CCEA GCSE MATHEMATICS (MODULAR)

MATHS



EXAM QUESTION PACK

MODULE N6 PAPER 1 (NON-CALCULATOR) HIGHER TIER GMN61 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 1
(Non-calculator)
Higher Tier

[GMN61]

MONDAY 16 JANUARY

9.15 am–10.30 am

GMN61

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 thirteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

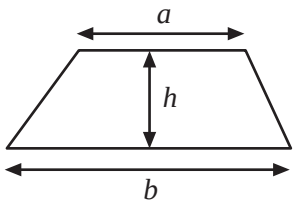
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

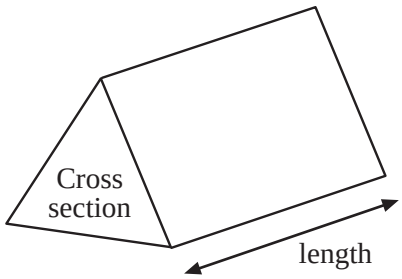
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

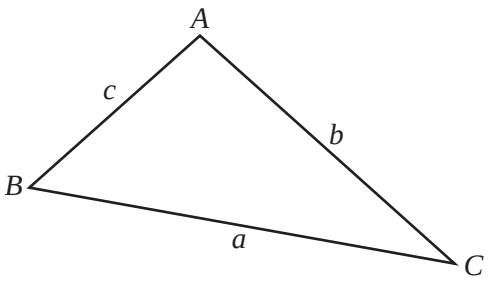


In any triangle *ABC*

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

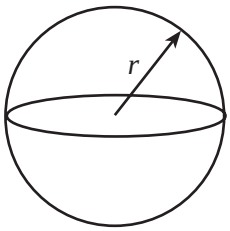
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



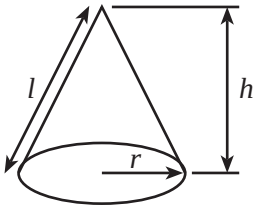
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

Examiner Only	
Marks	Remark

1 **(a)** Given that $\frac{1560}{24} = 65$ write down the answer to

(i) $\frac{1560}{240}$ Answer _____ [1]

(ii) 2.4×6.5 Answer _____ [1]

(b) Write 0.45555… as a recurring decimal.

Answer _____ [1]

(c) **(i)** Estimate $\frac{42 \times 596}{78}$

Show your working.

Answer _____ [2]

(ii) Estimate $\frac{213}{0.39}$

Show your working.

Answer _____ [2]

STEMUP.CO.UK

2 A six-sided dice is biased.

Examiner Only	
Marks	Remark

(a) The table below gives the probability of some outcomes when the dice is rolled once.

Outcome	1	2	3	4	5	6
Probability	0.1		0.15		0.22	0.25

(i) The probability of getting a 2 is the same as the probability of getting a 4. Complete the table above for the missing probabilities. [2]

(ii) The dice is rolled 500 times. How many times would you expect to get a 5?

Answer _____ times [2]

(b) Boris plays a game of chess with his friend Gary.

He states, "I can win, draw or lose, so the probability that I will win must be $\frac{1}{3}$".

Explain why Boris is wrong.

_____

_____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

3 $a = \dfrac{b-c}{d}$

Calculate the value of a when $b = -6$, $c = 10$ and $d = 4$

Answer $a =$ _____ [2]

4 Ruth has a bag containing 27 white balls and some black balls.

If a ball is taken at random from the bag, the probability that it will be white is $\frac{3}{5}$

(a) Work out the number of black balls that are in the bag.

Answer _____ black balls [2]

Ruth now puts some more black balls into the bag.

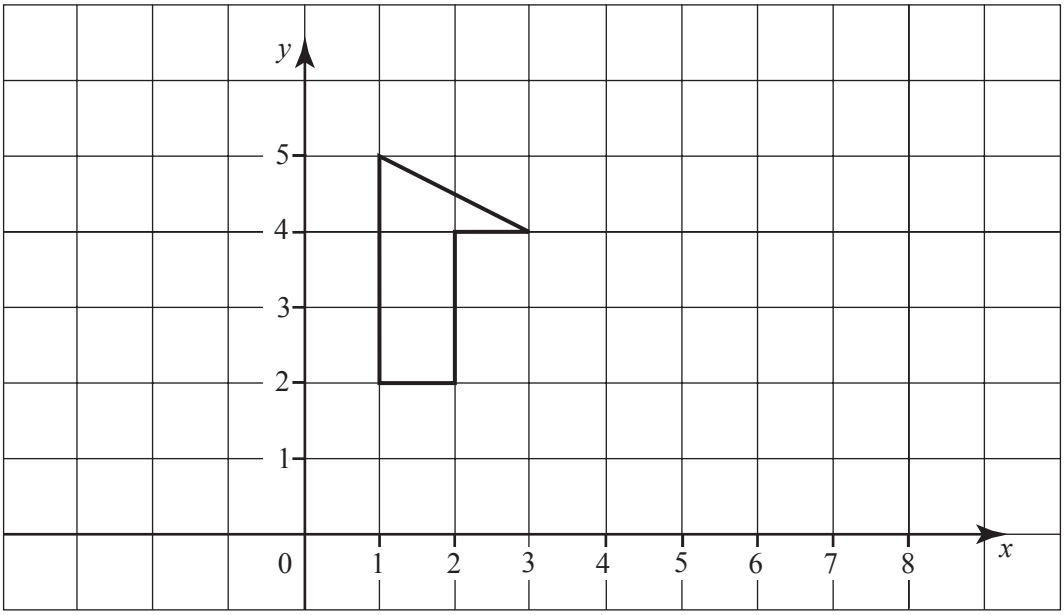
If a ball is now taken at random from the bag, then the probability that it will be black is $\frac{2}{3}$

(b) How many black balls did Ruth add to the bag?

Answer _____ black balls [2]

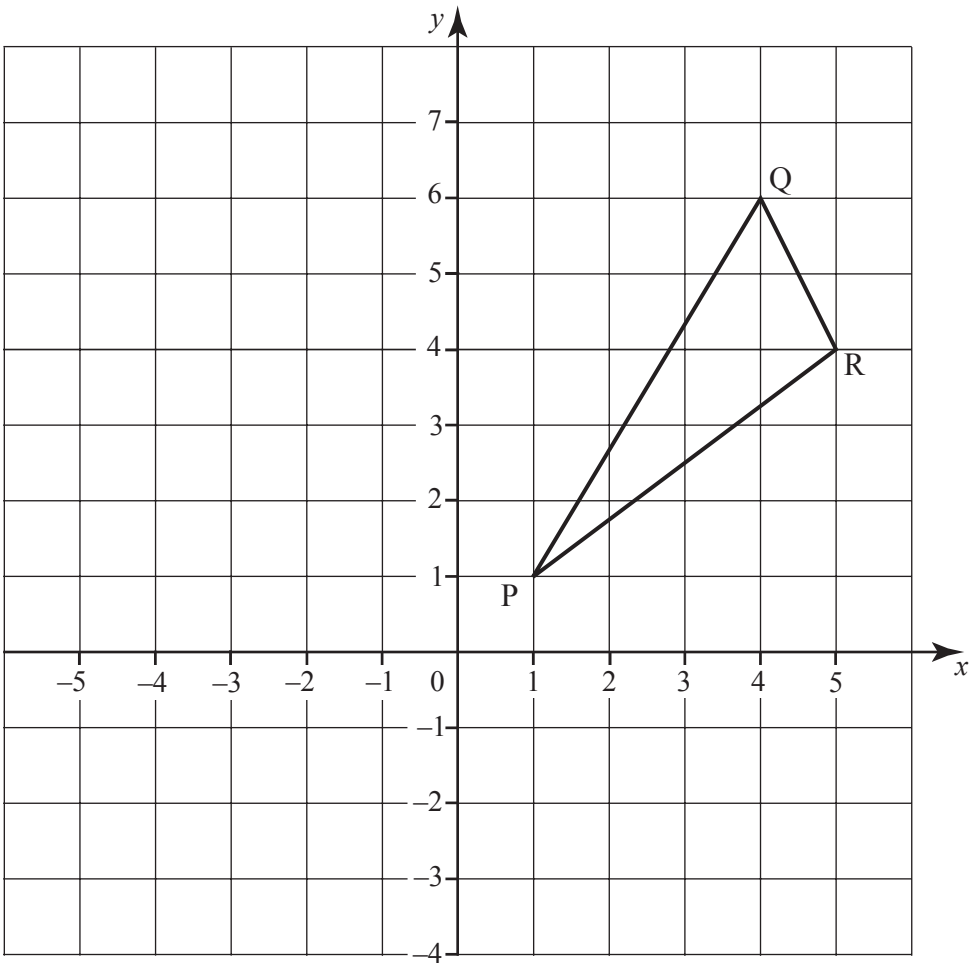
STEMUP.CO.UK

5 **(a)** Reflect the shape in the line $x = 3$.



[2]

(b) Rotate the triangle PQR 90° anticlockwise about the point (2, −1).



[2]

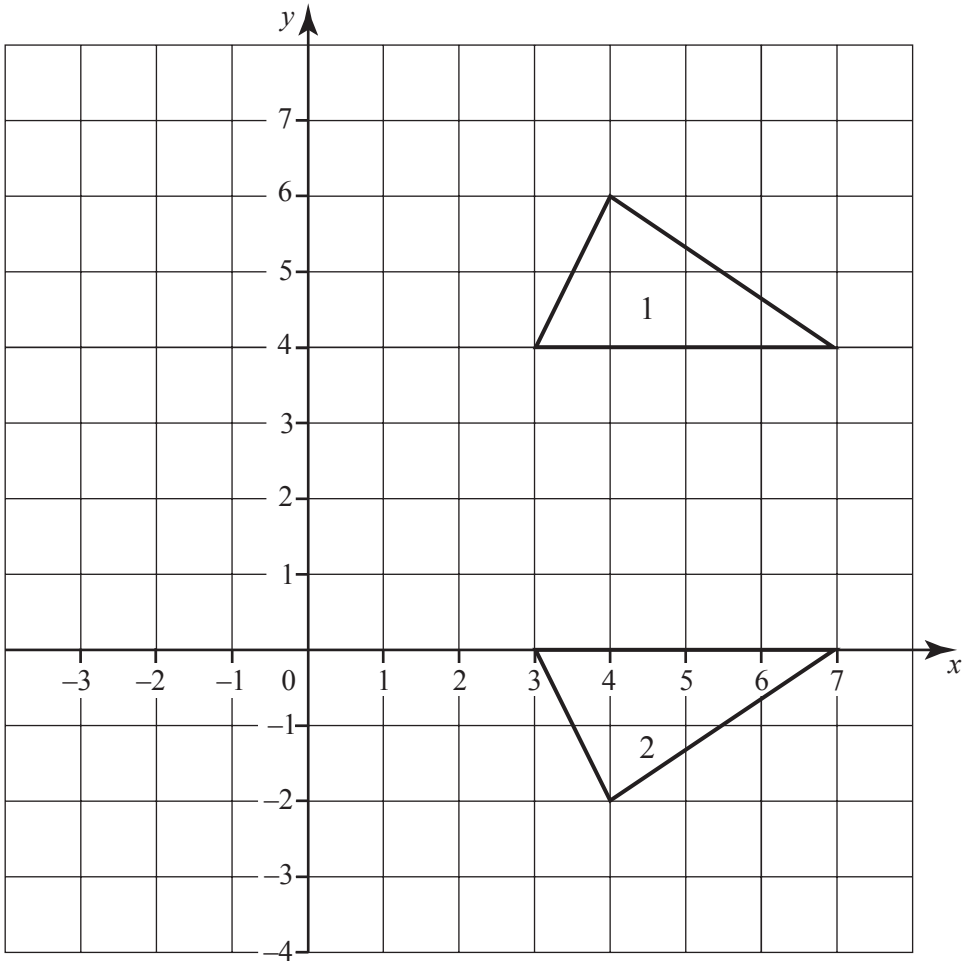
Examiner Only

Marks	Remark

STEMUP.CO.UK

(c) (i) Describe fully the single transformation which maps triangle 1 onto triangle 2

Answer _____ [2]



(ii) Draw the image of **triangle 1** after a translation 6 left and 1 up. [2]

Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

6 **(a)** "If a and b are square numbers, then the product of a and b is **always** an even number." Is this statement true or false? Explain your answer.

Answer _____ because _____

_____ [1]

(b) Simplify

(i) $\dfrac{t^3}{t^8}$

Answer _____ [1]

(ii) $\dfrac{t^2 \times t^7}{t^3}$

Answer _____ [1]

(c) Solve the inequality $-5 < 3n \leq 9$ for **integer** values of n.

Answer $n =$ _____ [3]

(d) Complete the identity $x(x + 4) \equiv x^2$ [1]

---

7 Calculate $(4 \times 10^9) \times (3 \times 10^{-6})$ giving your answer in standard form.

Answer _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

8 A bag contains a number of coloured counters. Some of them are green.

A counter is taken at random from the bag.

Its colour is recorded and the counter is put back into the bag.

This is repeated 300 times.

The total number of green counters taken from the bag and replaced is recorded after 100 trials, 200 trials and 300 trials as shown in the table.

Number of trials	Number of green counters	Relative Frequency
100	45	
200	105	
300	144	

(a) Complete the table to show the relative frequencies. [1]

(b) If a counter is picked at random from the bag, estimate the probability of it being green.

Answer _____ [1]

---

9 **(a)** Expand and simplify $(n + 3)^2 - (n - 3)^2$

Answer _____ [2]

(b) Rearrange $P = \sqrt{QR}$ to make R the subject.

Answer $R =$ _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

10 y is inversely proportional to the square of x and $y = 5$ when $x = 3$

(a) Express y in terms of x.

Answer $y =$ _____ [3]

(b) Hence find the value of y when $x = \frac{1}{2}$

Answer $y =$ _____ [1]

---

11 Write the recurring decimal $0.1\dot{4}\dot{5}$ as a fraction.

Answer _____ [2]

---

12 $w = \sqrt{40}$ $x = \sqrt{2}$ $y = \sqrt{5}$

Simplify fully $\frac{w}{xy}$

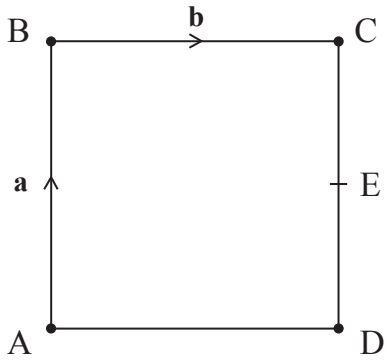
Answer _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

13 In the square ABCD, $\overrightarrow{AB}$ represents the vector **a** and $\overrightarrow{BC}$ represents the vector **b**.

E is the midpoint of CD. F is a point on AE such that AF : FE = 2 : 1



Express the following in terms of **a** and/or **b**

(a) (i) $\overrightarrow{BD}$

Answer _____ [1]

(ii) $\overrightarrow{AE}$

Answer _____ [1]

(iii) $\overrightarrow{AF}$

Answer _____ [1]

(b) Using vectors find the ratio BF : FD

Show your working.

Answer _____ [3]

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.

112525

Rewarding Learning

General Certificate of Secondary Education
January 2012

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

MONDAY 16 JANUARY

9.15 am – 10.30 am

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 solution to a question gains marks for correct method and marks for accurate working based on this method. 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, reading from tables, graphs or answers. Accuracy marks may depend on preceding **M** (method) marks, hence **M**0 **A**1 cannot be awarded, i.e where the method is not correct no marks can be given.

