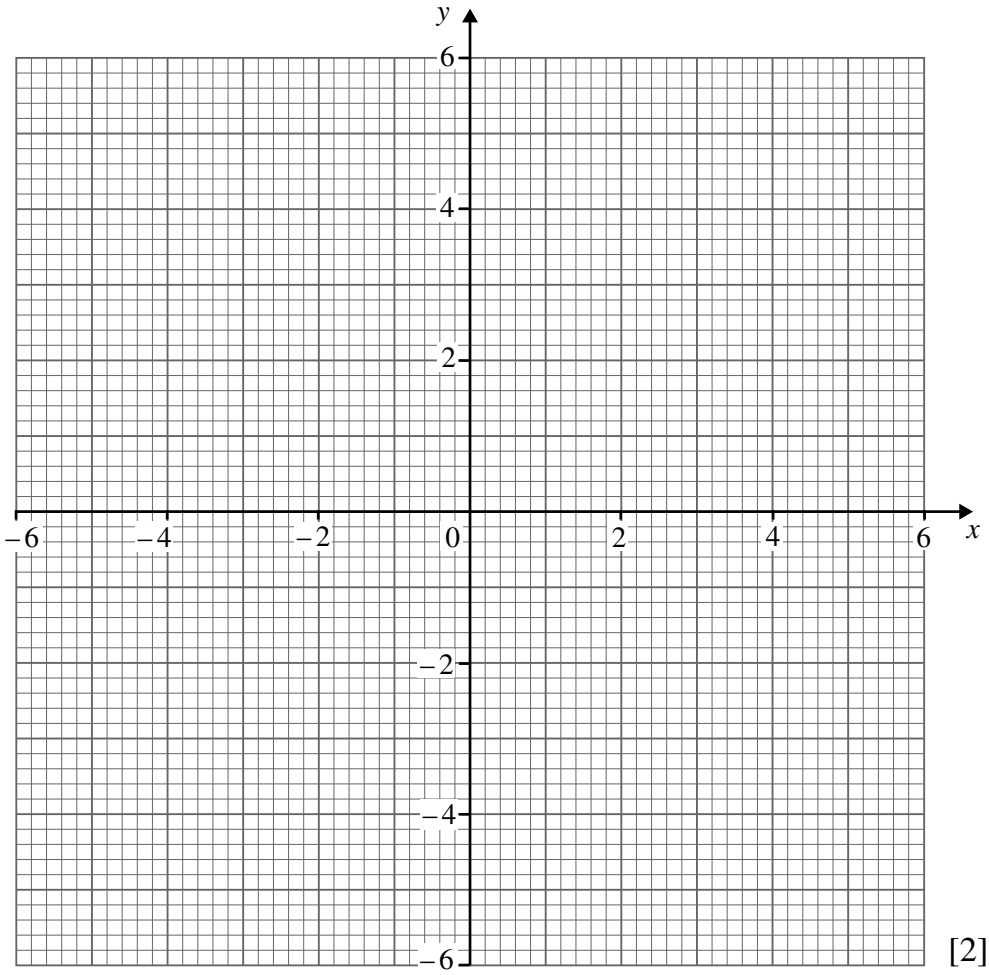
Answer: The camera bought for _____ [2]

4 **(a)** Complete the table of values for $y = x^2 - 3$

x	–3	–2	–1	0	1	2
y	6		–2	–3		1

[2]

(b) Hence draw the graph of $y = x^2 - 3$



[2]

Examiner Only

Marks	Remark

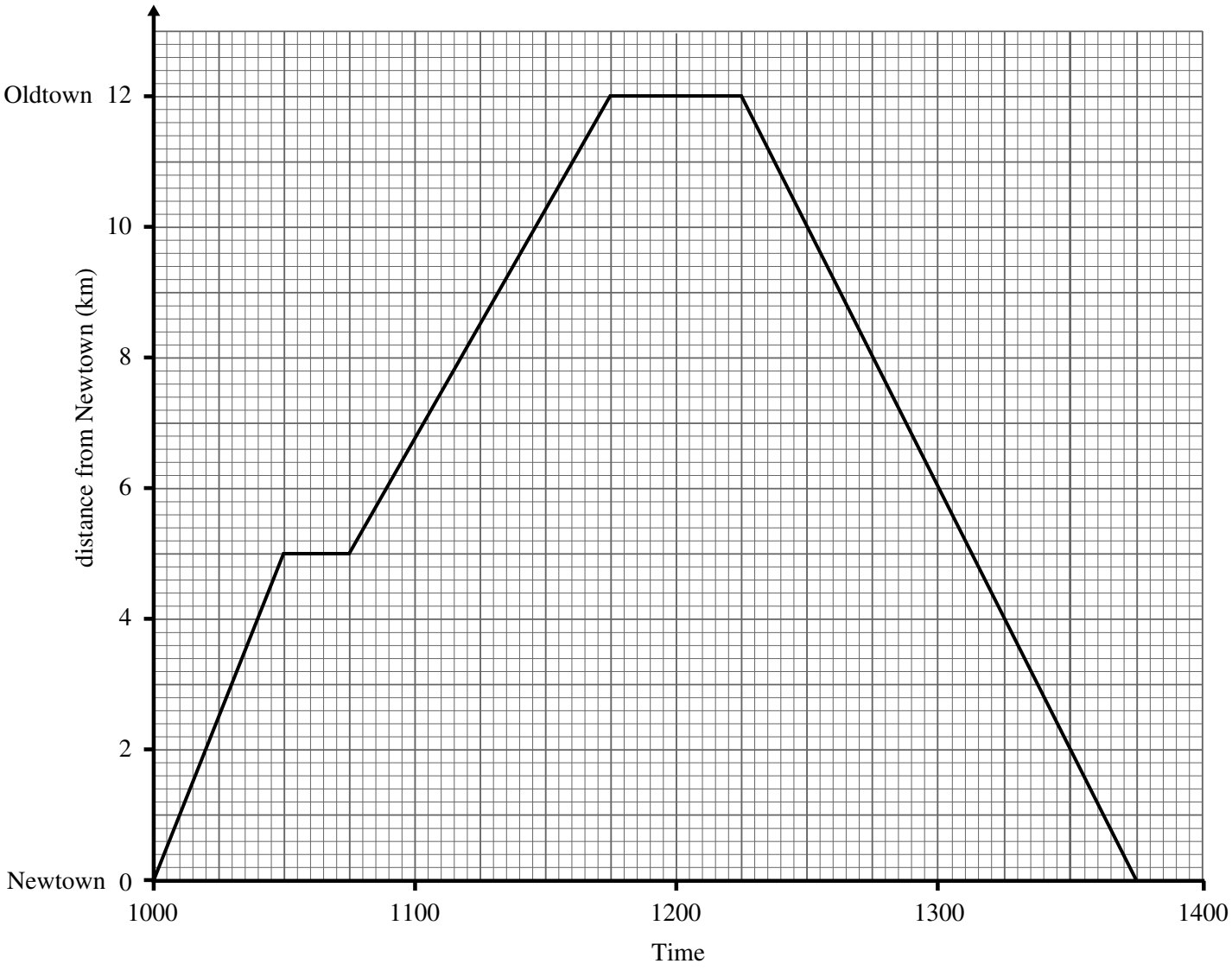
5 A piece of metal has a volume of 600 cm^3 and weighs 2700 g. Calculate its density.

Answer _____ g/cm^3 [2]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

6 An athlete goes for a run from Newtown to Oldtown and back. His journey is illustrated on the graph.



Examiner Only	
Marks	Remark

(a) What is the athlete's speed on the return journey from Oldtown to Newtown?

Answer _____ km/hr [2]

(b) A second athlete leaves Oldtown at 1030 and runs towards Newtown, at a speed of 7 km/hr.

(i) Illustrate his journey on the graph above. [3]

(ii) At what time do the two athletes pass each other?

Answer _____ [1]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

7 In Westwood School there are 550 girls and 450 boys. The probability that a girl plays the piano is 0.3 and the probability that a boy plays the piano is 0.18

How many pupils at Westwood School play the piano?

Answer _____ [4]

---

8 £180 is divided between Lisa, Mikey and Richard in the ratio 8:1:6
How much does each get?