MA indicates marks for combined method and accurate working.

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.

Quality of written communication

In GCSE Mathematics, particular questions are identified where candidates must demonstrate the quality of their written communication.

In particular, candidates must:

(i) ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear (i.e. comprehension and meaning is clear by using the correct notation and labelling conventions);

(ii) select and use a form and style of writing appropriate to their purpose and to complex subject matter (i.e. reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning); and

(iii) organise information clearly and coherently, using specialist vocabulary where appropriate (i.e the mathematical methods and processes used are coherently and clearly organised and appropriate mathematical vocabulary used).

This assessment may be through, for example, an explanation of the geometrical properties of a given shape or, for example, through concise mathematical argument in a multi-step problem.

STEMUP.CO.UK

				AVAILABLE MARKS
1	**(a)** **(i)**	6.5	A1	
	(ii)	15.6	A1	
	(b)	$0.4\dot{5}$	A1	
	(c) **(i)**	$\frac{40 \times 600}{80}$	MA1	
		$= 300$	A1	
	(ii)	$\frac{200}{0.4}$	MA1	
		$= 500$	A1	7
2	**(a)** **(i)**	$\frac{(1 - 0.72)}{2}$	MA1	
		0.14	A1	
	(ii)	500×0.22	MA1	
		110	A1	
	(b)	e.g. only true if equally likely chance of each outcome	A2	6
3		$\frac{-16}{4}$	MA1	
		-4	A1	2
4	**(a)**	$\frac{3}{5}$ is $27 \Rightarrow \frac{1}{5}$ is 9	MA1	
		18	A1	
	(b)	$27 = \frac{1}{3}$		
		total $= 81$ **or** $\frac{2}{3} = 54$	MA1	
		$54 - 18 = 36$	MA1	4
5	**(a)**	Correct reflection	A2	
	(b)	Correct rotation	A2	
	(c) **(i)**	Reflection in the line $y = 2$	A1, A1	
	(ii)	6 left, 1 up	A1, A1	8

STEMUP.CO.UK

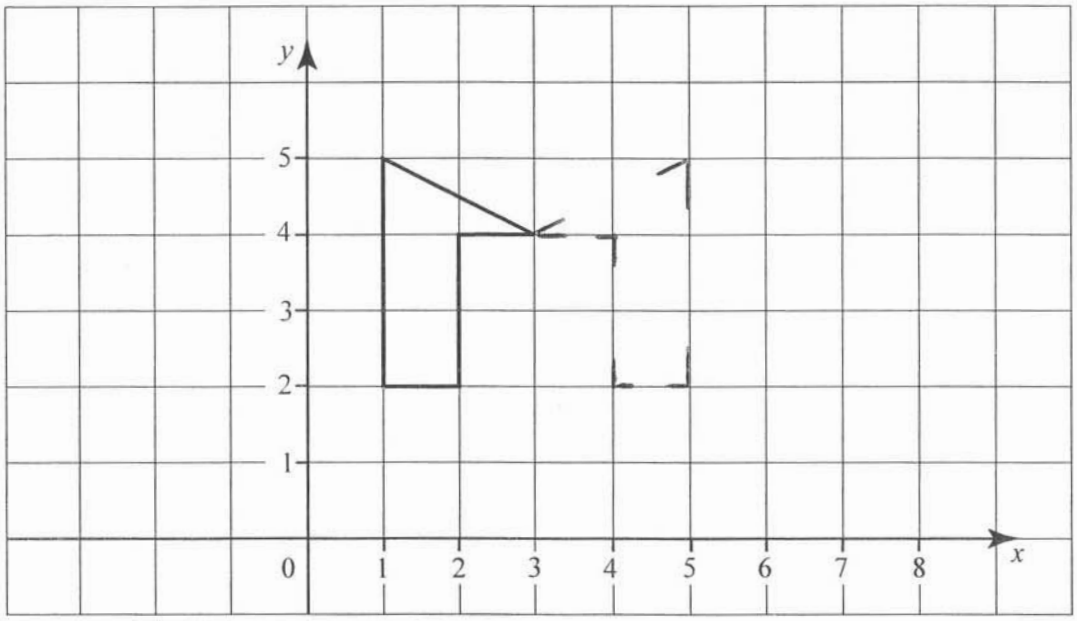
				AVAILABLE MARKS
6	**(a)**	False, suitable example, e.g. 1×9	A1	
	(b)	**(i)** $\frac{1}{t^5}$ **or** t^{-5}	A1	
		(ii) t^6	A1	
	(c)	$\frac{-5}{3} < n \leq 3$	MA1	
		$-1, 0, 1, 2, 3$	A2	
	(d)	$+ 4x$	A1	7
7		12×10^3 or 12 000	MA1	
		$= 1.2 \times 10^4$	A1	2
8	**(a)**	0.45, 0.525, 0.48 **or** $\frac{45}{100}, \frac{105}{200}, \frac{144}{300}$	A1	
	(b)	0.48 **or** $\frac{144}{300}$	A1	2
9	**(a)**	$n^2 + 6n + 9 - (n^2 - 6n + 9)$		
		$n^2 + 6n + 9 - n^2 + 6n - 9$	MA1	
		$12n$	A1	
	(b)	$P^2 = QR$	MA1	
		$R = \frac{P^2}{Q}$	MA1	4
10	**(a)**	$y = \frac{k}{x^2}$		
		$5 = \frac{k}{9}$	MA1	
		$k = 45$	MA1	
		$y = \frac{45}{x^2}$	MA1	
	(b)	180	MA1	4
11		$1000x = 145.454545....$		
		$10x = 1.454545....$	MA1	
		$990x = 144$		
		$x = \frac{144}{990} \left(= \frac{8}{55}\right)$	MA1	2

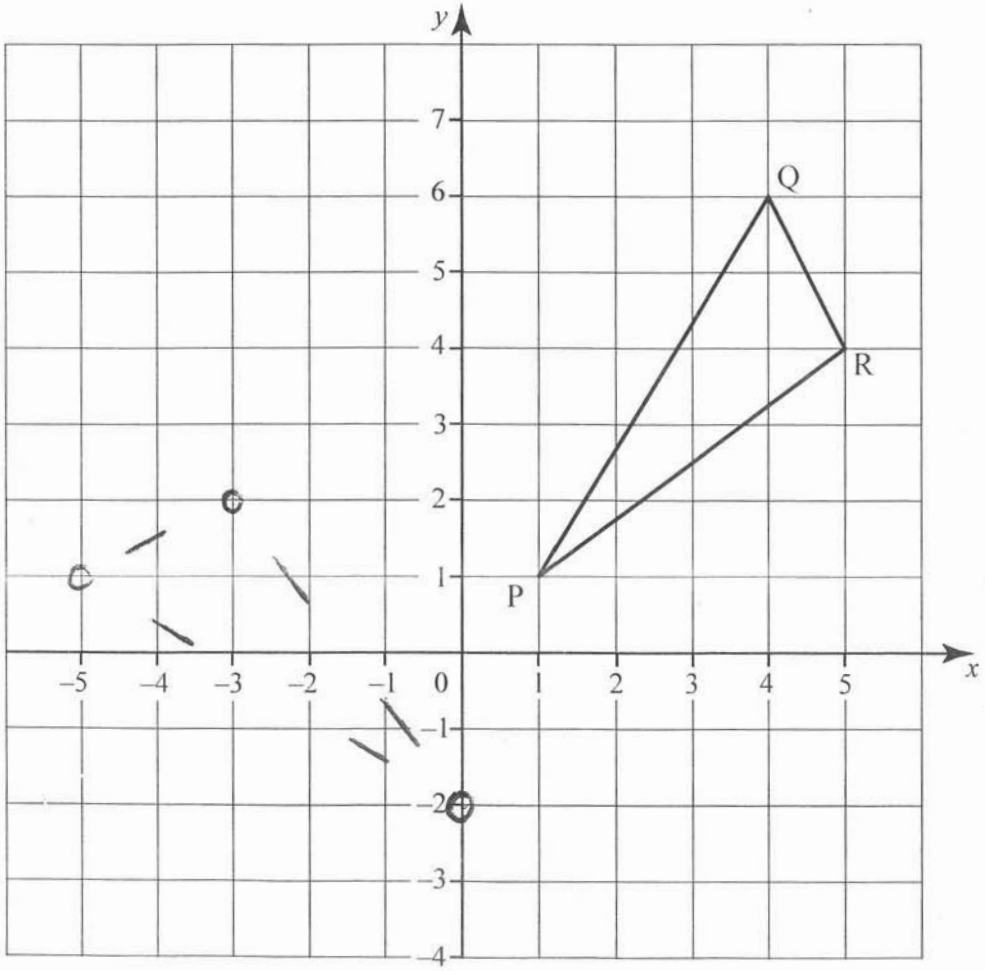
STEMUP.CO.UK

			AVAILABLE MARKS
12	$\frac{\sqrt{40}}{\sqrt{10}}$	MA1	
	$= 2$	A1	2
13	**(a)** **(i)** $\mathbf{b} - \mathbf{a}$	A1	
	(ii) $\mathbf{b} + \frac{1}{2}\mathbf{a}$	A1	
	(iii) $\frac{2}{3}\mathbf{b} + \frac{1}{3}\mathbf{a}$	A1	
	(b) $\overrightarrow{BF} = -\mathbf{a} + \frac{2}{3}\mathbf{b} + \frac{1}{3}\mathbf{a}$		
	$= \frac{2}{3}(\mathbf{b} - \mathbf{a})$	MA1	
	$\overrightarrow{FD} = -\frac{2}{3}\mathbf{b} - \frac{1}{3}\mathbf{a} + \mathbf{b}$		
	$= \frac{1}{3}(\mathbf{b} - \mathbf{a})$	MA1	
	$BF : FD = \frac{2}{3} : \frac{1}{3} \quad \rightarrow \quad 2 : 1$	MA1	6
		Total	**56**

STEMUP.CO.UK

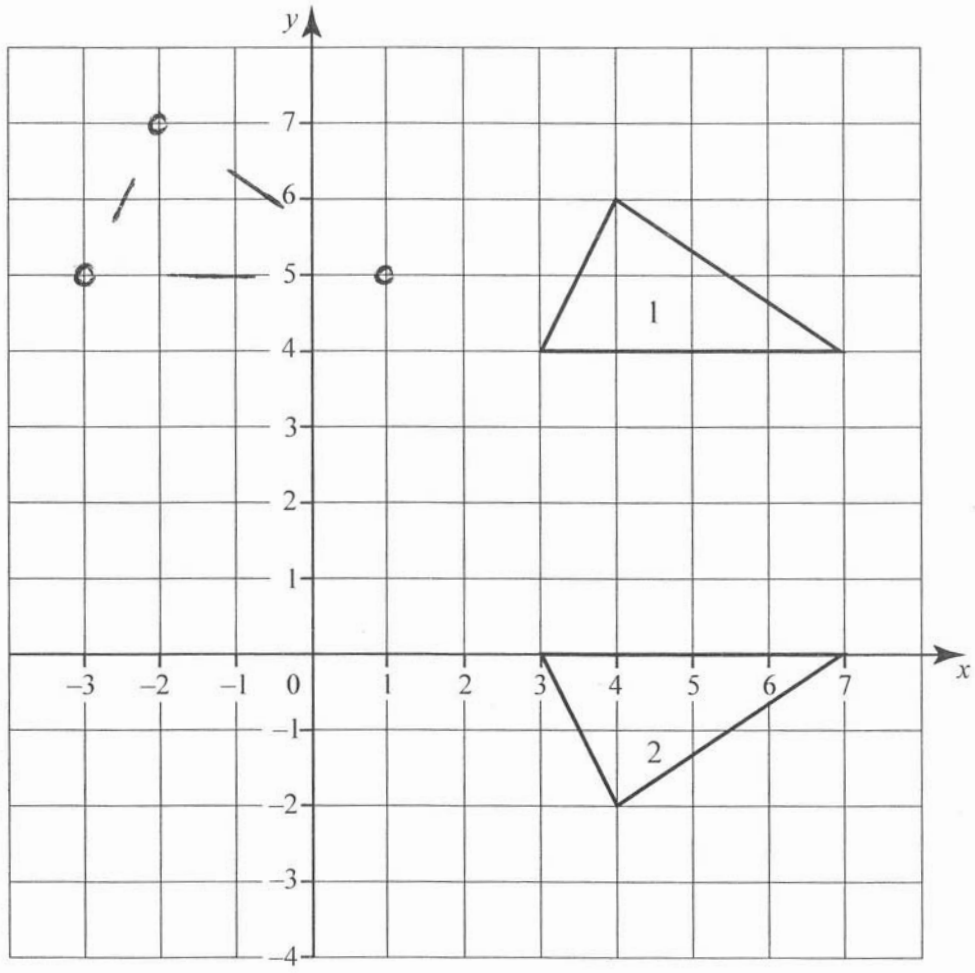
GCSE MATHEMATICS JANUARY 2012
MODULE N6–1
OVERLAY QUESTION 5 A & B





STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2012
MODULE N6–1
OVERLAY QUESTION 5 C



Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier



GMN61

[GMN61]

MONDAY 6 JUNE

1.30 pm – 2.45 pm

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.
Answer **all eighteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

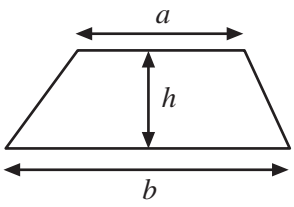
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

JUNE11GMN61

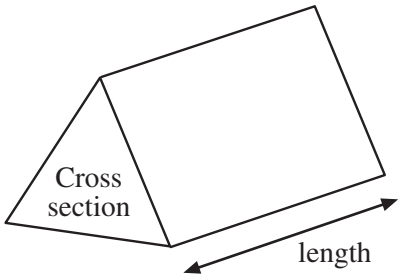
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

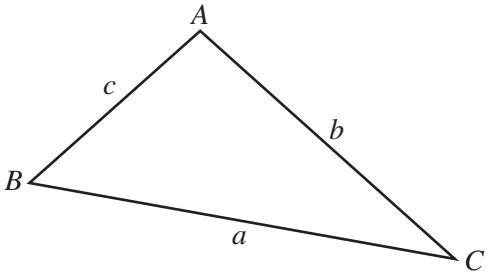


In any triangle *ABC*

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

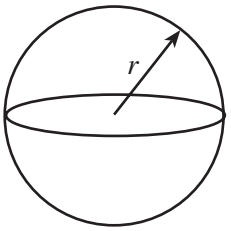
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



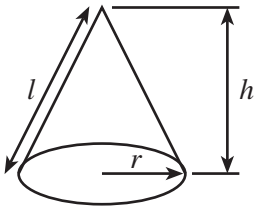
Volume of sphere = $\frac{4}{3}\pi r^3$

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 Rewrite $c - 2 = 10 - b$ to make b the subject.

Write your answer in its simplest form.