Answer £ _____ Lisa

Answer £ _____ Mikey

Answer £ _____ Richard [3]

---

9 Simplify

(a) $t^3 \times t^3$

Answer _____ [1]

(b) $r^6 \div r^2$

Answer _____ [1]

(c) $4x^{-1}y^3 \times 2x^2y$

Answer _____ [2]

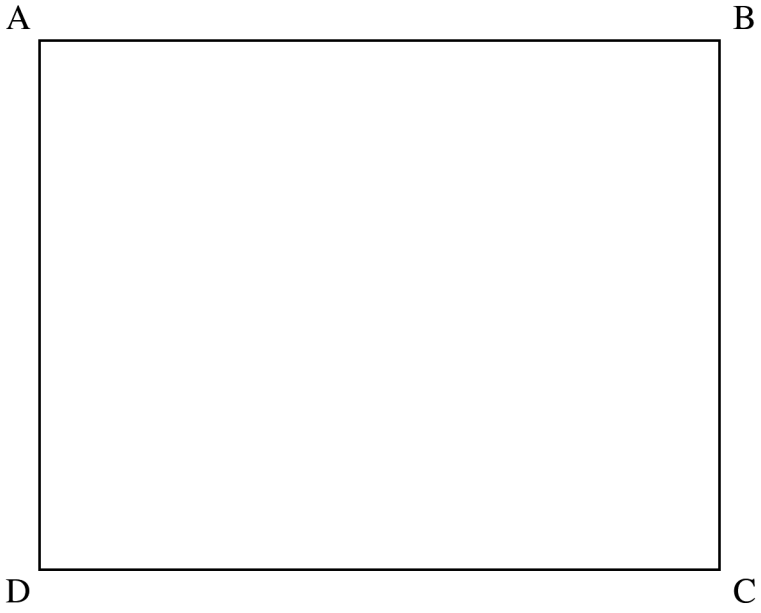
STEMUP.CO.UK

10 Calculate the surface area of a sphere of radius 9 cm.

Examiner Only	
Marks	Remark

Answer _____ cm^2 [2]

11



(a) Draw the locus of points that are the same distance from C as from D. [2]

(b) Shade the region inside the rectangle which is less than 6 cm from A and closer to C than to D. [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

12 h, l and r represent lengths.
Complete the table below indicating whether the expressions could represent

length area volume none of these

$\frac{3\pi r^2 h}{2rl}$	$\frac{\pi rlh}{r^3}$	$4\pi r^2(l + h)$	$(l + r)(h - r)$

[3]

13 Make r the subject of the formula $p = \frac{50(q+r)}{r}$.

Answer r = _____ [4]

STEMUP.CO.UK

14 The diagram shows a sector of a circle, radius 20 cm. Angle AOB = 144 °

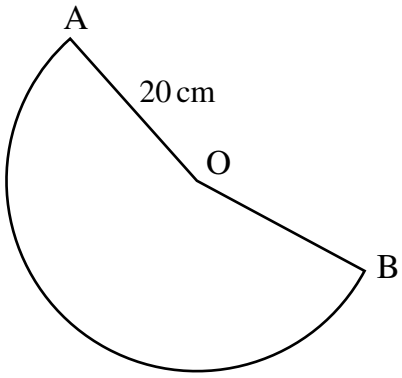
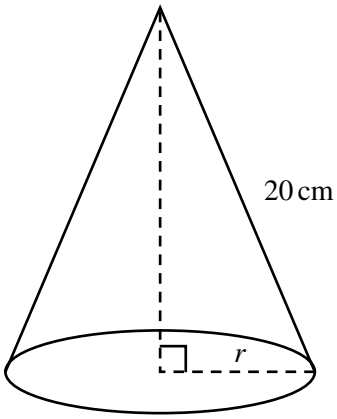


Diagram not drawn accurately

(a) Find, in terms of π, the arc length of the sector.

Answer _____ cm [3]

The straight edges of the sector are joined together to form a cone with slant height 20 cm as shown below.



(b) Find the radius, *r*, of the base of the cone.

Answer _____ cm [2]

Examiner Only

Marks	Remark

STEMUP.CO.UK

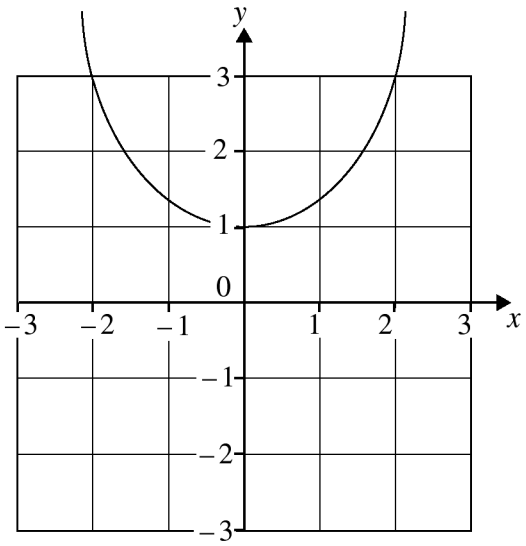
Examiner Only	
Marks	Remark

15 Given that $y = x^2 - 6x + 4$ can be written as $y = (x - 3)^2 - 5$, write down the coordinates of the minimum point on the graph of $y = x^2 - 6x + 4$

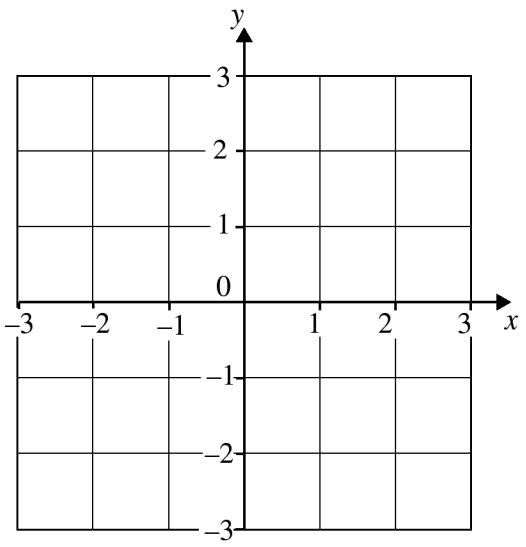
Answer _____ [2]

---

16 The grid shows a sketch of a function $y = f(x)$.



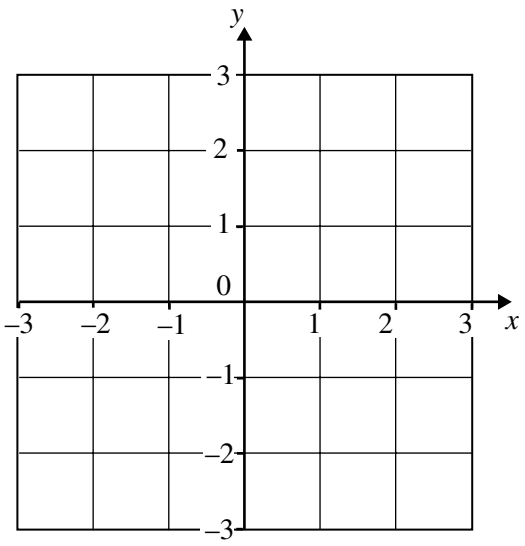
(a) Sketch the function $y = -f(x)$



[1]

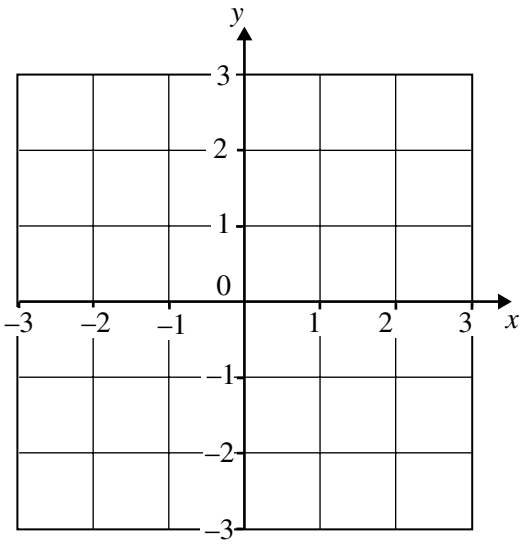
STEMUP.CO.UK

(b) Sketch the function $y = f(3x)$



[1]

(c) Sketch the function $y = f(x) - 3$



[1]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

GCSE

Mathematics (Modular)

Summer 2009

Mark Schemes

Issued: October 2009

Rewarding Learning

General Certificate of Secondary Education
Summer 2009

Mathematics

Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

MONDAY 1 JUNE
10.45 am – 12.00 noon

MARK SCHEME

STEMUP.CO.UK

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more that half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