Answer $b =$ _____ [2]

Examiner Only | Marks | Remark

Total Question 1

---

2 **(a)** Given that $84 \times 356 = 29904$, find

(i) $\dfrac{29904}{8.4}$

Answer _____ [1]

(ii) 0.84×3560

Answer _____ [1]

(b) Write down the two numbers which are the square roots of 144

Answer _____, _____ [1]

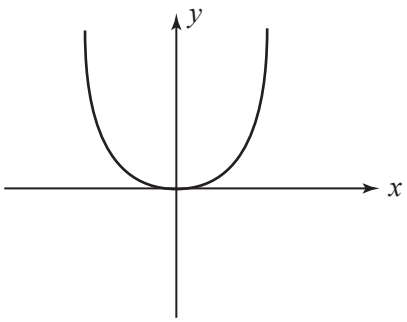
(c) **Estimate** $\dfrac{4.9 \times 30.1}{7.8 - 3.85}$

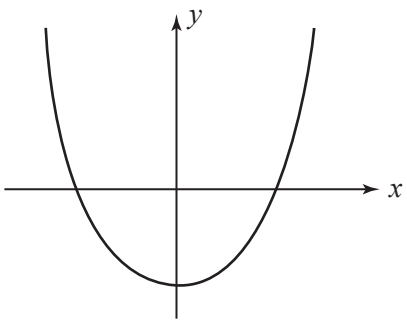
Answer _____ [2]

Total Question 2

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

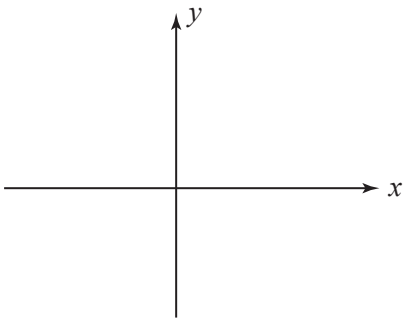
(a) Below are two graphs. Choose the correct equation from the three listed above to match each graph.





Equation: _____ Equation: _____ [2]

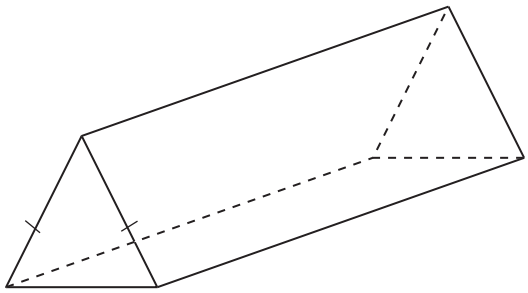
(b) Sketch the graph of the remaining equation.



[1]

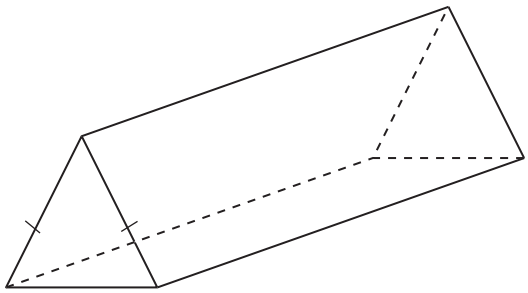
Examiner Only	
Marks	Remark
Total Question 3	

4 **(a)** Draw a plane of symmetry on the prism below.



[1]

(b) Draw a **different** plane of symmetry on the prism below.



[1]

Examiner Only	
Marks	Remark
Total Question 4	

5 **(a)** Use the formula $A = B^2(8 - C)$ to find the value of A when $B = -3$ and $C = 2$.

Answer _____ [2]

(b) n is an integer. From the expressions

$2n$ $\quad n^2 + 1$ $\quad 2n - 1$ $\quad 2n + 2$ $\quad n - 1$ $\quad 2n + 3$

choose

(i) an expression which will always give an even number,

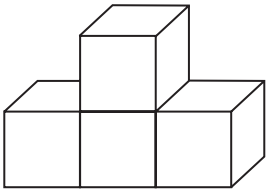
Answer _____ [1]

(ii) an expression which could give an odd or even number.

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 5	

6 Below is a sketch of a 3-D shape.



SIDE

FRONT

Draw **(a)** the plan,

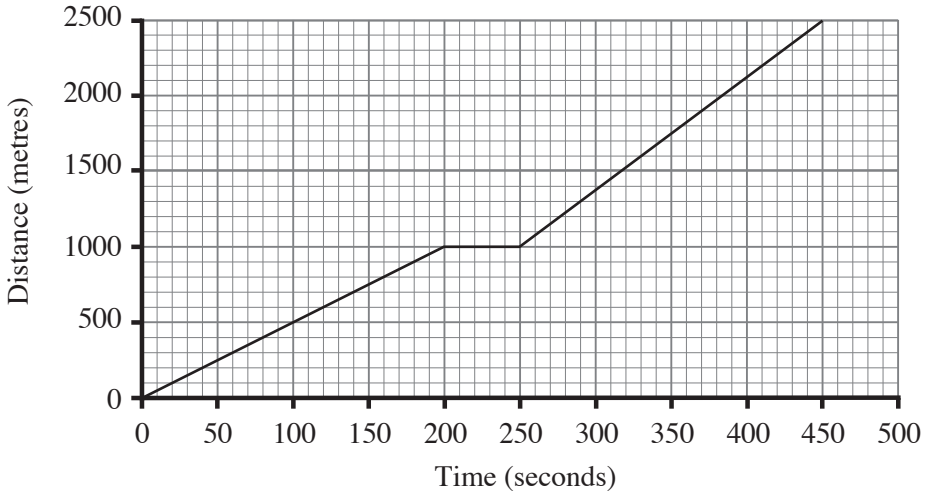
[1]

(b) the side elevation.

[1]

Examiner Only	
Marks	Remark
Total Question 6	

7 The graph illustrates Pete's journey as he cycled from home to school.



(a) Between what times was he cycling at his fastest average speed?

Answer _____ and _____ [1]

(b) He stopped at a shop on the way to school.
Calculate his average speed for the journey **between the shop and the school**.

Answer _____m/s [2]

(c) Pete's sister Jade, left home **4 minutes** after him, and travelled to the same school by car.
She arrived in school **1 minute** before him.

(i) Show Jade's journey on the graph above. [2]

(ii) How far were they **from the school** when Jade overtook Pete?

Answer _____ m [1]

Examiner Only	
Marks	Remark
Total Question 7	

8 Jack divided marbles between himself and Jill in the ratio 4 : 3

Jack then had 84 marbles.

How many marbles were there in total?

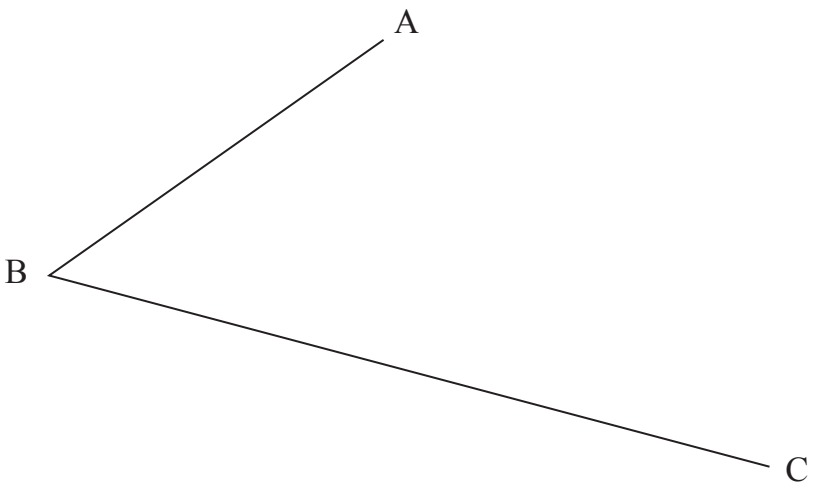
Answer _____ [2]

Examiner Only | Marks | Remark

Total Question 8

9 Use ruler and compasses to construct the bisector of the angle ABC.

You must show all construction lines.



[2]

Total Question 9

10 Simplify

(a) $\dfrac{m^7}{m \times m^2}$

Answer _____ [2]

(b) $(p^3)^2$

Answer _____ [1]

Total Question 10

11 Terry and Trev counted how many car number plates contained the letter Z. They recorded their results as shown.

Terry		Trev	
Number of cars	Number with Z	Number of cars	Number with Z
100	80	261	207

Whose results give the best estimate of the probability of a car number plate containing the letter Z?
Give a reason for your answer.

Answer _____ because _____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 11	

12

Examiner Only	
Marks	Remark

P × ×Q

P and Q are two points which are 7 cm apart.

(a) Using ruler and compasses only, draw the locus of points that are the same distance from P as from Q.

Show all construction lines. [2]

(b) Shade the region which contains those points which are both closer to P than to Q, and less than 5 cm from Q. [2]

Total Question 12

13 **(a)** k, m and n are all lengths.

Decide whether each of the expressions below represent length, area, volume or none of these.

(i) $\dfrac{\pi k^2}{m-n}$

Answer _____ [1]

(ii) $\frac{1}{2}k\sqrt{m^2 + n^2}$

Answer _____ [1]

(b) Find the value of x if $\dfrac{m^x}{n(n + k)}$ represents a length.

Answer $x =$ _____ [1]

Total Question 13

14 **(a)** Write 0.0000624 in standard form.

Answer _____ [1]

(b) Write down a fraction which is a recurring decimal.

Answer _____ [1]

(c) Rationalise the denominator of $\dfrac{10}{\sqrt{2}}$

Answer _____ [2]

Total Question 14

Examiner Only

Marks	Remark

STEMUP.CO.UK

15 A bag contains 5 red grapes and 7 green grapes.
Florence and Ann each choose a grape at random from this bag.

(a) What is the probability that they choose the same colour?

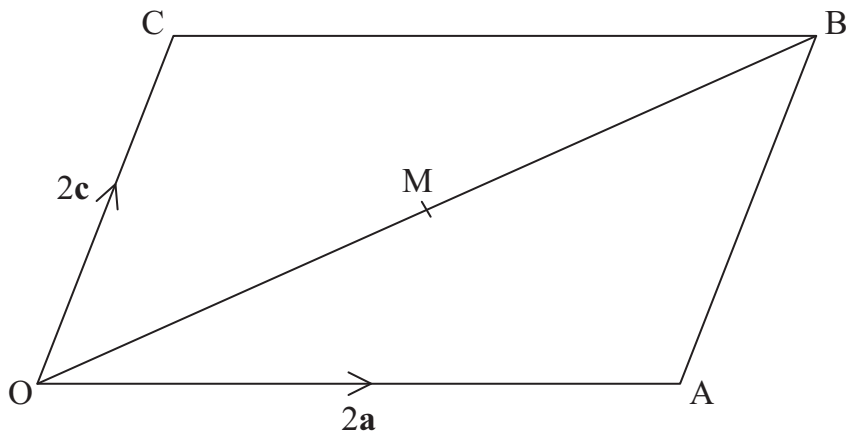
Answer _____ [3]

(b) What is the probability that they choose different colours?

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 15	

16



OABC is a parallelogram.

M is the mid-point of the diagonal OB.

$\overrightarrow{OA} = 2\mathbf{a}$ and $\overrightarrow{OC} = 2\mathbf{c}$.

(a) Express $\overrightarrow{OM}$ in terms of **a** and **c**.

Answer $\overrightarrow{OM}$ = _____ [1]

(b) Use vectors to prove that M is also the mid-point of AC.

[3]

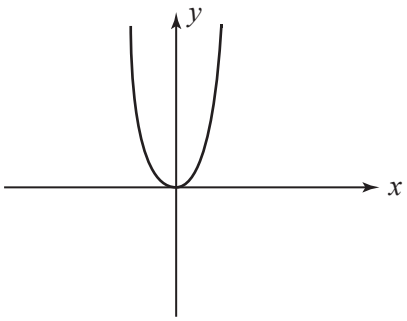
Examiner Only	
Marks	Remark
Total Question 16	

17 Expand $(7 - \sqrt{3})^2$ giving your answer in the form $a + b\sqrt{3}$

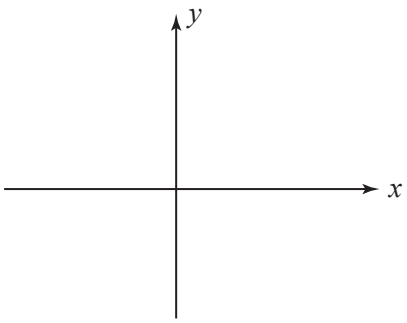
Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 17	

18 The diagram shows the graph of $y = f(x)$

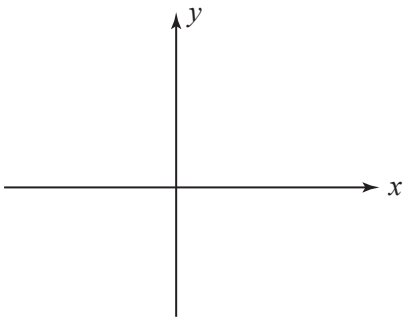


(a) Sketch the graph of $y = f(x) - 1$ on the axes below.



[1]

(b) Sketch the graph of $y = f(x + 1)$ on the axes below.



[1]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark
Total Question 18	

STEMUP.CO.UK

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE

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.

111336

Rewarding Learning

General Certificate of Secondary Education
2011

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

MONDAY 6 JUNE

1.30 pm – 2.45 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.

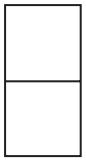
(vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.

(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.

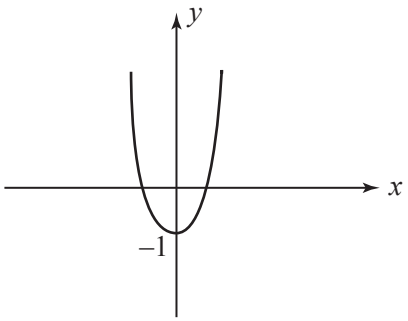
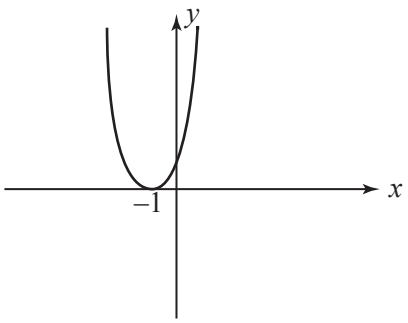
			AVAILABLE MARKS
1	$c - 2 + b = 10$ $b = 12 - c$	MA1 MA1	2
2	**(a)** **(i)** 3560	A1	
	(ii) 2990.4	A1	
	(b) 12, −12	A1	
	(c) $\frac{5\times30}{8-4}$	MA1	
	$\frac{150}{4} = 37.5$	A1	5
3	**(a)** $y = x^2$ $y = x^2 - 2$	A1 A1	
	(b) third graph correctly sketched	MA1	3
4	**(a)** plane drawn correctly	A1	
	(b) different plane drawn correctly	A1	2
5	$= 9(8 - 2)$ 54	MA1 A1	
	(b) **(i)** $2n$ **or** $2n + 2$	A1	
	(ii) $n^2 + 1$ **or** $n - 1$	A1	4
6	**(a)** 	A1	
	(b) 	A1	2

STEMUP.CO.UK

			AVAILABLE MARKS
7	**(a)** 250, 450	A1	
	(b) Speed = 1500/200	MA1	
	= 7.5	A1	
	(c) **(i)** Correct starting point (240, 0)	MA1	
	Correct finishing point (390, 2500) with line connecting	MA1	
	(ii) 770−870	A1	6
8	$84 \div 4 = 21$ or $84 \times \frac{3}{4} = 63$ or 84:63	MA1	
	147	MA1	2
9	Correct construction arcs	MA1	
	Correct angle bisector drawn	A1	2
10	**(a)** m^7/m^3	MA1	
	$= m^4$	MA1	
	(b) p^6	A1	3
11	Trev	A1	
	more data	A1	2
12	**(a)** Correct construction arcs drawn	A1	
	Perpendicular bisector of PQ drawn	A1	
	(b) Arc of circle drawn, centre Q, radius 5 cm	A1	
	Correct region shaded	A1	4
13	**(a)** **(i)** Length	A1	
	(ii) Area	A1	
	(b) 3	A1	3

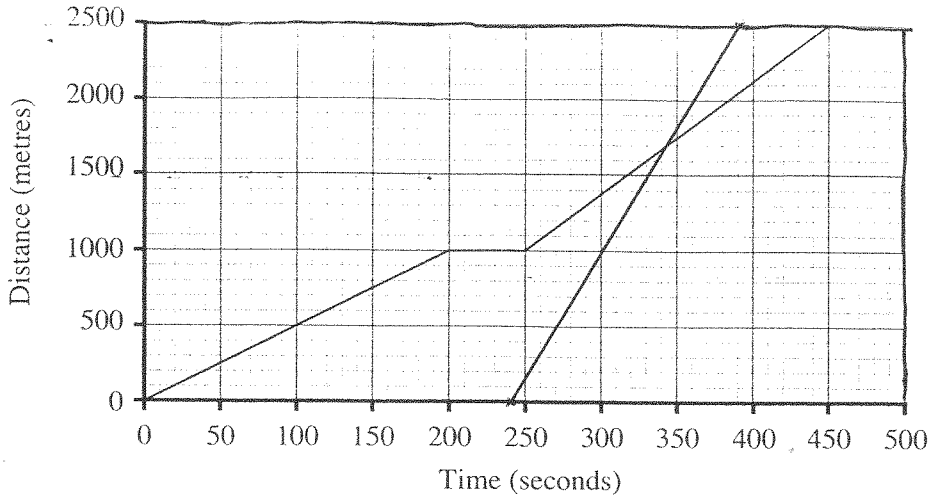
STEMUP.CO.UK

			AVAILABLE MARKS
14	**(a)** 6.24×10^{-5}	MA1	
	(b) e.g. $\frac{1}{3}$, $\frac{2}{9}$ etc	MA1	
	(c) $\frac{10}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$	MA1	
	$5\sqrt{2}$ or $\frac{10\sqrt{2}}{2}$	MA1	4
15	**(a)** $\frac{5}{12} \times \frac{4}{11} + \frac{7}{12} \times \frac{6}{11}$	M1 A1	
	$= \frac{62}{132}$ or equivalent	A1	
	(b) $\frac{70}{132}$ or equivalent	A1	4
16	**(a)** $\overrightarrow{OM} = \mathbf{a} + \mathbf{c}$	A1	
	(b) $\overrightarrow{AM} = -2\mathbf{a} + \mathbf{a} + \mathbf{c} = -\mathbf{a} + \mathbf{c}$	MA1	
	$\overrightarrow{AC} = -2\mathbf{a} + 2\mathbf{c}$	MA1	
	$\overrightarrow{AC} = 2 \times \overrightarrow{AM}$, so M is mid-point of AC	MA1	4
17	$(7 - \sqrt{3})(7 - \sqrt{3}) = 49 - 7\sqrt{3} - 7\sqrt{3} + 3$	MA1	
	$52 - 14\sqrt{3}$	MA1	2

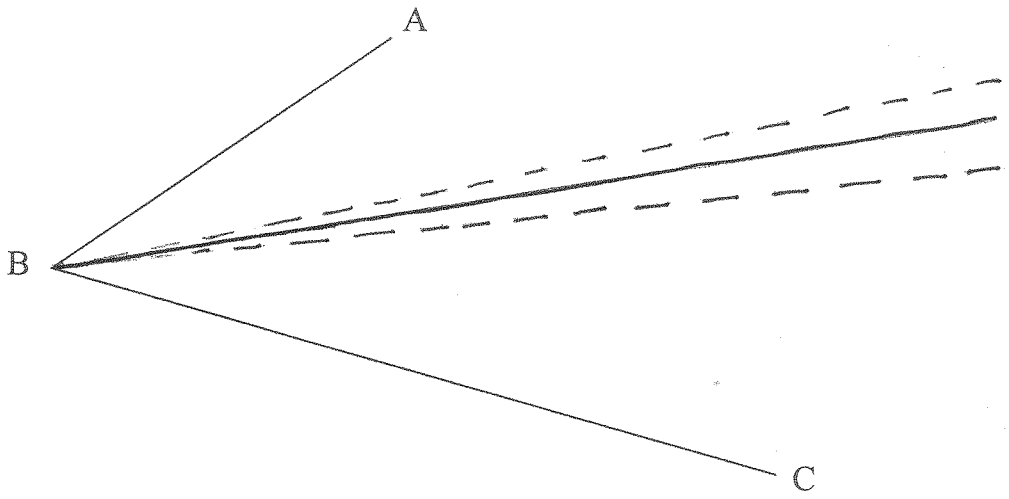
			AVAILABLE MARKS
18	**(a)**		
		A1	
	(b)		
		A1	2
		Total	**56**

STEMUP.CO.UK

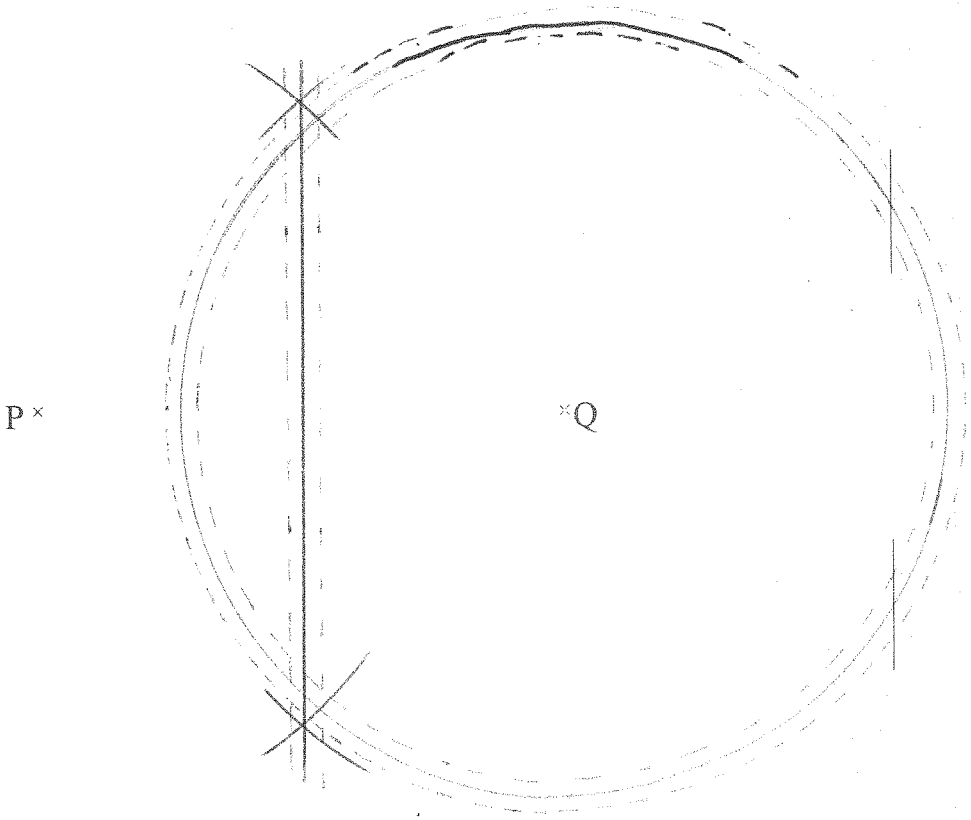
GCSE MATHEMATICS SUMMER 2011
MODULE N6-1
OVERLAYS QUESTION 7



GCSE MATHEMATICS SUMMER 2011
MODULE N6-1
OVERLAYS QUESTION 9



GCSE MATHEMATICS SUMMER 2011
MODULE N6-1
OVERLAYS QUESTION 12



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

FRIDAY 14 JANUARY 2011

9.15 am – 10.30 am

GMN61

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.
You **must not** use a calculator for this paper.

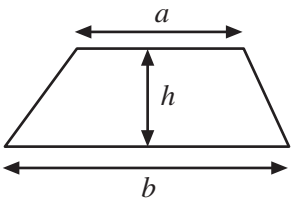
INFORMATION FOR CANDIDATES

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 ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

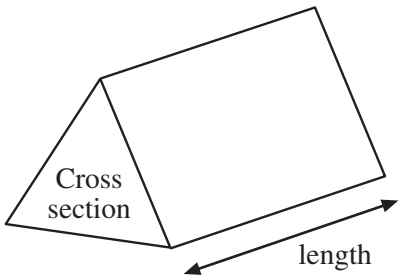
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

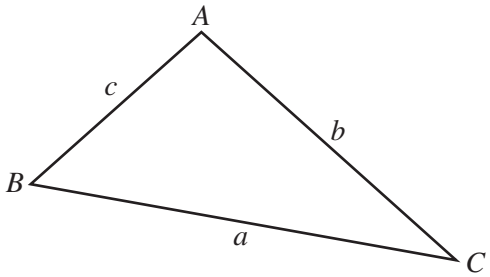


In any triangle ABC

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

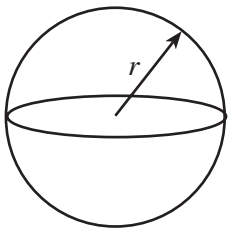
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



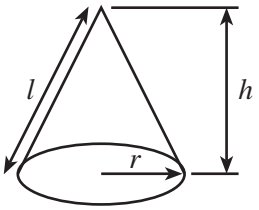
Volume of sphere = $\frac{4}{3}\pi r^3$

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

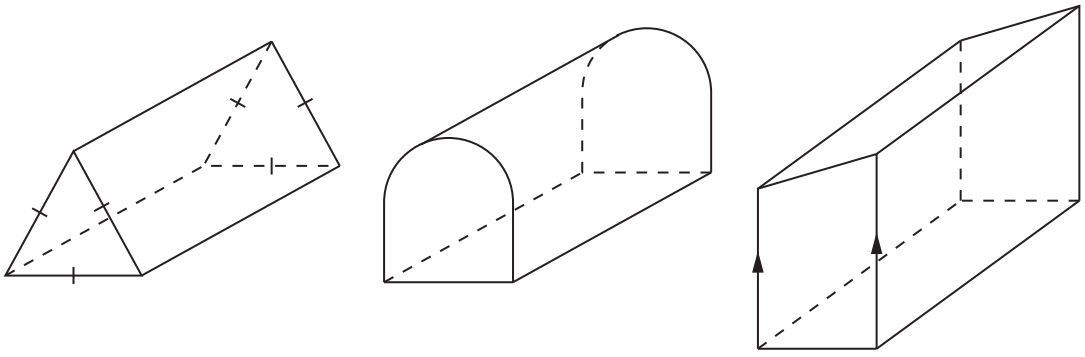
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Examiner Only	
Marks	Remark

1 $E = \dfrac{2A+5}{D-1}$ Find the value of E when $A = 20$ and $D = -9$

Answer $E =$ _____ [3]

2 **(a)** Three solids are shown below.



A **B** **C**

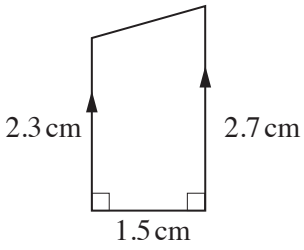
(i) Which solid has exactly 2 planes of symmetry?

Answer _____ [1]

(ii) How many planes of symmetry has solid **A**?

Answer _____ [1]

(b) A cross-section of solid **C** is drawn below.



Calculate the area of the cross-section.

Answer _____ cm^2 [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

3 300 people each buy a ticket for a prize draw.

Each ticket costs 5p.

The probability of winning a prize of £3 is $\frac{1}{100}$ and the probability of winning a prize of 30p is $\frac{1}{20}$. No other prizes can be won.

How much profit will the ticket seller make on the game?

Answer _____ [4]

---

4 Rewrite $5 - x = 3 + y$ to make x the subject.
Write the answer in its simplest form.

Answer $x =$ _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

5 **(a)** Estimate the answer to $\dfrac{4.7 \times 20.1}{5.6 - 1.8}$

Answer _____ [2]

(b) Find the reciprocal of 2.2

Answer _____ [2]

(c) Given that $4.67 \times 634 = 2960.78$, find the value of

(i) 46.7×0.634

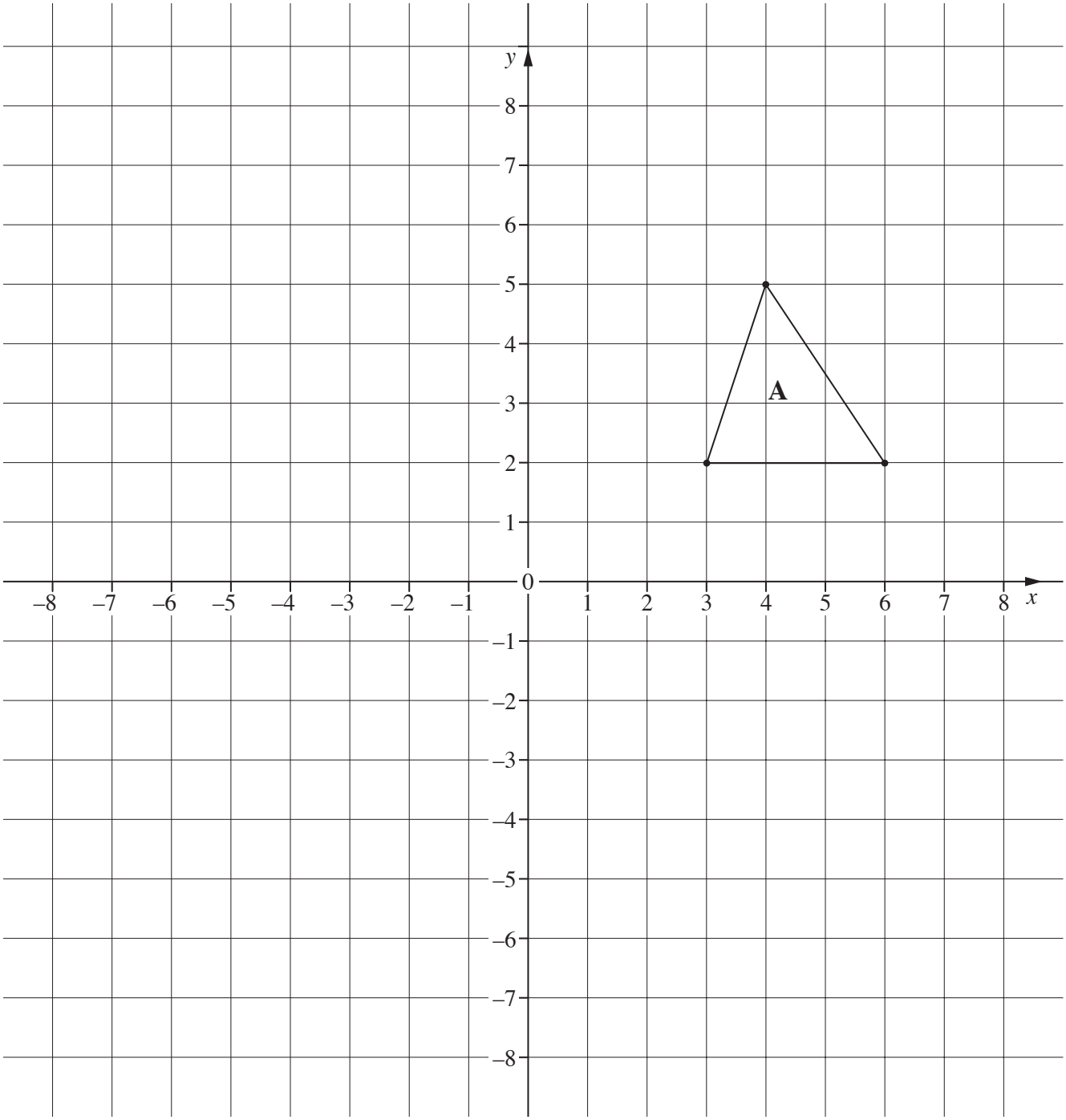
Answer _____ [1]