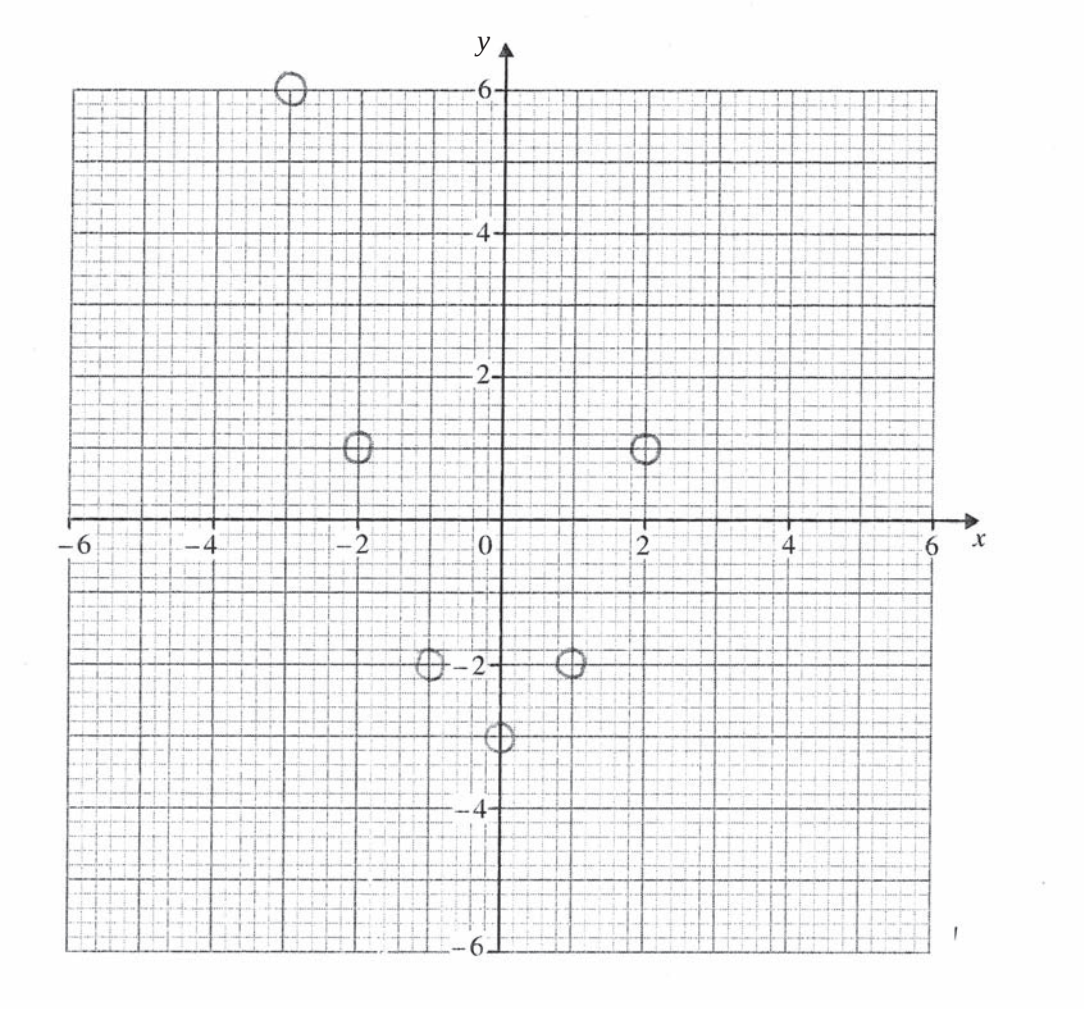
			AVAILABLE MARKS
1	$\left[\frac{4}{25}\right] \times 200$	MA1	
	32	A1	2
2	$\frac{1}{2}(8.5 + 12.6) \times 6.1 = 64.355$	M1, A1	
	Answer 64	A1 (accuracy)	3
3	**(a)** $1\frac{1}{2} \times 20 = 30$	MA1	
	$1\frac{1}{2} \times 36 = 54$	MA1	
	$1\frac{1}{2} \times 52 = 78$	MA1	
	(b) $\frac{€42}{€3} = 14$		
	$14 \times 5 = \$70 = £\frac{70}{2}$		
	$\therefore \quad = £35$		
	$\therefore$ €42 camera is cheaper	M1, A1	5
4	**(a)** 1 and –2	A1, A1	
	(b) plotting points	A1	
	accuracy of curve	A1	4
5	$\frac{2700}{600} = 4.5$	M1, A1	2
6	**(a)** $12 \div 1\frac{1}{2}$	M1	
	$= 8$km/hr	A1	
	(b) **(i)** starting point (1030, 12)	A1	
	line passing through (1130, 5)	MA2	
	(ii) 1108 or 1107	A1	6
7	$550 \times 0.3 = 165$	M1, A1	
	$450 \times 0.18 = 81$	MA1	
	$165 + 81 = 246$	MA1	4

STEMUP.CO.UK

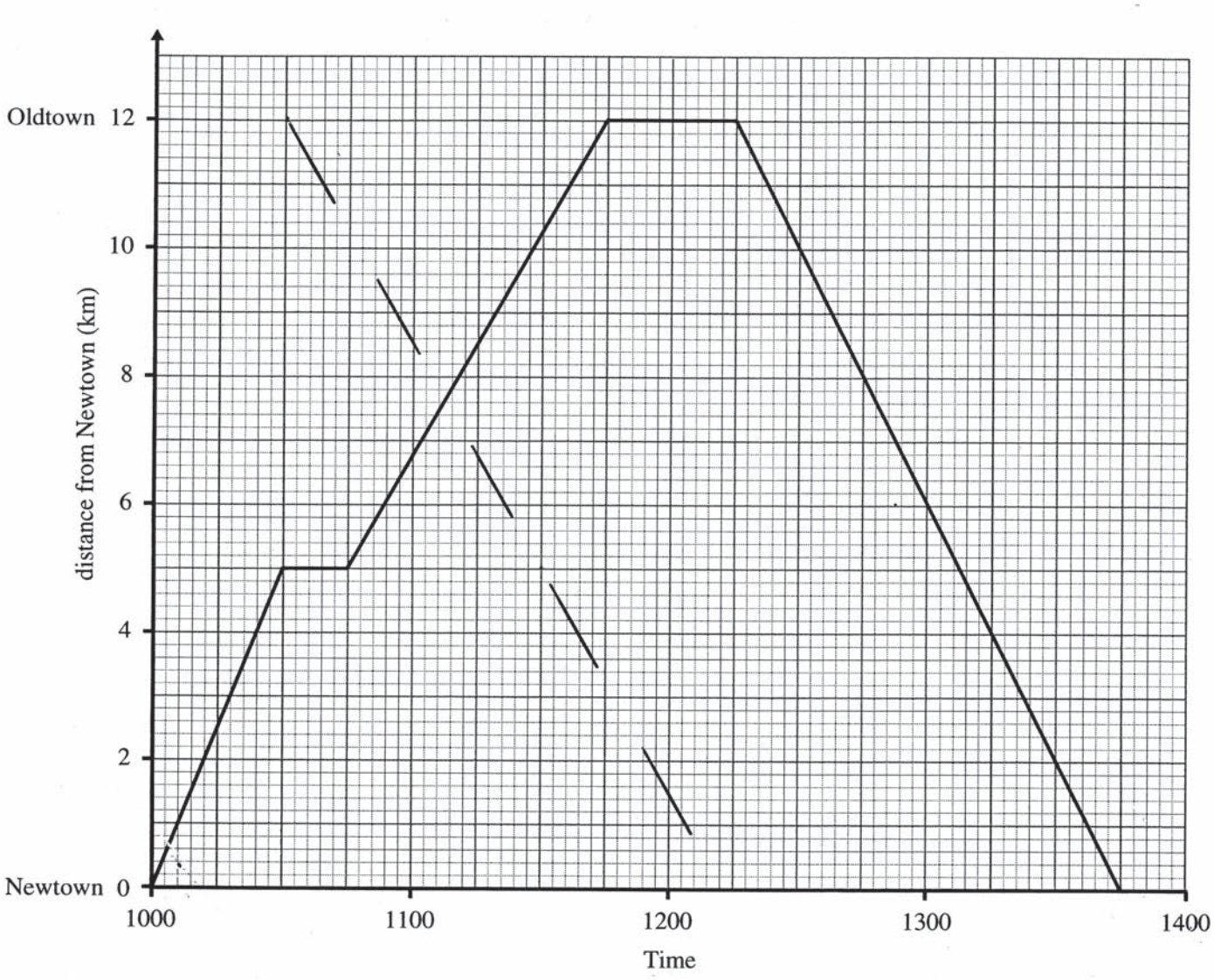
			AVAILABLE MARKS
8	£12 × 8 = £96 (Lisa) £180 ÷ 15 = £12 (Mikey) £12 × 6 = £72 (Richard)	MA1 MA1 MA1	3
9	**(a)** t^6	A1	
	(b) r^4	A1	
	(c) $8xy^4$	A2 for 3 correct terms (A1 for any two)	4
10	$4\pi \times 9^2 = 1017.876$	M1, A1	2
11	**(a)** Perpendicular bisector of CD	A2	
	(b) Circular arc centre A, radius 6 cm Shaded area between arc and perp. bisector (upper part)	A1 A1	4
12	length none volume area (3 correct A2, 2 correct A1)	A3	3
13	$pr = 50q + 50r$ $pr - 50r = 50q$ $r(p - 50) = 50q$ $r = \dfrac{50q}{p - 50}$	MA1 MA1 MA1 MA1	4
14	**(a)** Arc length $= \dfrac{216}{360} \times 2\pi \times 20 = 24\pi$	MA1, M1, A1	
	(b) $2\pi r = 24\pi$ $r = 12$	M1 A1	5
15	(3, –5)	A1, A1	2
16	**(a)** correct transformation (reflection in x axis)	A1	
	(b) correct transformation (enlargement scale factor $\frac{1}{3}$ on x axis)	A1	
	(c) correct transformation (3 down)	A1	3
		Total	**56**