(ii) $296.078 \div 6340$

Answer _____ [1]

STEMUP.CO.UK

6 (a)



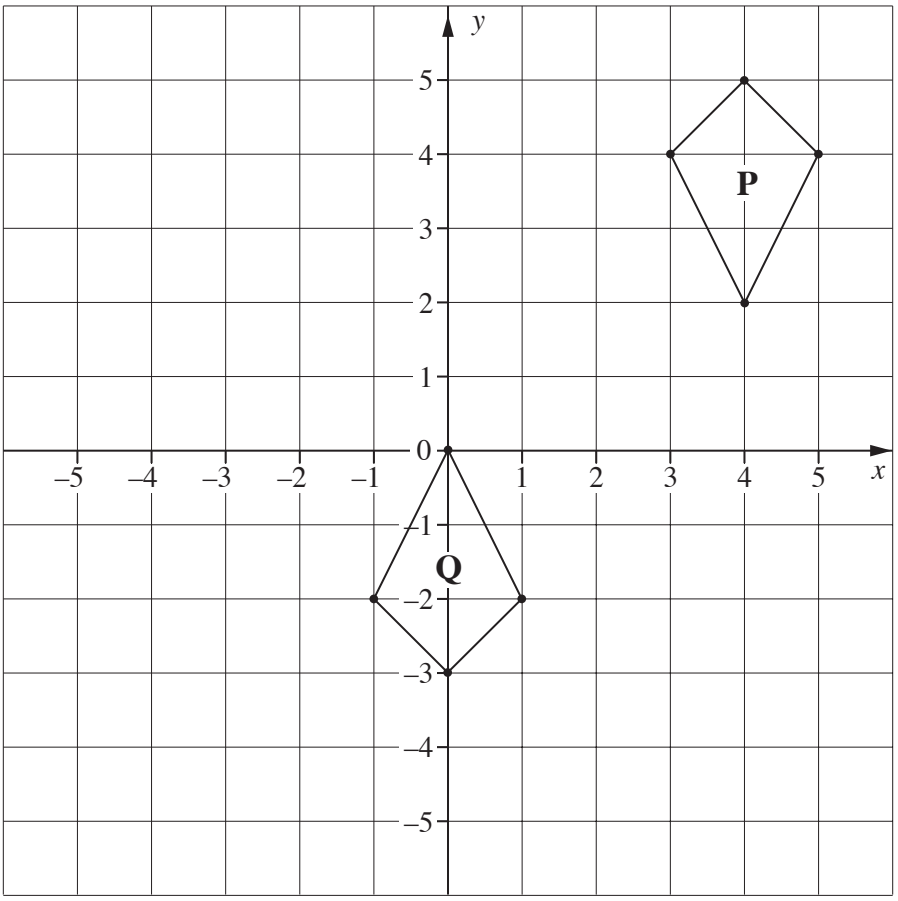
(i) Reflect triangle **A** in the line $y = 1$. Label the new triangle **B**. [2]

(ii) Draw the image of **A** under a translation of $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$.
Label the new triangle **C**. [2]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

(b) Describe fully the **single** transformation which maps kite **P** onto kite **Q**.



Answer _____

_____ [3]

Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

7 Calculate the probability of getting a tail on tossing a coin and at the same time throwing an odd number on a dice.

Answer _____ [3]

---

8 **(a)** Simplify

(i) $m^7 \div m^3$ Answer _____ [1]

(ii) $a^5 \times a^4$ Answer _____ [1]

(iii) $(p^6)^2$ Answer _____ [1]

(b) Two numbers a and b are **prime numbers**.

By giving an example, show that the value for $a^2 - b^2$ is **not** always **even**.

Answer _____ [2]

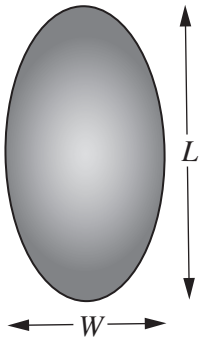
(c) Complete the identity

$(x + 3)^2 \equiv x^2 + ____ + 9$

[1]

STEMUP.CO.UK

9



Only one of the following formulae could be used to calculate the volume of this egg.

$V = \frac{1}{6}\pi LW$ $\quad V = \frac{1}{6}\pi(L+W)$ $\quad V = \frac{1}{6}\pi LW^2$ $\quad V = \frac{1}{6}\pi L^2W^2$

Which formula is correct? Explain your answer.

Formula $V =$ _____ because _____

_____ [2]

10 Solve the inequality $5n - 3 \geq 2n - 8$

Answer _____ [2]

Examiner Only

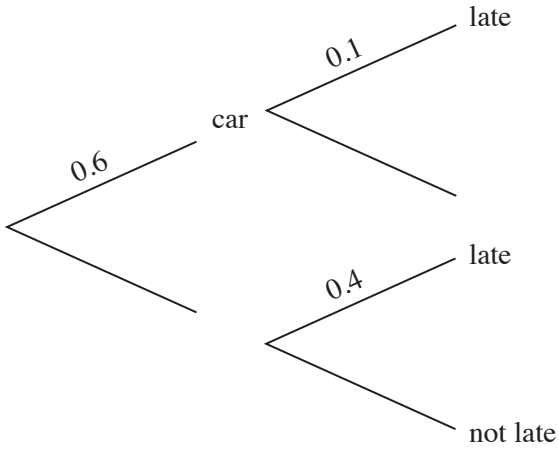
Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

11 The probability that Peter goes to school by car on any school day is 0.6
If he goes by car then the probability that he is late is 0.1
If he doesn't go to school by car then the probability that he is late is 0.4

(a) Use this information to complete the tree diagram below.



[1]

(b) Calculate the probability that on any school day Peter will be late for school.

Answer _____ [2]

---

12 **(a)** Express $\frac{1}{7}$ as a recurring decimal.

Answer _____ [1]

(b) Given that $p = \sqrt{5}$ and $q = \sqrt{20}$,

(i) find the value of p^2,

Answer _____ [1]

(ii) show that $(p + q)^2 = 45$.

[2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

13 Rearrange $tx + tc = c^2 - cx$ to make x the subject.

Answer $x =$ _____ [3]

14 A bag contains 6 red, 3 green and 3 yellow beads. Two beads are selected at random from the bag without replacement. Calculate the probability that both beads are red.

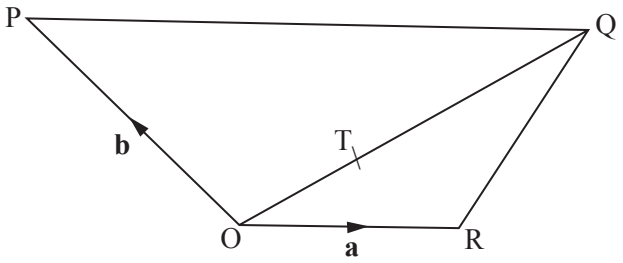
Answer _____ [3]

15 The diagram shows a quadrilateral OPQR.

$\overrightarrow{OR} = \mathbf{a}$ and $\overrightarrow{OP} = \mathbf{b}$

T is a point on OQ such that $\overrightarrow{OT} = \frac{1}{3}\overrightarrow{OQ}$

$\overrightarrow{PQ} = 2\overrightarrow{OR}$



What is the ratio PT : TR?

Show all your working.

Answer PT : TR = _____ [4]

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.

111525

Rewarding Learning

General Certificate of Secondary Education
January 2011

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

FRIDAY 14 JANUARY

9.15 am – 10.30 am

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.

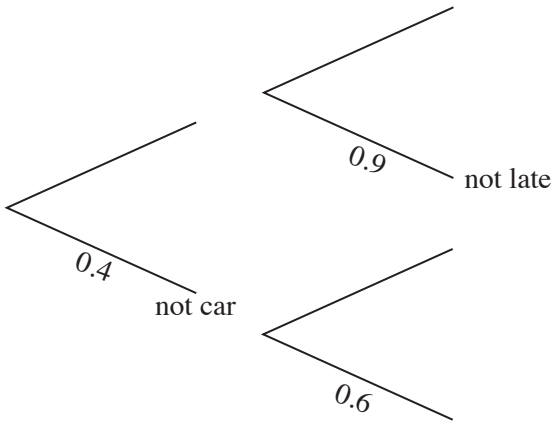
When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

STEMUP.CO.UK

			AVAILABLE MARKS
1	$E = \dfrac{2\times 20+5}{-9-1} = \dfrac{45}{-10}$	A1	
		A1	
	$E = -4.5$	A1	3
2	**(a)** **(i)** B	A1	
	(ii) 4	A1	
	(b) $\dfrac{1}{2}(2.3+2.7)\times 1.5$	MA1	
	$= 3.75$	A1	4
3	$\dfrac{1}{100}\times 300 = 3 \rightarrow$ £9	MA1	
	$\dfrac{1}{20}\times 300 = 15 \rightarrow$ £4.50	MA1	
	300 × 5p = £15	MA1	
	Profit £1.50	MA1	4
4	$5 - 3 - y = x$	MA1	
	$2 - y = x$	A1	2
5	**(a)** $\dfrac{5\times 20}{6-2} = 25$	MA1 A1	
	(b) $2.2 = \dfrac{11}{5}$ or $\dfrac{22}{10}$	MA1	
	$\dfrac{5}{11}$ or $\dfrac{10}{22}$	A1	
	(c) **(i)** 29.6078	A1	
	(ii) 0.0467	A1	6
6	**(a)** **(i)** Correct reflection (Overlays to be provided)	M1 A1	
	(ii) Correct translation (Overlays to be provided)	A1 A1	
	(b) Rotation, 180°, about the point (2,1)	A1 A1 A1	7

STEMUP.CO.UK

			AVAILABLE MARKS
7	$\frac{1}{2} \times \frac{3}{6}$	M1 A1	
	$= \frac{3}{12}\left(\frac{1}{4}\right)$	A1	3
8	**(a) (i)** m^4	A1	
	(ii) a^9	A1	
	(iii) p^{12}	A1	
	(b) e.g. $3^2 - 2^2 = 9 - 4 = 5$	MA2	
	(c) $6x$	A1	6
9	$V = \frac{1}{6}\pi LW^2$ because its dimensions are L^3 which is the only one representing a volume (*or similar explanation*)	A1 A1	2
10	$3n \geq -5$	MA1	
	$n \geq \frac{-5}{3}$	A1	2
11	**(a)**	A1	



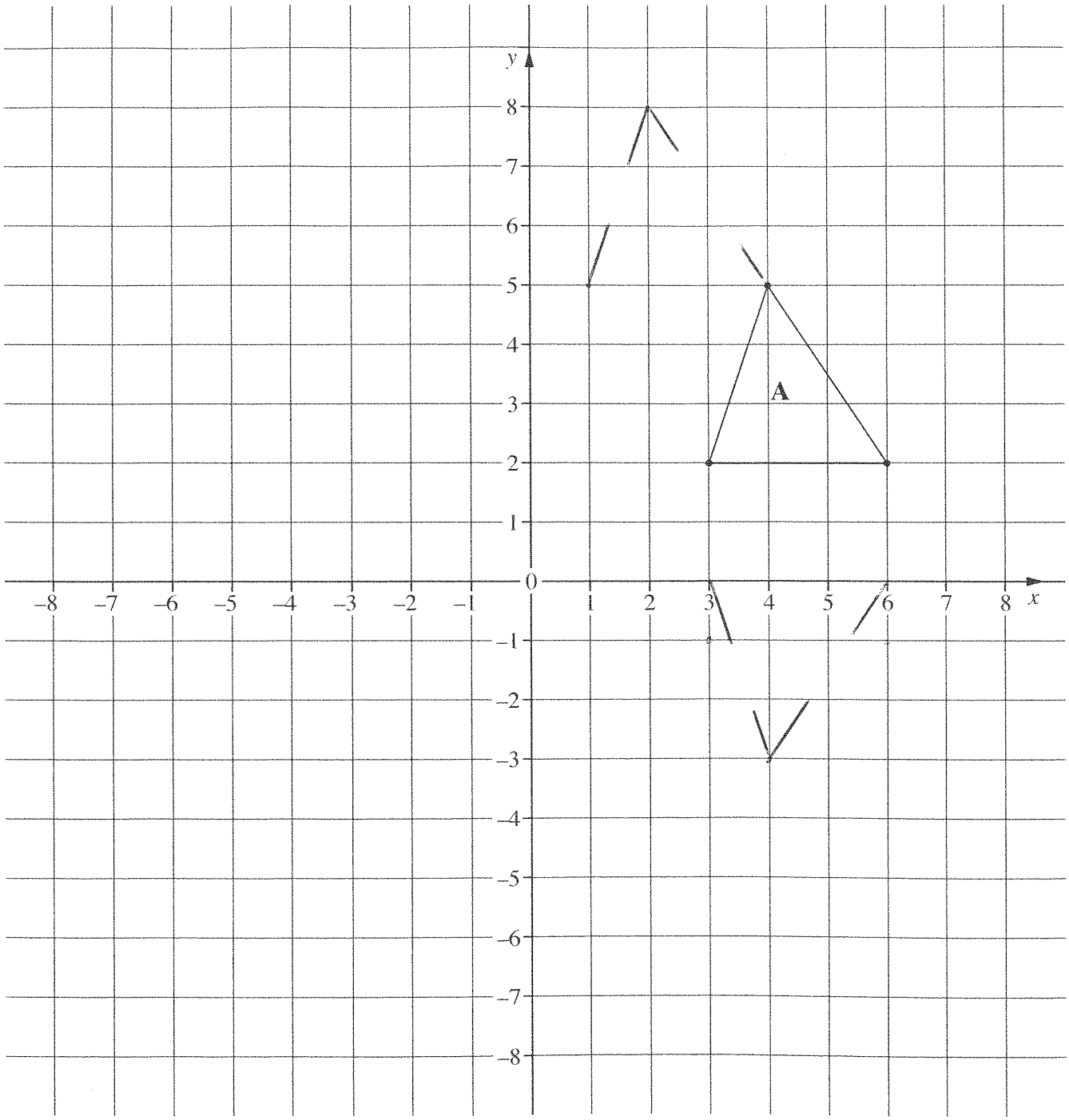
	(b) $0.6 \times 0.1 + 0.4 \times 0.4$	MA1	
	$= 0.06 + 0.16 = 0.22$	A1	3

STEMUP.CO.UK

			AVAILABLE MARKS
12	**(a)** $0.\dot{1}42857\dot{}$	A1	
	(b) **(i)** 5	A1	
	(ii) $5+20+2\sqrt{100}=25+20=45$		
	or $(\sqrt{5}+2\sqrt{5})^2=(3\sqrt{5})^2=45$	MA1 A1	4
13	$tx + cx = c^2 - tc$	MA1	
	$(t + c)\,x = c^2 - tc$	MA1	
	$x=\dfrac{c^2-tc}{t+c}$	MA1	3
14	$\text{P(RR)}=\dfrac{6}{12}\times\dfrac{5}{11}$	$\dfrac{6}{12}$, $\dfrac{5}{11}$ MA1	
		$\times$ M1	
	$=\dfrac{5}{22}$	MA1	3
15	$\overrightarrow{OQ} = \boldsymbol{b} + 2\boldsymbol{a}$	MA1	
	$\overrightarrow{PT} = -\boldsymbol{b} + \frac{1}{3}(\boldsymbol{b} + 2\boldsymbol{a}) = -\frac{2}{3}\boldsymbol{b} + \frac{2}{3}\boldsymbol{a}$	MA1	
	$\overrightarrow{TR} = -\frac{1}{3}(\boldsymbol{b} + 2\boldsymbol{a}) + \boldsymbol{a} = -\frac{1}{3}\boldsymbol{b} + \frac{1}{3}\boldsymbol{a}$	MA1	
	$PT : TR = 2 : 1$	A1	4
		Total	**56**