STEMUP.CO.UK

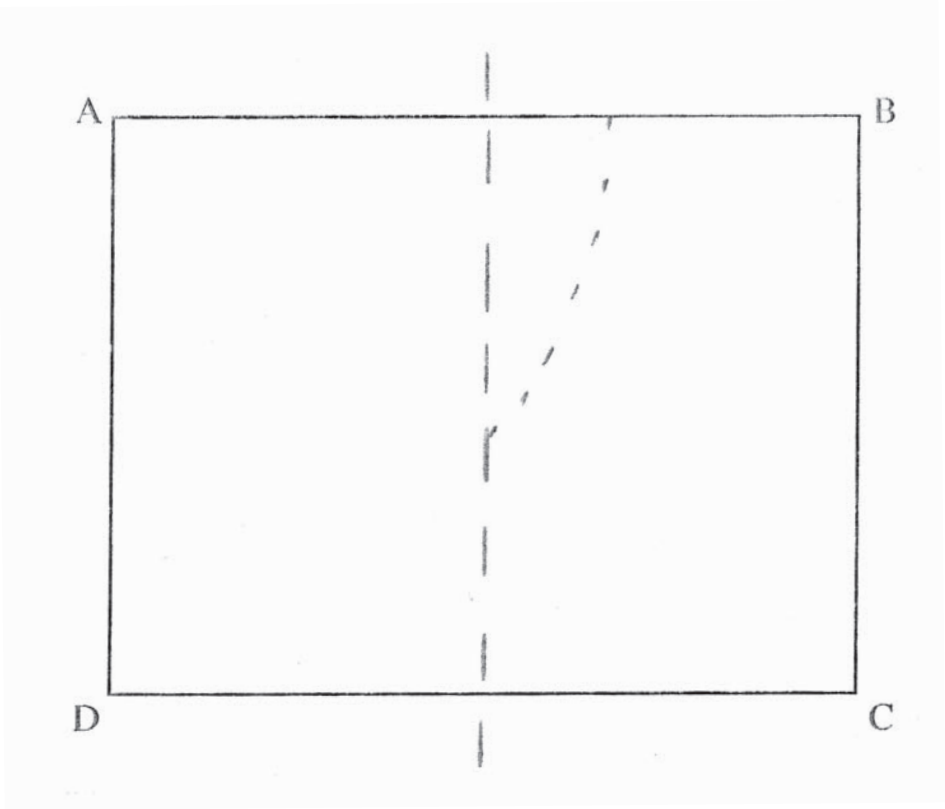
GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 4



GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 6



GCSE MATHEMATICS SUMMER 2009
MODULE N6-2
OVERLAY QUESTION 11



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics



Module N6 Paper 2
(With calculator)
Higher Tier

[GMN62]

GMN62

WEDNESDAY 14 JANUARY

3.00 pm – 4.15 pm

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

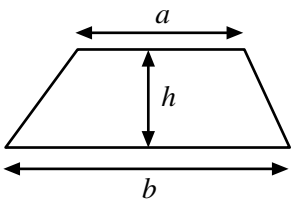
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

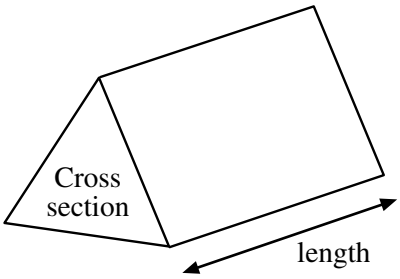
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

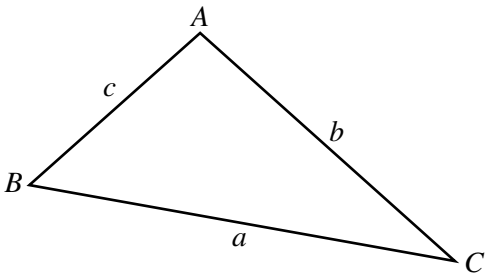


In any triangle ABC

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

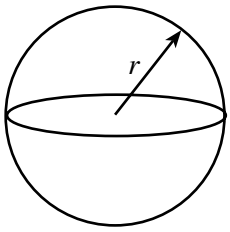
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



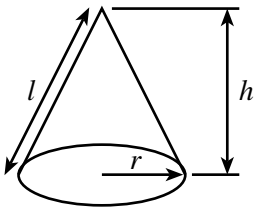
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

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

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

1 Rearrange $y + 5 = 7 - x$ to make x the subject.

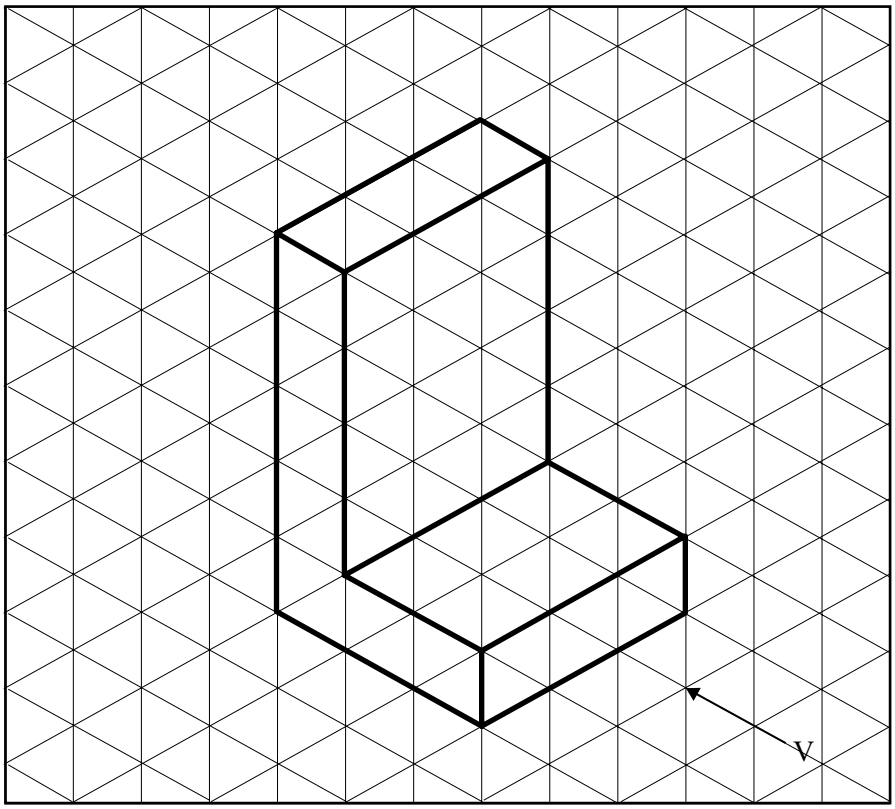
Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark

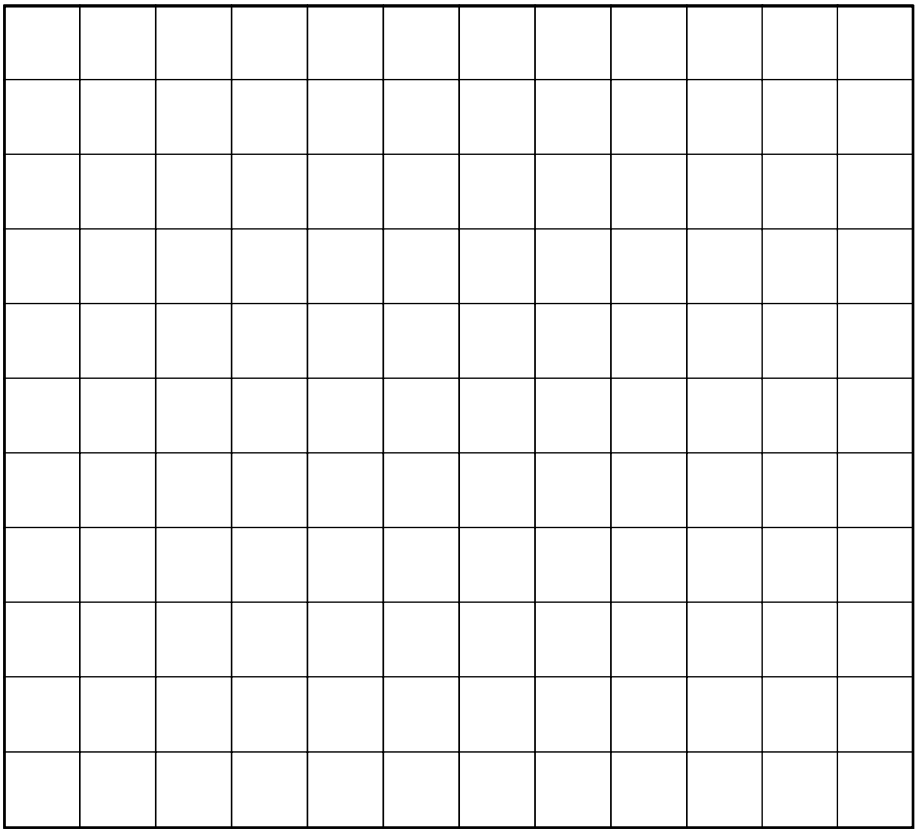
STEMUP.CO.UK

2 **(a)** On the lower grid draw the front elevation of the solid as viewed from V.