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2011
MODULE N6-1
OVERLAY QUESTION 6



Centre Number

7	1			

Candidate Number

Rewarding Learning

General Certificate of Secondary Education

2010

Mathematics



Module N6 Paper 1
(Non-calculator)
Higher Tier

GMN61

[GMN61]

MONDAY 7 JUNE

1.30 pm – 2.45 pm

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	

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 sixteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

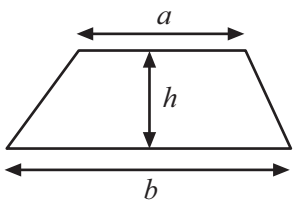
INFORMATION FOR CANDIDATES

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 ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

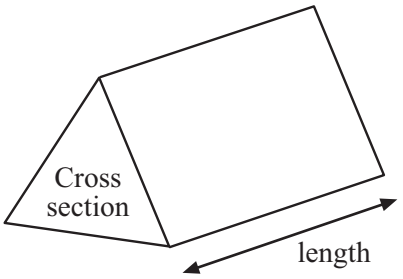
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

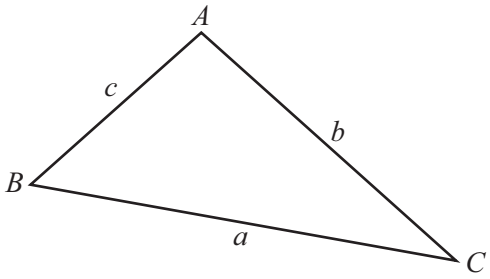


In any triangle ABC

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

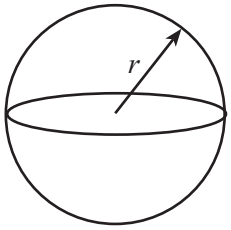
Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



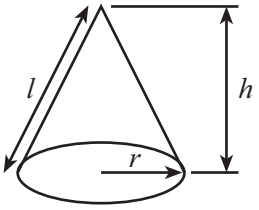
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



Quadratic equation:

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

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

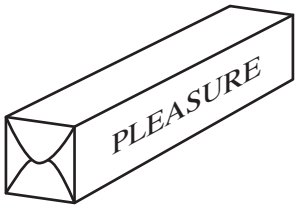
5571

STEMUP.CO.UK

Question 1

Examiner Only	
Marks	Remark

There are four colours of sweet in a packet of "Pleasure". The probability of picking a sweet of each colour is given in the table.



Colour	Green	Blue	Red	Orange
Probability	0.35	0.2		0.2

What is the probability of selecting a red sweet?

Answer _____ [2]

Question 2

Examiner Only	
Marks	Remark

$$R = \frac{S(2 + T)}{6}$$

Calculate the value of R when $S = 15$ and $T = -10$

Answer $R =$ _____ [3]

Question 3

Examiner Only	
Marks	Remark

(a) Estimate the value of $\dfrac{8.3 \times 19.6}{6.1 - 3.7}$

Show your working.

Answer _____ [2]

(b) Given that $\dfrac{3024}{36} = 84$, write down the answer to:

(i) 360×84

Answer _____ [1]

(ii) $3024 \div 840$

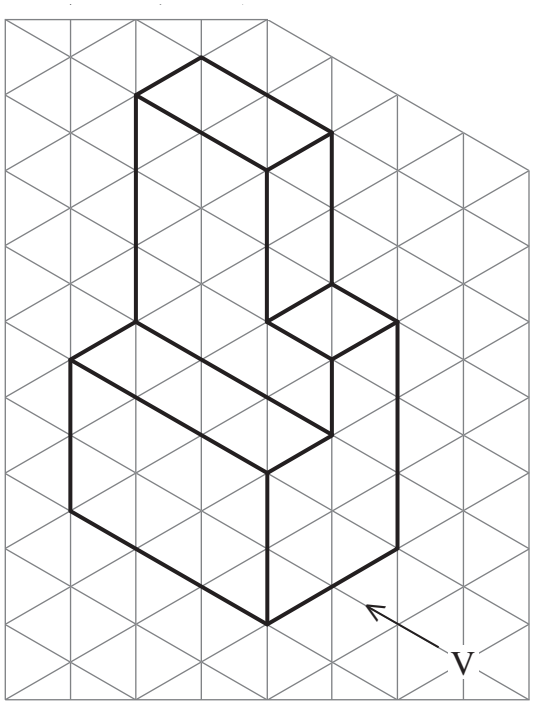
Answer _____ [1]

STEMUP.CO.UK

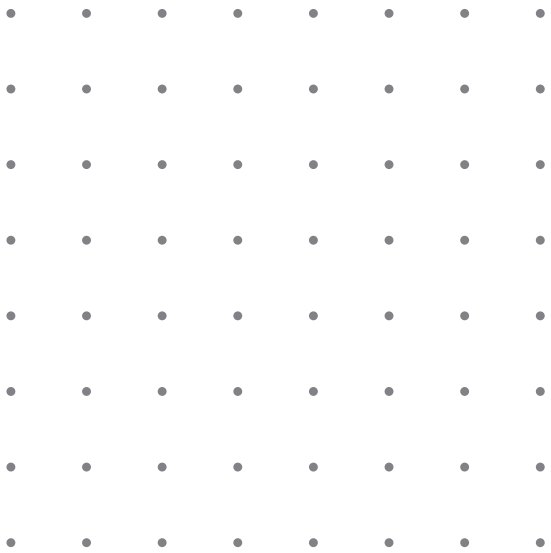
Question 4

Examiner Only	
Marks	Remark

On the lower grid, draw the front elevation of the solid as viewed from V.



Front elevation

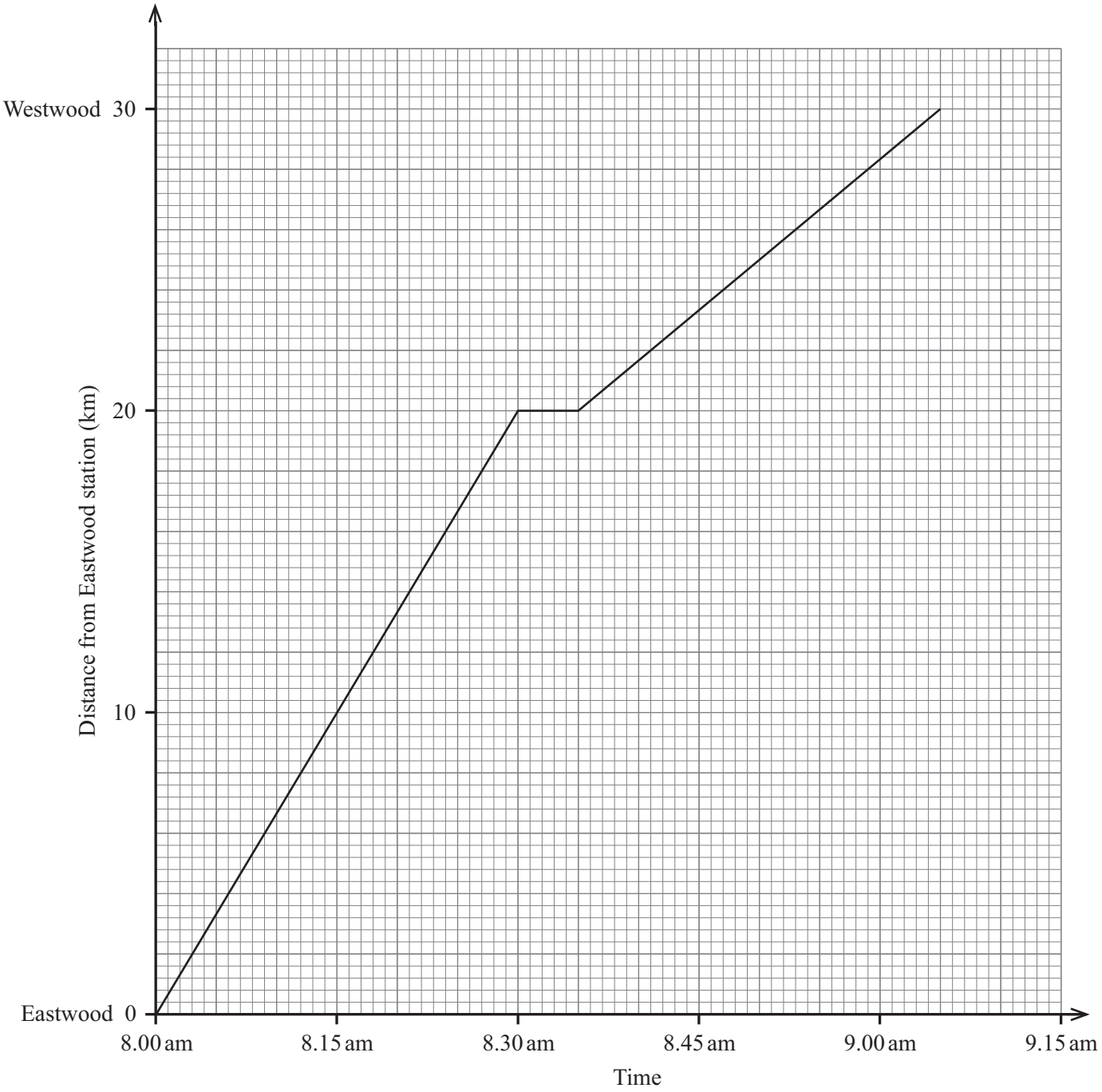


[2]

BLANK PAGE

Question 5

The graph shows the journey for a bus from Eastwood station to Westwood station.



5571

STEMUP.CO.UK

Question 5 continued

Examiner Only	
Marks	Remark

(a) What is the average speed of this bus during the first half hour?

Answer _____ km/h [2]

(b) Between which times was this bus travelling at its greatest average speed?

Answer _____ and _____ [1]

At 8.10 am, another bus left Westwood for Eastwood station and travelled non-stop at an average speed of 50 km/h.

(c) Use the graph opposite to find at what time the second bus passes the first bus.

Answer _____ [4]

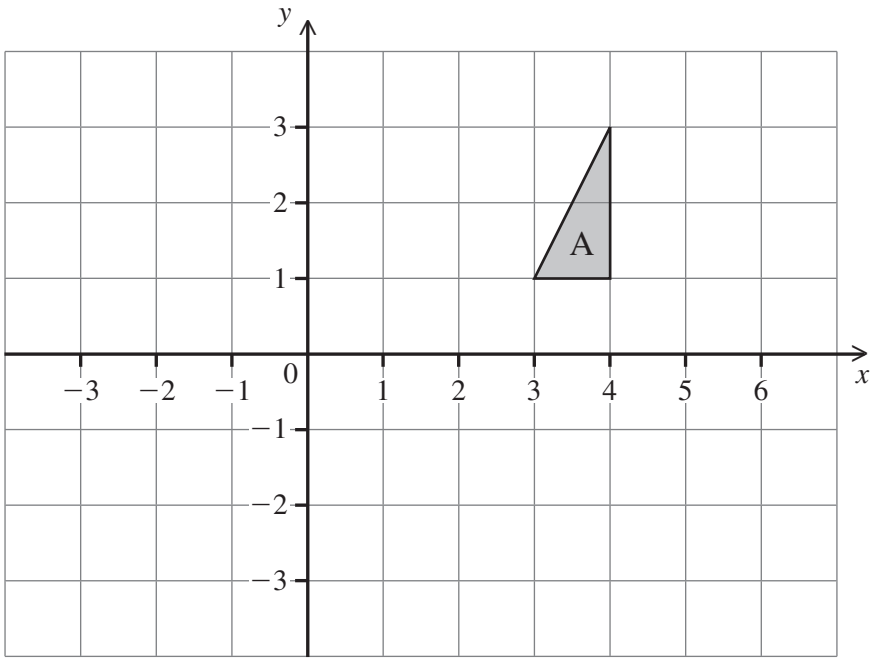
Question 6

Examiner Only	
Marks	Remark

(a) Draw the image of the triangle A shown in the diagram below after the translation 6 left and 2 down. Label your triangle, B. [1]

(b) Reflect triangle A in the line $x = 2$
Label your triangle, C. [2]

(c) Draw the image of triangle A after a rotation of 90° clockwise about the point (3, 0).
Label your triangle, D. [2]



STEMUP.CO.UK

Question 7

Examiner Only

Marks	Remark

(a) Rewrite $12 - x = y + 5$ to make x the subject.

Answer $x =$ _____ [2]

(b) Simplify

(i) $p^5 \times p^2$

Answer _____ [1]

(ii) $\frac{p^2}{p^8}$

Answer _____ [1]

(iii) $\frac{p^4 \times p^6}{p^2}$

Answer _____ [1]

STEMUP.CO.UK

Question 8

Examiner Only	
Marks	Remark

A machine that makes glasses has developed a fault. Peter checks a sample of 100 glasses and finds 18 with scratches.
The machine produces 4500 glasses each shift.
How many glasses on each shift would you expect to have scratches?

Answer _____ [2]

STEMUP.CO.UK

Question 9

Examiner Only	
Marks	Remark

Decide whether the following statements are true or false.
In each case, give an example to support your answer.

(a) Negative numbers have no reciprocals.

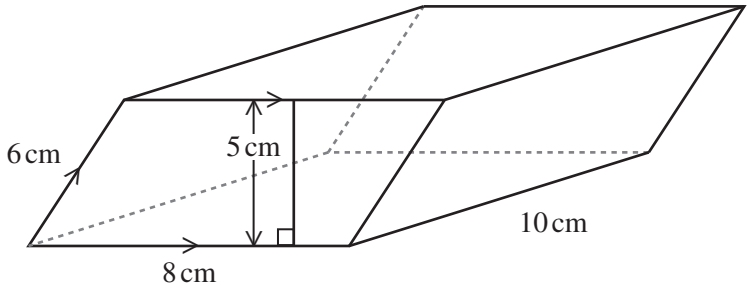
Answer _____ because _____ [1]

(b) The product of a number with its own reciprocal is 1

Answer _____ because _____ [1]

Question 10

Examiner Only	
Marks	Remark



Calculate the volume of this prism whose cross-section is a parallelogram.

Answer _____ cm^3 [3]

5571

STEMUP.CO.UK

Question 11

Examiner Only	
Marks	Remark

(a) A memory stick holds 128 000 000 bytes of data.
A hard disk can store 2.56×10^{10} bytes of data.
How many of these memory sticks are equivalent to this hard disk?

Answer _____ [2]

(b) Given that $(1.6 \times 10^{a}) \times (8 \times 10^{b}) = (c \times 10^{4})$
where all three values are in standard form, find

(i) the value of c

Answer c = _____ [1]

(ii) one set of possible values for a and b.