Examiner Only	
Marks	Remark

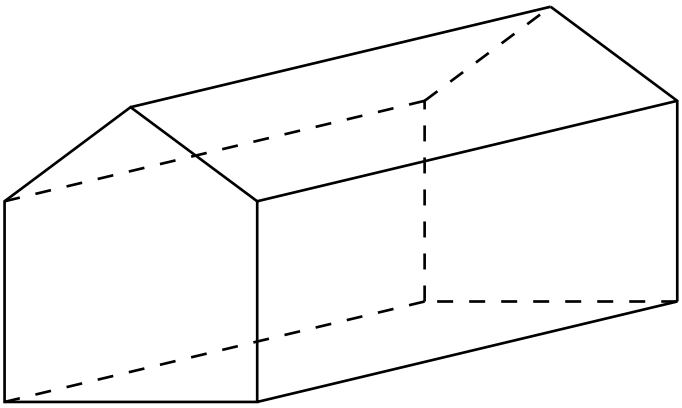


Front elevation



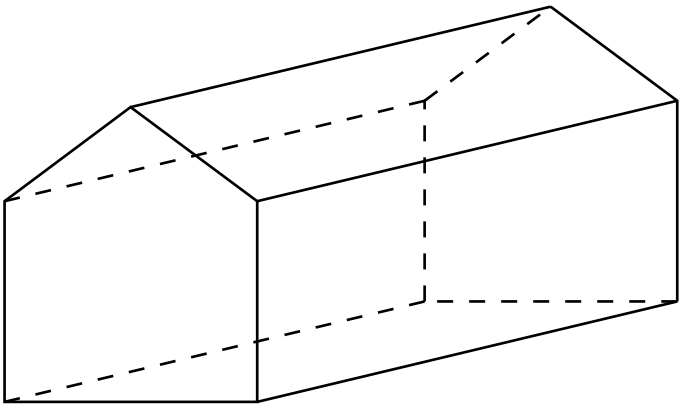
[2]

(b) (i) Draw a plane of symmetry in this solid.



[1]

(ii) Draw a different plane of symmetry in this solid.



[1]

Examiner Only

Marks	Remark

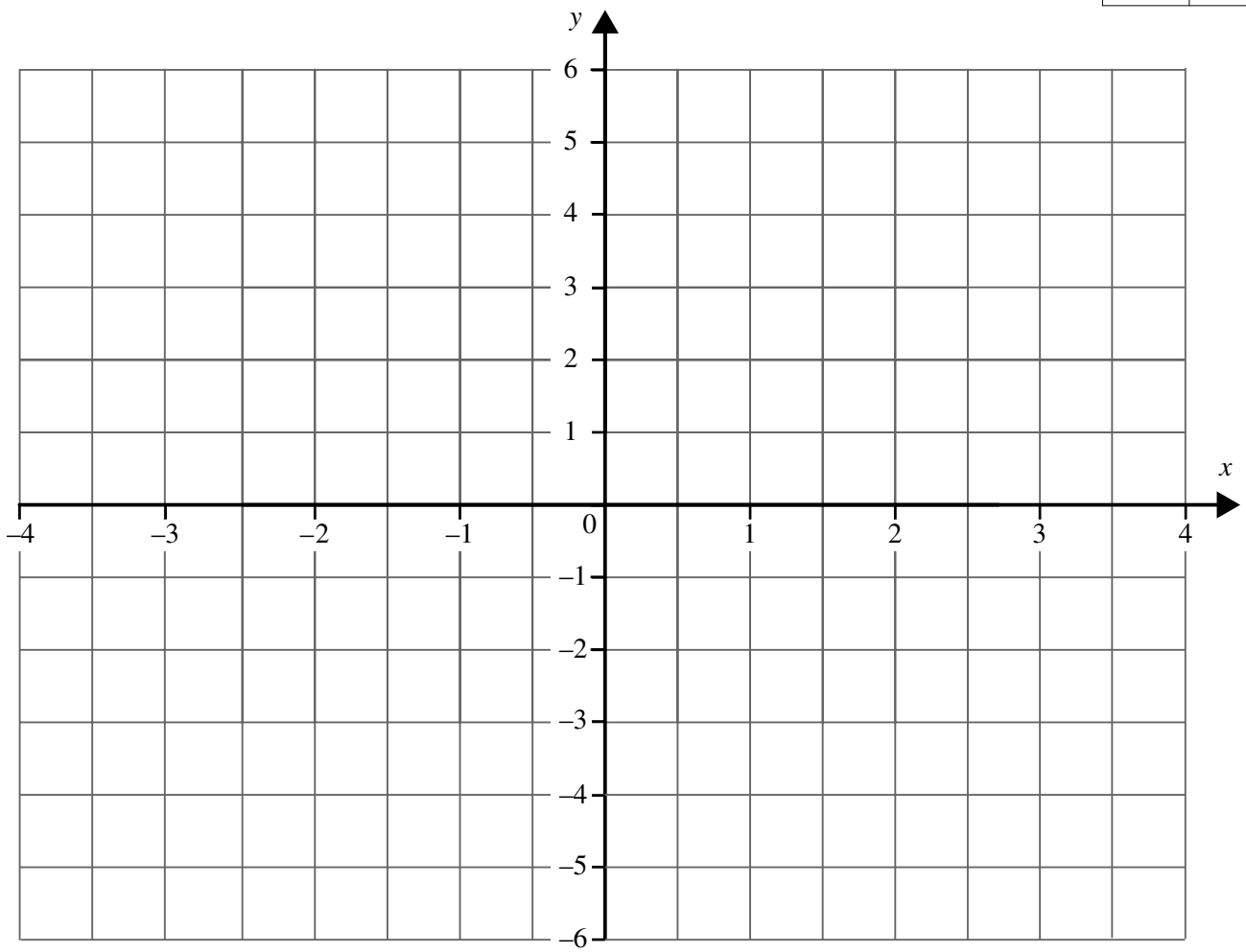
3 **(a)** Complete the table for the graph of $y = 5 - x^2$

Examiner Only	
Marks	Remark

x	–3	–2	–1	0	1	2
y	–4		4	5	4	

[2]

(b) Hence draw the graph on the grid below. [2]



STEMUP.CO.UK

4 Which of 'always odd', 'always even', 'could be odd or even' describes the number $4n - 3$? (n is an integer)
Explain your answer.

Answer _____

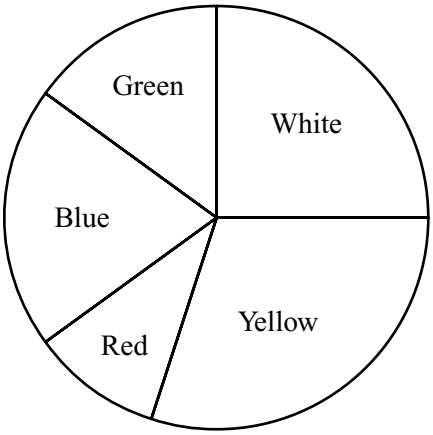
because _____

_____ [2]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

5



A spinner can land on one of 5 colours. The probability of the spinner landing on four of the colours is given in the table below.

Colour	Red	Blue	White	Yellow	Green
Probability	0.1		0.25	0.3	0.15

(a) What is the probability that the spinner will land on blue?

Answer _____ [2]

The spinner is spun 600 times.

(b) How many times would you expect the spinner to land on white or green?

Answer _____ [2]

(c) The probability that a contestant wins £100, £200, £500 or £1000 in a TV quiz show is given in the table below.

Winnings	£100	£200	£500	£1000
Probability	0.3	0.35	0.2	0.15

Find the probability that a contestant selected at random will win at least £500.

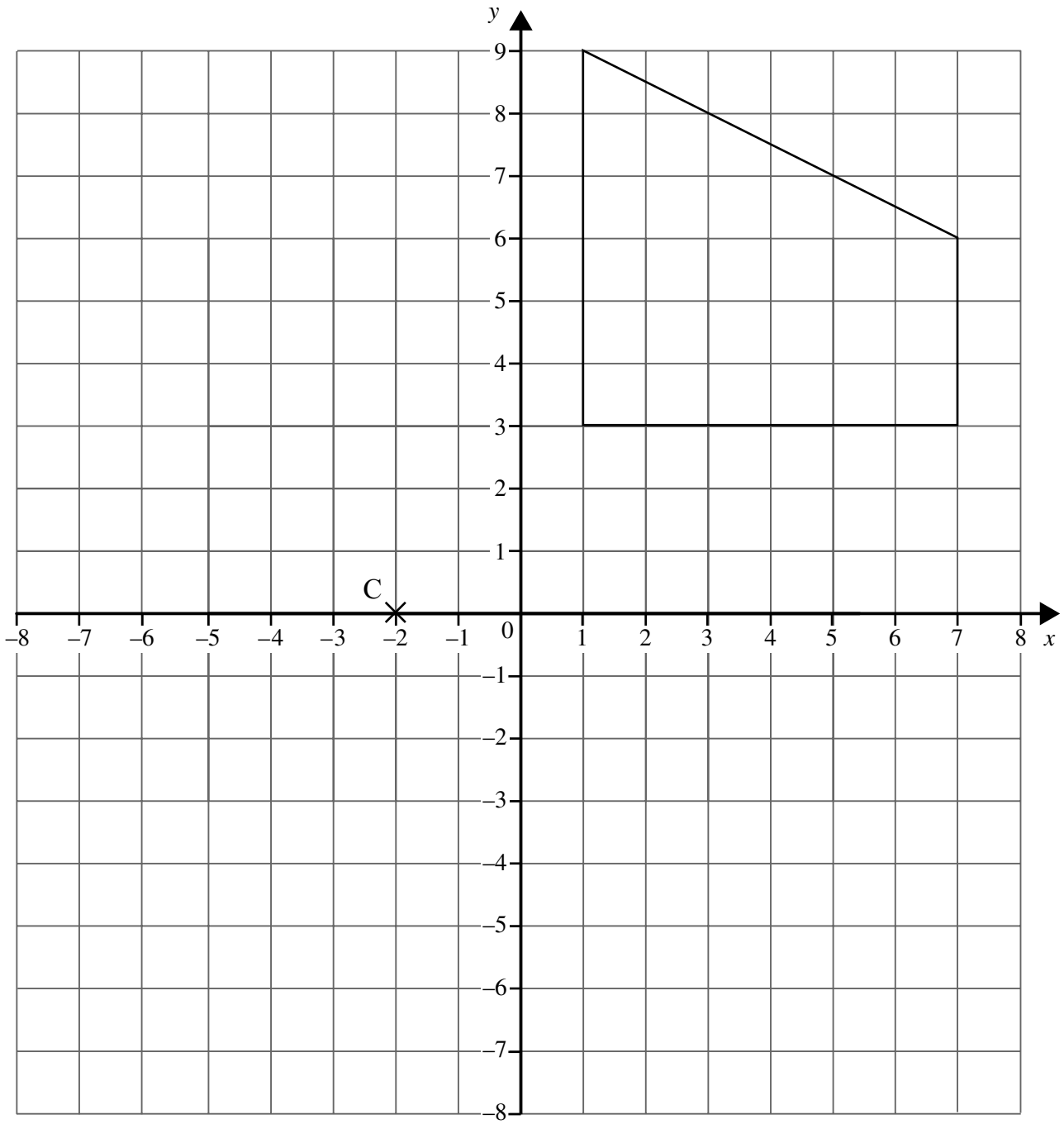
Answer _____ [2]