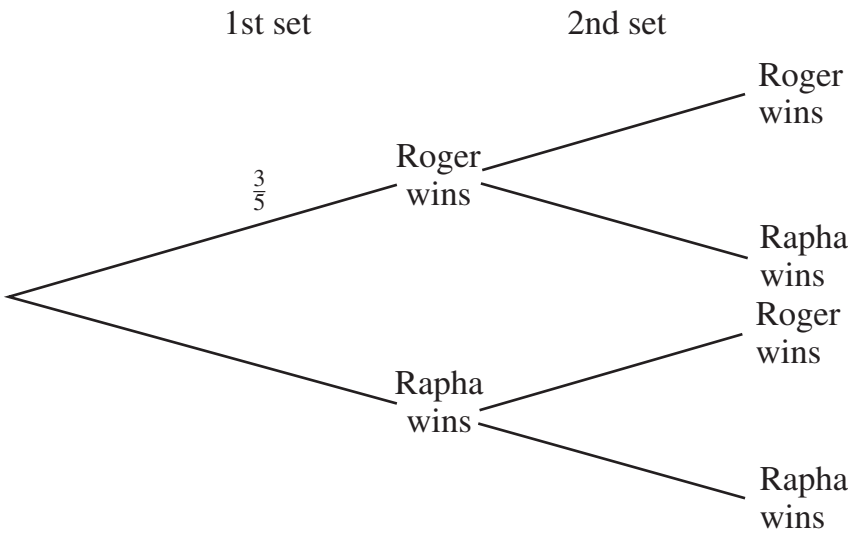
Answer a = _____ b = _____ [1]

Question 12

Examiner Only	
Marks	Remark

Roger and Rapha play two sets of tennis.
The probability that Roger wins the first set is $\frac{3}{5}$
If Roger wins the first set, the probability of him winning the second set is $\frac{2}{3}$
If he loses the first set, the probability of him winning the second set is $\frac{1}{2}$
A draw is not possible.

(a) Complete the probability tree diagram.



[2]

(b) Calculate the probability that Rapha wins both sets.

Answer _____ [2]

5571

STEMUP.CO.UK

Question 13

A sector of a circle makes an angle of 110° at the centre of the circle.
The radius of the circle is 6 cm.
Show that the area of the sector is $11\pi\,\text{cm}^2$.

[2]

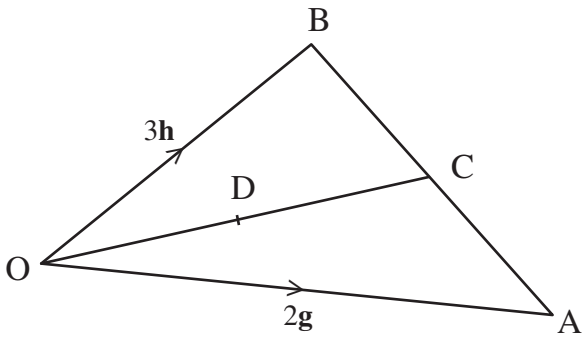
Examiner Only	
Marks	Remark

STEMUP.CO.UK

Question 14

Examiner Only	
Marks	Remark

In the triangle OAB shown, the side OA represents the vector 2**g** and the side OB represents the vector 3**h**.
C is the mid point of the side BA.
D is the mid point of the line OC.



Express the following in terms of **g** and/or **h**.

(a) $\overrightarrow{BA}$

Answer _____ [1]

(b) $\overrightarrow{OC}$

Answer _____ [1]

(c) $\overrightarrow{DB}$

Answer _____ [2]

STEMUP.CO.UK

Question 15

Examiner Only	
Marks	Remark

(a) Express $0.3\dot{4}\dot{2}$ as a fraction.
Show your working.

Answer _____ [2]

(b) Express $(\sqrt{3} - 4)^2$ in the form $a + b\sqrt{3}$

Answer _____ [2]

Question 16

Examiner Only	
Marks	Remark

A man only wears black or white socks. In a drawer he has four socks.
In the dark, he picks out one sock and then another.
The probability of both socks being white is $\frac{1}{2}$
What is the probability of both socks being black?

Answer _____ [3]

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 1
(Non-calculator)
Higher Tier

[GMN61]

MONDAY 7 JUNE

1.30 pm – 2.45 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:

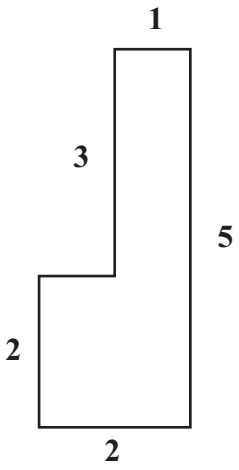
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's 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	$0.35 + 0.2 + 0.2 = 0.75$	MA1	
	$1 - 0.75 = 0.25$	MA1	2
2	$\frac{15(2 - 10)}{6}$	MA1	
	$\frac{-120}{6}$	MA1	
	-20	A1	3
3	**(a)** $\frac{8 \times 20}{6 - 4}$	MA1	
	80	A1	
	(b) **(i)** 30240	A1	
	(ii) 3.6	A1	4
4		M1, A1	2
5	**(a)** 40 km/h	M1, A1	
	(b) 8 am and 8.30 am	A1	
	(c) Line through (8.10 am, 30) and (8.40 am, 5 km)	MA2	
	Point of intersection	MA1	
	8.25 am (±1 min)	A1	7

STEMUP.CO.UK

				AVAILABLE MARKS
6	**(a)**	Correct translation	MA1	
	(b)	Correct line	A1	
		Three points correct	A1	
	(c)	Correct rotation	M1	
		Three points correct	A1	5
7	**(a)**	$x = 7 - y$	M1, A1	
	(b)	**(i)** p^7	A1	
		(ii) $\frac{1}{p^6}$ or p^{-6}	A1	
		(iii) p^8	A1	5
8	$\frac{18}{100} \times 4500 = 810$		M1, A1	2
9	**(a)**	False with a given example	A1	
	(b)	True with a given example	A1	2
10	$8 \times 5 \times 10$		MA2	
	400		A1	3
11	**(a)**	$2.56 \times 10^{10} \div (1.28 \times 10^8)$	M1	
		200	A1	
	(b)	**(i)** 1.28	MA1	
		(ii) a and b must be numbers that add up to 3	MA1	4

STEMUP.CO.UK

			AVAILABLE MARKS
12	**(a)**	$\frac{2}{3}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{5}$ $\frac{1}{2}$ A2	
	(b)	$\frac{2}{5} \times \frac{1}{2} = \frac{2}{10}$ $(\frac{1}{5})$ MA1, A1	4
13		Area $= \pi \times 6^2 \times \frac{110}{360}$ MA1	
		$= 11\pi$ cm^2 MA1	2
14	**(a)**	$-3\mathbf{h} + 2\mathbf{g}$ MA1	
	(b)	$1.5\mathbf{h} + \mathbf{g}$ MA1	
	(c)	$0.75\mathbf{h} + 0.5\mathbf{g} + 1.5\mathbf{h} - \mathbf{g}$ MA1	
		$2.25\mathbf{h} - 0.5\mathbf{g}$ A1	4
15	**(a)**	$1000x = 342.424242.....$	
		$10x = 3.424242.....$ MA1	
		$990x = 339$	
		$x = \frac{339}{990} = (\frac{113}{330})$ MA1	
	(b)	$3 - 4\sqrt{3} - 4\sqrt{3} + 16$ MA1	
		$19 - 8\sqrt{3}$ A1	4

STEMUP.CO.UK

			AVAILABLE MARKS
16	P(WW) $= \frac{n}{4} \times \frac{n-1}{3} = \frac{1}{2}$		
	$n(n-1) = 6$		
	$n^2 - n - 6 = 0$		
	$(n-3)(n+2) = 0$		
	$n = 3$	MA2	
	Answer 0	MA1	3
		Total	**56**

STEMUP.CO.UK

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics



Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

GMN61

FRIDAY 15 JANUARY

9.15 am – 10.30 am

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	
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 seventeen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

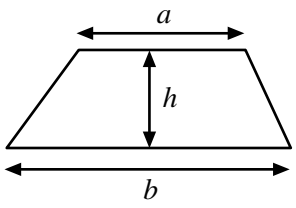
INFORMATION FOR CANDIDATES

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 ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

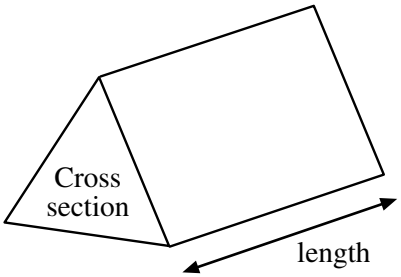
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

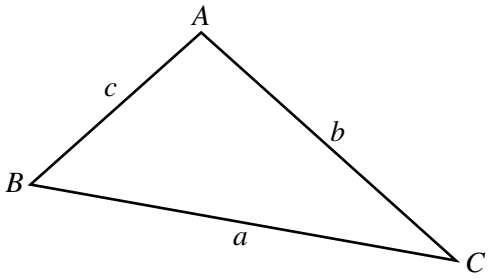


In any triangle ABC

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

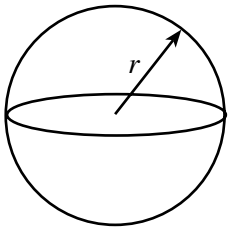
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



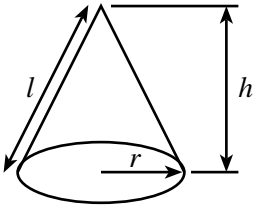
Volume of sphere = $\frac{4}{3}\pi r^3$

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)** Jill takes 120 steps to cover 72 metres.
What distance will she cover in taking 90 similar sized steps?

Answer _____ m [2]

(b) A recipe for 2 medium glasses of Apple and blackcurrant smoothie uses

250 ml	Apple and blackcurrant juice
2 tablespoons	Natural yoghurt
180 ml	Milk
3 scoops	Vanilla ice cream

Complete the recipe for 5 medium glasses.

Answer

_____ ml Apple and blackcurrant juice

5 tablespoons Natural yoghurt

_____ ml Milk

_____ scoops Vanilla ice cream [2]

---

2 Complete the identities

(a) $\frac{x}{4} \equiv \frac{3x}{\quad}$ [1]

(b) $3(y + 2) - 2y \equiv y$ [1]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

3 In a fairground game of chance, 120 people buy one ticket each.
The cost of a ticket is 50p.
The probability that a person wins a prize is $\frac{1}{12}$
Each winning ticket gets a prize of £1.50
What profit is made by the fairground?

Answer £ _____ [2]

---

4 Given that $49 \times 123 = 6027$

Find

(a) 4.9×12.3 Answer _____ [1]

(b) $602.7 \div 4.9$ Answer _____ [1]

---

5 **(a)** Use the formula $P = 3R - 4(Q - 2)$ to find the value of P when $Q = -8$ and $R = -6$

Answer P = _____ [3]

(b) Use the formula $L = \frac{M(N + 8)}{6}$ to find the value of L when $M = 9$ and $N = -30$

Answer L = _____ [3]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

6 **(a)** Rearrange $2p - 3 = 6 - q$ to make q the subject.
Simplify your answer.

Answer $q =$ _____ [2]

(b) Simplify

(i) $d^3 \times d^4$

Answer _____ [1]

(ii) $\dfrac{e^8}{e^4}$

Answer _____ [1]

(iii) $\dfrac{f \times f^3}{f^9}$

Answer _____ [1]

(c) "If a and b are prime numbers, then $a \times b$ is always an odd number."
Is this statement true or false? Explain your answer.

Answer _____ because _____

_____ [1]

---

7 Jill and Joan both work in the same office.
The probability that Jill is late for work on a given day is 0.15
The probability that Joan is late for work on a given day is 0.2

(a) What is the probability that both of them are late for work on the same day?

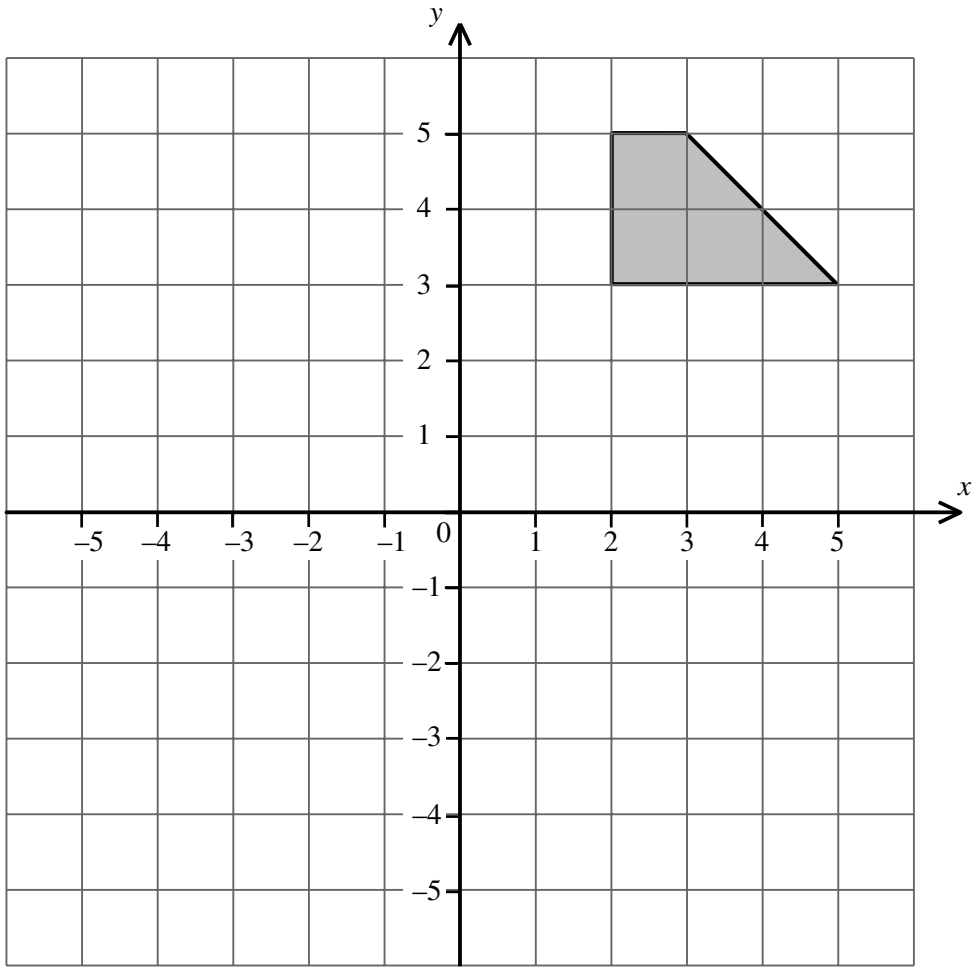
Answer _____ [2]

(b) What assumption did you make in answering part **(a)**?