Examiner Only

Marks	Remark

STEMUP.CO.UK

6 Enlarge the shape on the grid by scale factor $\frac{1}{3}$ and centre C.



[2]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

7 £8 500 is shared between Alice, Barbara and Carol in the ratio 10 : 9 : 6 respectively.
Calculate the amount each one gets.

Alice £ _____

Barbara £ _____

Carol £ _____ [3]

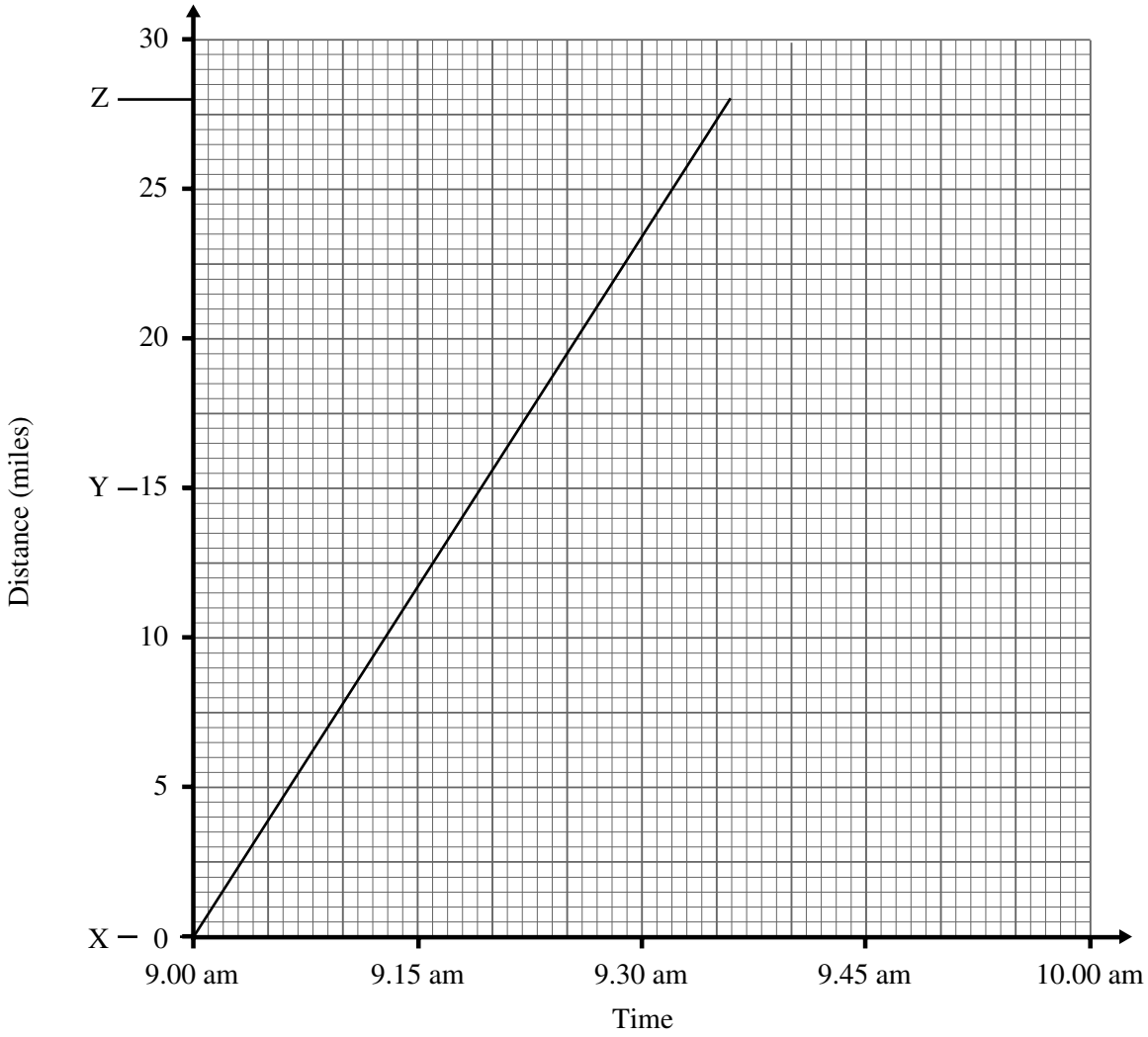
8 There are 240 males and 180 females working in an electronics company.
The probability that a male worker is married is 0.4 and that a female worker is married is 0.45
No male worker in the electronics company is married to a female worker in the company.

Calculate the number of married workers in the electronics company.

Answer _____ [4]

STEMUP.CO.UK

9 A car travels from town X to town Z passing through town Y, 15 miles from X. The graph shows its journey.



Another car leaves town Z at 9.10 am and travels to town Y arriving at 9.30 am. It stops there for 3 minutes and then travels to town X at an average speed of 45 mph.

(a) Show the journey of this car on the graph as it travels from town Z to town X. [3]

(b) At what time do the cars pass each other?

Answer _____ am [1]

Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

10 **(a)** Calculate the area of the trapezium ABCD.
Give your answer to an appropriate degree of accuracy.

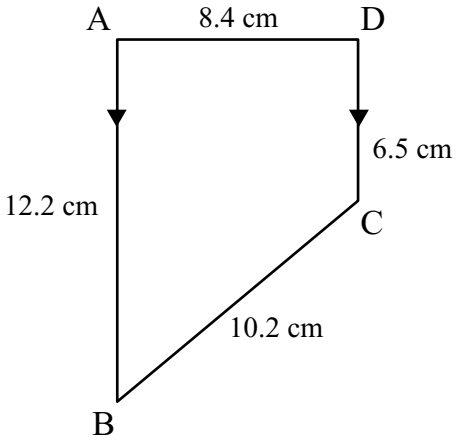
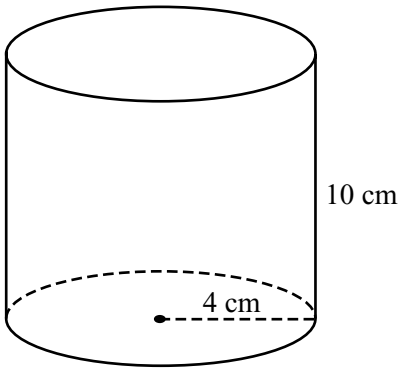


Diagram not drawn accurately

Answer _____ cm^2 [3]

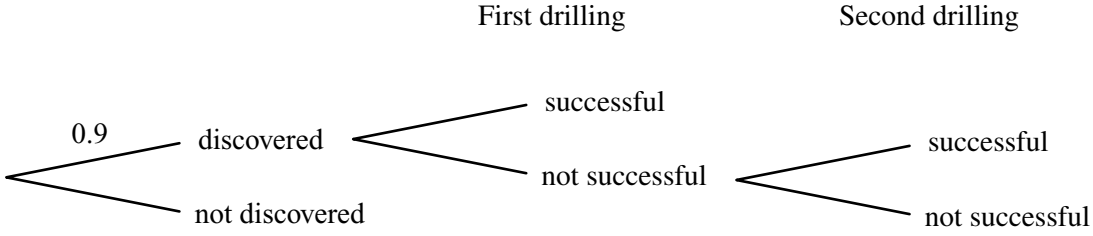
(b) Calculate the curved surface area of the cylinder.



Answer _____ cm^2 [2]

STEMUP.CO.UK

11



The probability of a famous oil prospector discovering oil in a region of the North Sea is 0.9
If she discovers oil, the chance of pumping oil to the surface on the first drilling is 0.7
If the first drilling fails, the chance of successfully pumping oil to the surface on the second drilling is 0.4
If the second drilling is unsuccessful, the drilling is abandoned as the process is too expensive.

(a) Complete the tree diagram for these events. [2]

(b) What is the probability of discovering oil and pumping it to the surface on the first drilling?

Answer _____ [2]

(c) What is the probability that oil will be discovered and pumped to the surface?

Answer _____ [3]

(d) What is the probability that no oil will be pumped to the surface?

Answer _____ [1]

Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

12 **(a)** Rearrange $x(y + 1) = 2$

to find y in terms of x.

Answer $y =$ _____ [2]

(b) Make r the subject of $v = \sqrt{ar}$

Answer $r =$ _____ [2]

---

13 y varies inversely as the square of x. When $x = 6$, $y = 6.75$

(a) Express y in terms of x

Answer $y =$ _____ [3]

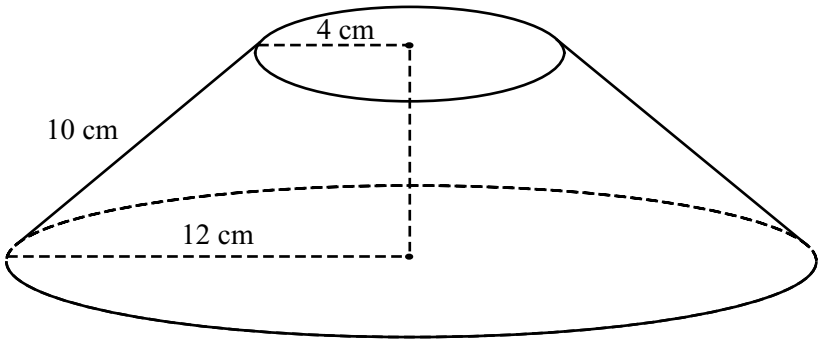
(b) Find the value of y when $x = \frac{1}{3}$

Answer $y =$ _____ [1]

STEMUP.CO.UK

14 Calculate the curved surface area of the frustum of a solid cone.

Examiner Only	
Marks	Remark



Answer _____ cm^2 [4]

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

GCSE

Mathematics (Modular)

January 2009

Mark Schemes

Issued: April 2009

Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N6 Paper 2

(With calculator)

Higher Tier

[GMN62]

WEDNESDAY 14 JANUARY

3.00 pm – 4.15 pm

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2009

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:

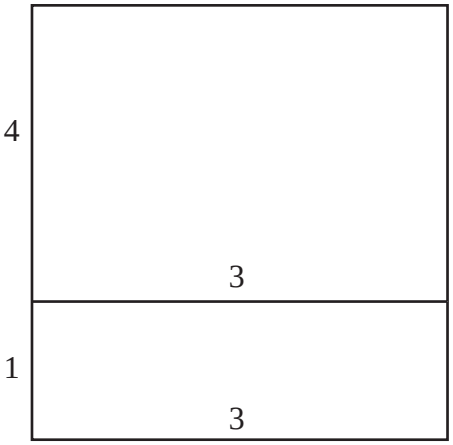
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

			AVAILABLE MARKS
1	$y + x = 2$ $x = 2 - y$	A1 A1	2
2	**(a)** 	A1, A1 (each rectangle)	
	(b) 2 vertical planes identified	A1, A1	4
3	**(a)**	A1, A1	

x	–2	2
y	1	1

	See overlay **(b)** Points correctly plotted Accuracy of curve	 A1 A1	 4
4	always odd suitable reason, e.g. $4x$ is always even; subtracting 3 gives odd number	 A1, A1	 2
5	**(a)** $0.1 + 0.25 + 0.3 + 0.15 = 0.8$ $1 - 0.8 = 0.2$	MA1 MA1	
	(b) $(0.25 + 0.15) \times 600 = 0.4 \times 600 = 240$	M1, A1	
	(c) $0.2 + 0.15 = 0.35$	M1, A1	6
6	See overlay Correct size Correct centre used	 A1 A1	 2
7	$8500 \div 25 = 340$ Alice £3400 Barbara £3060 Carol £2040	MA1 MA1 MA1	 3

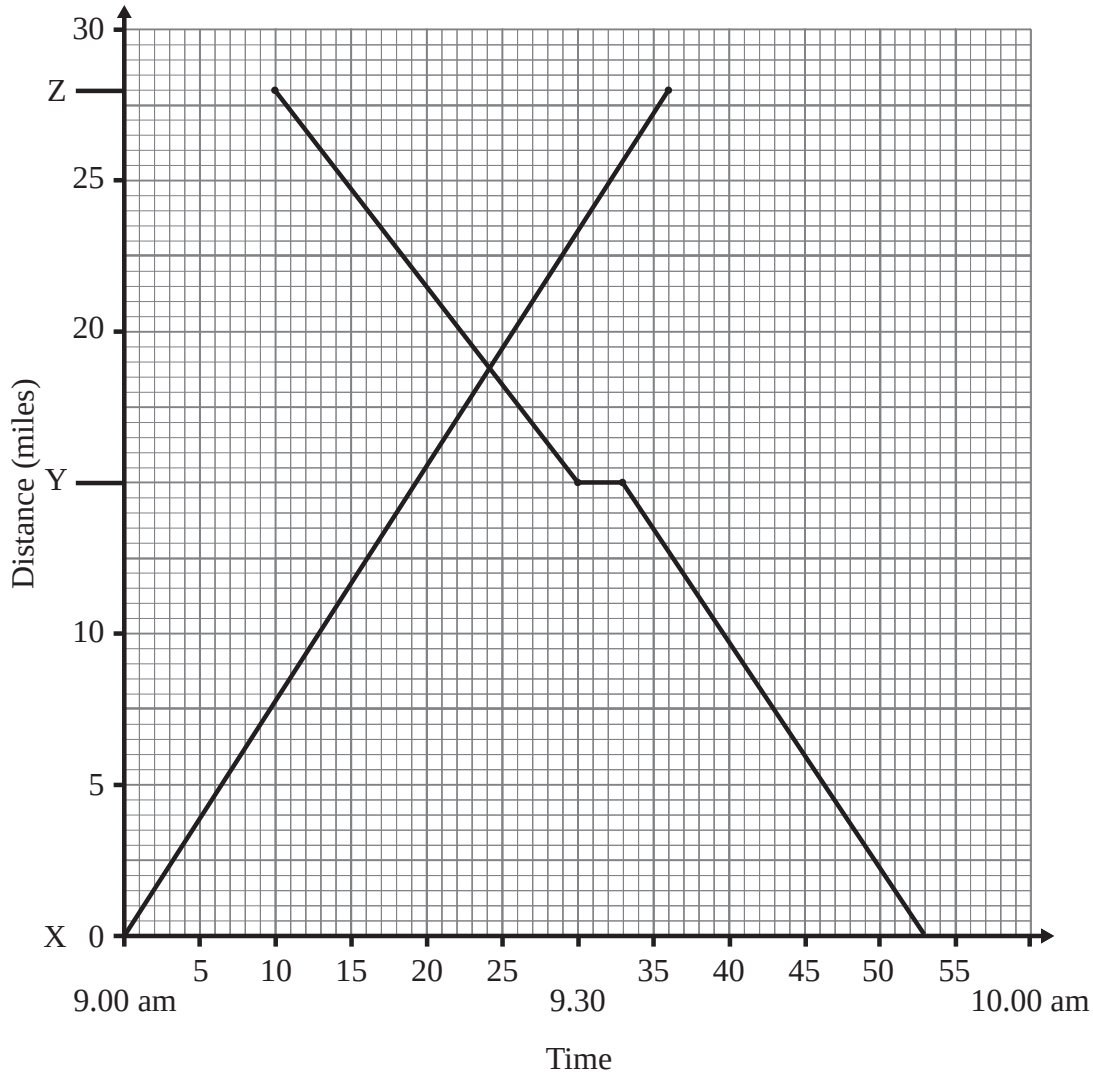
STEMUP.CO.UK

	AVAILABLE MARKS

8 $240 \times 0.4 + 180 \times 0.45$ M1, A1
$96 + 81 = 177$ MA1, A1 — 4

9 **(a)** See overlay
Correct straight line drawn to y A1
Correct line for 3 minutes A1
Indication of 20 minutes for last part of journey and line drawn to axes MA1

(b) 9.24 am (from graph) A1 — 4

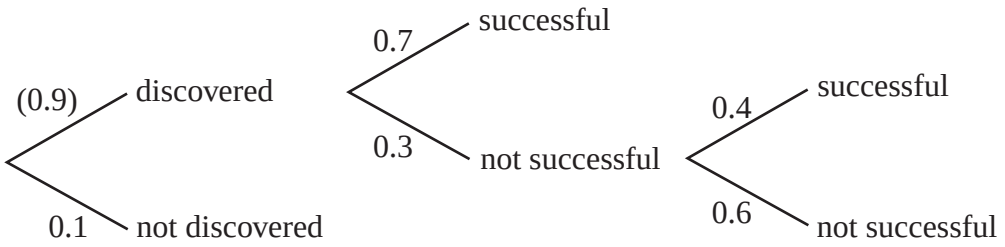


10 **(a)** $\frac{1}{2}(12.2 + 6.5) \times 8.4$ MA1
$= 78.54$ A1

Answer 79 (accept 78.5) A1

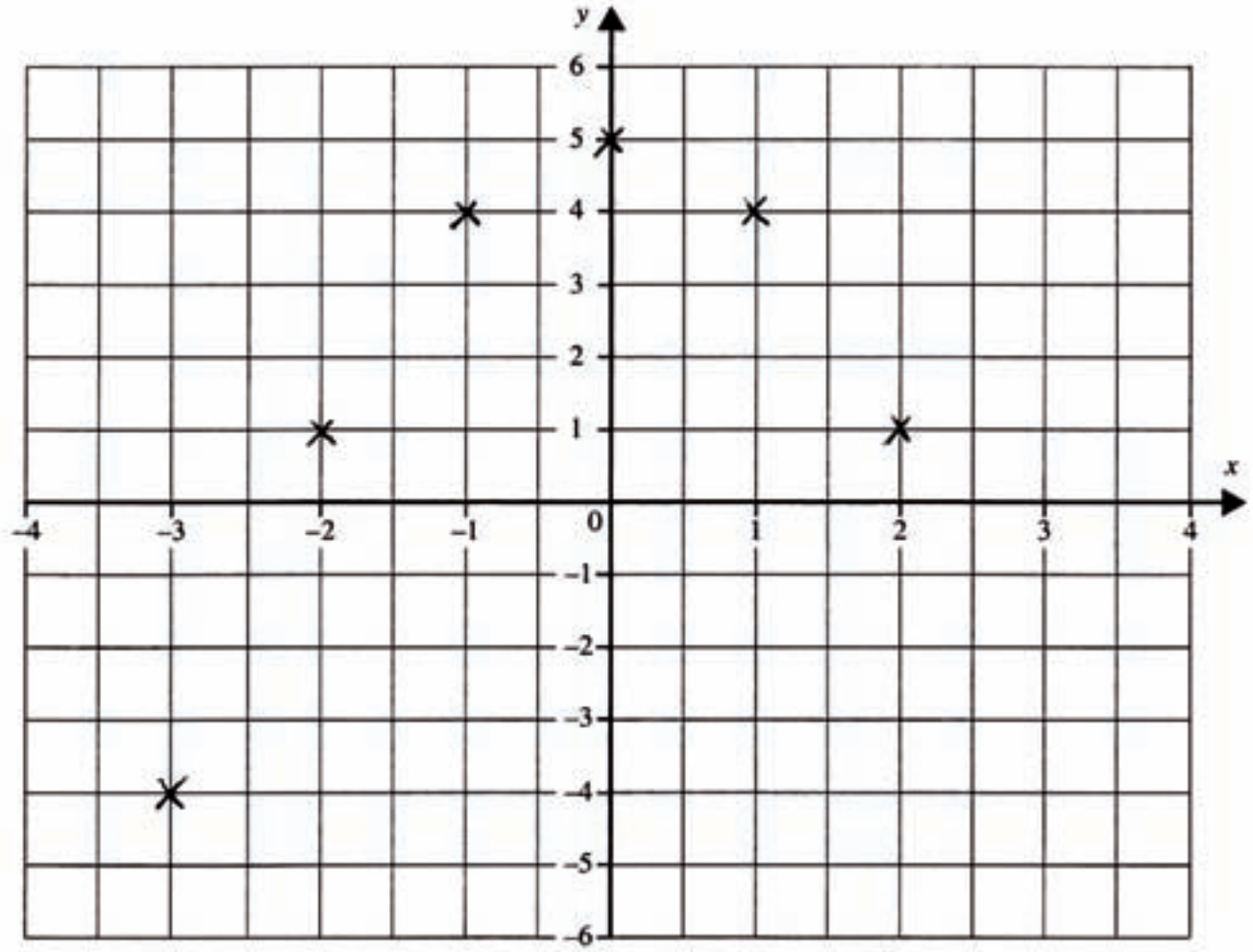
(b) $2 \times \pi \times 4 \times 10$ MA1
$= 251.3$ A1 — 5

STEMUP.CO.UK

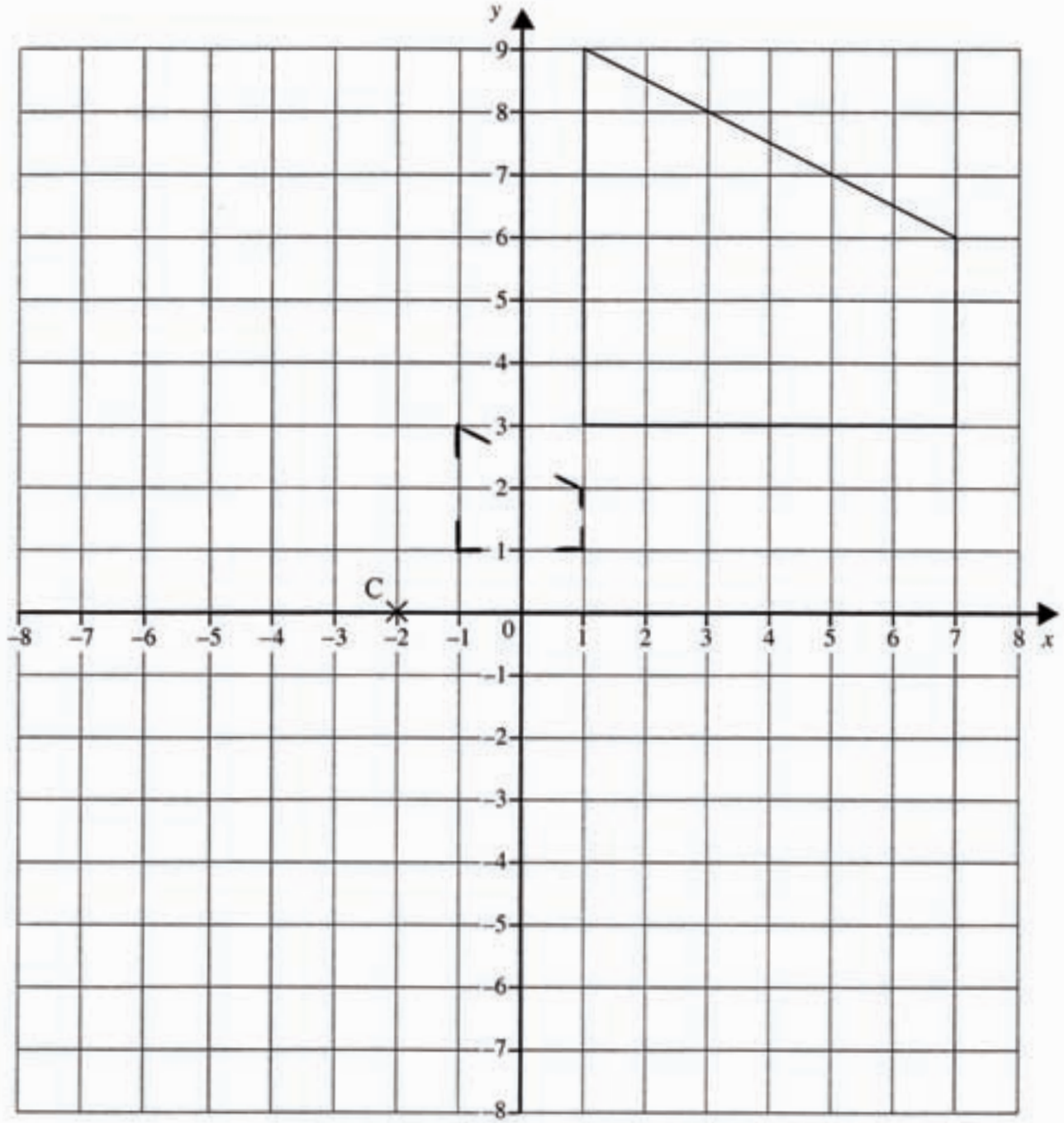
			AVAILABLE MARKS
11	**(a)**		
		(A1 for 3 or 4 correct) A2	
	(b)	$0.9 \times 0.7 = 0.63$ MA1, A1	
	(c)	$0.9 \times 0.7 + 0.9 \times 0.3 \times 0.4$ MA1, A1 $= 0.63 + 0.108 = 0.738$ A1	
	(d)	$1 - 0.738 = 0.262$ MA1	8
12	**(a)**	$y + 1 = \frac{2}{x}$ MA1	
		$y = \frac{2}{x} - 1$ MA1	
		or $xy + x = 2 \rightarrow xy = 2 - x$ MA1	
		$y = \frac{2 - x}{x}$ MA1	
	(b)	$v^2 = ar$ MA1	
		$r = \frac{v^2}{a}$ A1	4
13	**(a)**	$y = \frac{k}{x^2}$	
		$6.75 = \frac{k}{36}$ MA1	
		$k = 36 \times 6.75 = 243$ MA1	
		$y = \frac{243}{x^2}$ A1	
	(b)	$y = \frac{243}{\left(\frac{1}{3}\right)^2}$	
		$= 2187$ A1	4
14		Slant height of small cone 5 cm M1, A1	
		$CSA = \pi \times 12 \times 15 - \pi \times 4 \times 5$ MA1	
		160π (= 502.7) A1	4
		Total	**56**

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 3



GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N6-2
OVERLAY QUESTION 9