Answer _____ [1]

STEMUP.CO.UK

8 **(a)** Reflect the shape below in the line $y = 1$

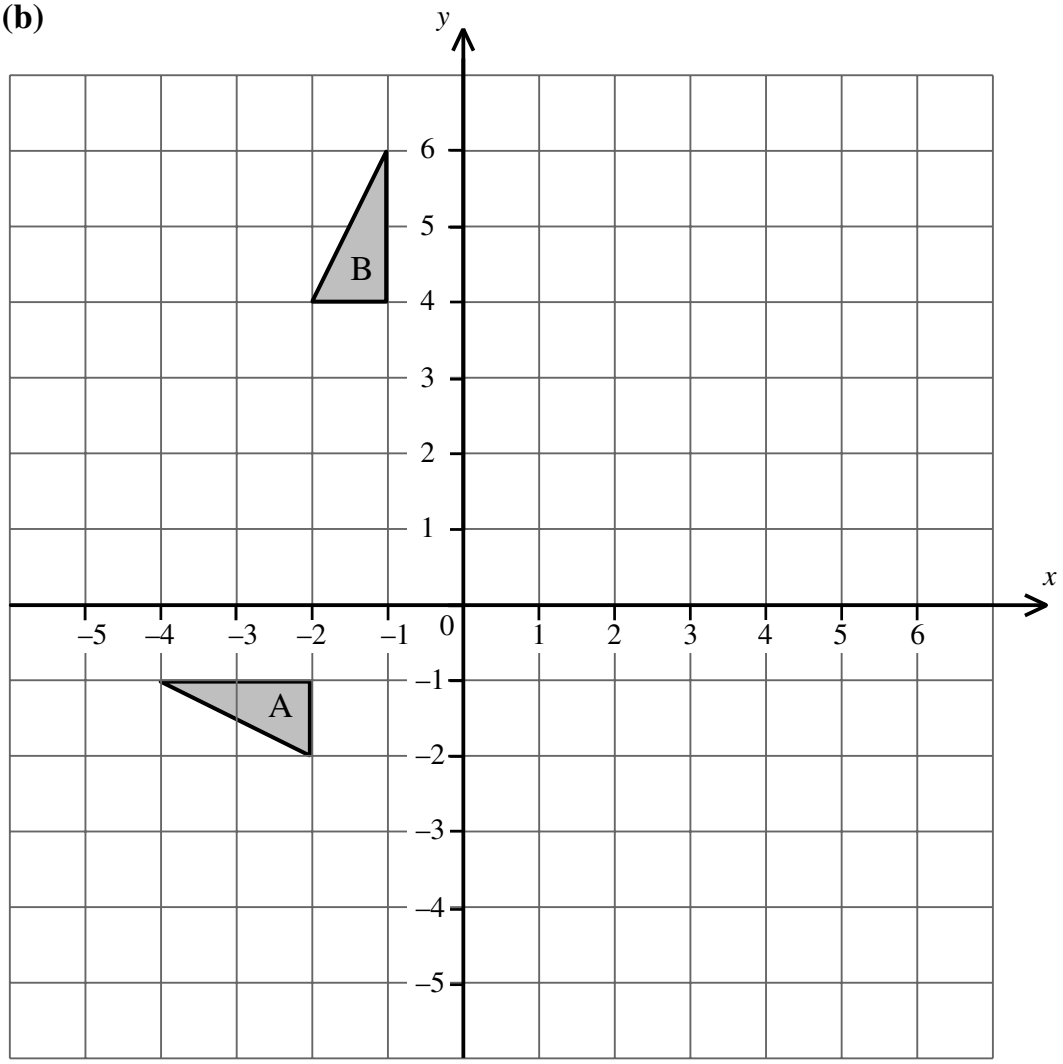


[2]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

(b)



(i) Draw the image of triangle A after a translation $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$ [2]

(ii) Describe fully the **single** transformation which maps triangle A onto triangle B.

Answer _____

_____ [3]

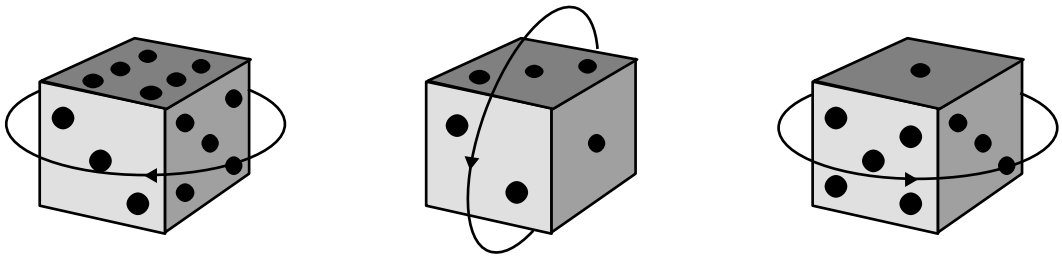
Examiner Only

Marks	Remark

STEMUP.CO.UK

Examiner Only	
Marks	Remark

9 Opposite faces of a dice add up to give seven.
As shown, the total of the numbers on the front faces is 3 + 2 + 5 = 10
In one move, **each** dice below is rotated in the direction shown one face at a time (a quarter turn).
After two moves, what will be the total of the numbers on the **front** faces?
Show your working.



Answer **Total** = _____ [2]

---

10 In a survey of 200 cars crossing a bridge, 45 had no passengers.
On a day when 4000 cars cross the bridge, how many cars would you expect to have no passengers?

Answer _____ [2]

---

11 Brenda knows that one of the following formulae can be used to find the correct area of a shape. Each letter a, b, c, d represents a length.

Which is the correct formula? Give a reason for your answer.

A $\pi ac^2 + ab^2$ B $\pi a^2 b + bc^2$

C $\frac{1}{3}b + \pi c$ D $\frac{1}{4}cd + a^2$

Answer _____

because _____ [2]

STEMUP.CO.UK

12 Show that $(n + 2)^2 - (n - 2)^2 \equiv 8n$

[2]

Examiner Only	
Marks	Remark

13 **(a)** Which of the following is closest to $\sqrt{0.91}$?
Circle your answer.

0.45 0.3 0.9 [1]

(b) Write $0.1\dot{7}$ correct to 3 decimal places.

Answer _____ [1]

(c) Write the recurring decimal $0.2\dot{1}\dot{5}$ in fraction form.

Answer _____ [2]

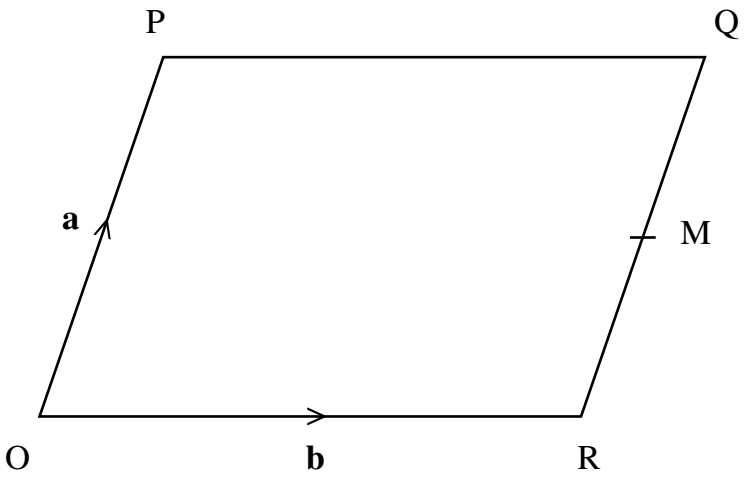
14 Simplify $(3x^2y^3)^4$

Answer _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

15



OPQR is a parallelogram. M is the mid-point of RQ.

$\overrightarrow{OP} = \mathbf{a}$ and $\overrightarrow{OR} = \mathbf{b}$

Express in terms of **a** and/or **b**

(a) $\overrightarrow{QP}$, Answer _____ [1]

(b) $\overrightarrow{OM}$, Answer _____ [1]

(c) $\overrightarrow{PM}$. Answer _____ [1]

---

16 $(x - 4)^2 + e \equiv x^2 - dx + 21$

(a) Find values for d and e.

Answer d = _____ e = _____ [2]

(b) Hence write down the minimum value of the expression $x^2 - dx + 21$ from part **(a)**.

Answer _____ [1]

STEMUP.CO.UK

17 At a party each child is given a balloon at random.
There are 20 red balloons and 40 yellow balloons.
What is the probability that the first two children receive the same colour of balloon?

Examiner Only	
Marks	Remark

Answer _____ [4]

THIS IS THE END OF THE QUESTION PAPER

STEMUP.CO.UK

GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

FRIDAY 15 JANUARY

9.15am – 10.30am

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)**	$\frac{90}{120} = \frac{3}{4}$	A1	
		$\frac{3}{4} \times 72 = 54$	MA1	
	(b)	625 ml		
		450 ml		
		7.5 scoops	MA2 (MA1 for any 1 correct)	4
2	**(a)**	12	MA1	
	(b)	+ 6 on RHS or – 6 on LHS	MA1	2
3		$\frac{1}{12} \times 120 = 10$ people £1.50 × 10 = £15	MA1	
		60 − 15 = 45	MA1	2
4	**(a)**	60.27	A1	
	(b)	123	A1	2
5	**(a)**	− 18 − 4(− 8 − 2)	MA1	
		− 18 + 40	MA1	
		22	A1	
	(b)	$\frac{9(-30+8)}{6}$	MA1	
		$\frac{-198}{6}$	MA1	
		−33	A1	6

STEMUP.CO.UK

				AVAILABLE MARKS
6	**(a)**	$2p - 3 - 6 = -q$ **or** $2p - 9 = -q$	MA1	
		$q = 3 + 6 - 2p$ **or** $q = q - 2p$	MA1	
	(b)	**(i)** d^7	A1	
		(ii) e^4	A1	
		(iii) f^{-5} or $\frac{1}{f^5}$	A1	
	(c)	False because it is even if either a or b equals 2	MA1	6
7	**(a)**	0.15×0.2	M1	
		$= 0.03$	A1	
	(b)	The events are independent	A1	3
8	**(a)**	Correct reflection	A2	
	(b)	**(i)** Correct translation 6 right	A1	
		Correct translation 2 down	A1	
		(ii) Rotation, 90° clockwise, about (1, 1)	A3	7
9		$4 + 5 + 2$	MA1	
		$= 11$	A1	2
10		$\frac{45}{200} \times 4000$	MA1	
		$= 900$	A1	2
11		D	A1	
		D is the only area **or** A and B are volumes and C is a length	A1	2
12		$n^2 + 4n + 4 - (n^2 - 4n + 4)$	MA1	
		$n^2 + 4n + 4 - n^2 + 4n - 4 = 4n + 4n = 8n$	MA1	2

STEMUP.CO.UK

			AVAILABLE MARKS
13	**(a)** 0.9	A1	
	(b) 0.178	A1	
	(c) Let $x = 0.21515\ldots$		
	$1000x = 215.1515\ldots$ $10x = 2.1515\ldots$		
	$990x = 213$	M1	
	$x = \frac{213}{990}$ $(\frac{71}{330})$	A1	4
14	$81x^8y^{12}$	MA2	2
15	**(a)** $-\mathbf{b}$	MA1	
	(b) $\frac{1}{2}\mathbf{a} + \mathbf{b}$	MA1	
	(c) $\mathbf{b} - \frac{1}{2}\mathbf{a}$	MA1	3
16	**(a)** $\mathbf{d} = 8$, $\mathbf{e} = 5$	MA1, MA1	
	(b) 5	A1	3
17	$\frac{20}{60} \times \frac{19}{59} + \frac{40}{60} \times \frac{39}{59}$	MA2	
	$= \frac{19}{177} + \frac{78}{177}$ **or** $\frac{380}{3540} + \frac{1560}{3540}$	MA1	
	$= \frac{97}{177}$ **or** $\frac{1940}{3540}$	A1	4
		Total	**56**

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 1

(Non-calculator)

Higher Tier

[GMN61]

MONDAY 1 JUNE

9.15 am – 10.30 am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 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:

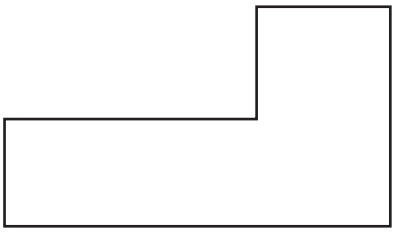
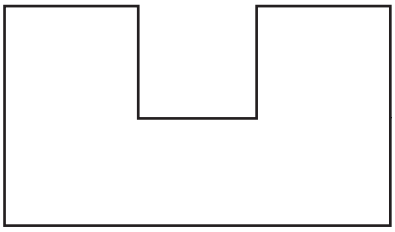
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's 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	**(a)** $1 - 0.8 = 0.2$	M1, A1	
	(b) $0.15 \times 600 = 90$	M1, A1	4
2	$\dfrac{(2-12)\times(-4)}{8}$	MA1	
	$= \dfrac{40}{8}$	A1	
	$= 5$	A1	3
3	**(a)** 	A2	
	(b) 	A2	4
4	**(a)** **(i)** $\dfrac{5\times 30}{(9-7)} = \dfrac{5\times \cancel{30}^{15}}{\cancel{2}} = 75$	MA1, MA1	
	(ii) $\sqrt{90\,000 / 100} = \sqrt{900} = 30$	M1, A2	
	(b) 15 800	A1	6

STEMUP.CO.UK

				AVAILABLE MARKS
5	**(a)**	enlargement scale factor 2 centre (1,2)	MA1, MA1, MA1	
	(b)	reflection in the line $y = x$	MA1, MA1	
	(c)	rotation 90° clockwise about (0, –2)	MA1, MA1, MA1	8
6	**(a)**	$v - u = gt$	MA1	
		$g = \frac{v-u}{t}$	MA1	
	(b)	$-7 < 3n \leq 9$	MA1	
		$-2\frac{1}{3} < n \leq 3$	MA1	
		$n = -2, -1, 0, 1, 2, 3$	A2	6
7		70°	A1	1
8	**(a)**	$2n \times 2n$	MA1	
		$4n^2$ which can be divided by 4	MA1	
	(b)	any negative number ≤ -1	A1	
	(c)	$n^2 - n + n - 1 + 2n - 2n + 2 - n^2$ along with suitable indication of	A1	
		completion to = 1	A1	5
9	**(a)**	3.6714×10^8	A1	
	(b)	5.972×10^{-5}	A1	
	(c)	$18 \times 10^{-7} = 1.8 \times 10^{-6}$	A1, A1	4
10	**(a)**	0.3, 0.4, 0.6, 0.4	A1	
	(b)	$0.7 \times 0.4 + 0.3 \times 0.6 = 0.28 + 0.18 = 0.46$	M1, A1	3
11	**(a)**	$(2\sqrt{2} + 3\sqrt{2})^2$ **or** $8 + 6\sqrt{16} + 18$	MA1	
		$= (5\sqrt{2})^2 = 25 \times 2$ $8 + 24 + 18$		
		50 50	A1	
	(b)	$f = 3.4545.....$		
		$100f = 345.4545.....$		
		$99f = 342$	M1, A1	
		$f = \frac{342}{99} \left(= \frac{38}{11}\right)$	A1	5

STEMUP.CO.UK

			AVAILABLE MARKS
12	**(a)** $\left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right)$	M1, A1	
	$\frac{6}{132}$ or $\frac{1}{22}$	A1	
	(b) $\left[\left(\frac{3}{12}\right) \times \left(\frac{2}{11}\right) \times \left(\frac{9}{10}\right)\right] + \left[\left(\frac{7}{12}\right) \times \left(\frac{6}{11}\right) \times \left(\frac{5}{10}\right)\right]$ $+\left[\left(\frac{2}{11}\right) \times \left(\frac{1}{11}\right) \times \left(\frac{10}{10}\right)\right]$	M1, A1	
	$\left(\frac{54}{1320}\right) + \left(\frac{210}{1320}\right) + \left(\frac{20}{1320}\right)$ $= \frac{284}{1320}$ or $\frac{71}{330}$ or 0.215151...	A2	7
		Total	**56**

STEMUP.CO.UK

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics



Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

GMN61

WEDNESDAY 14 JANUARY

1.30 pm – 2.45 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.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

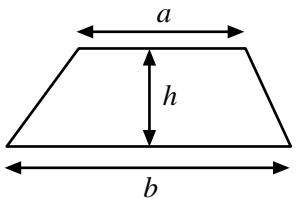
The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

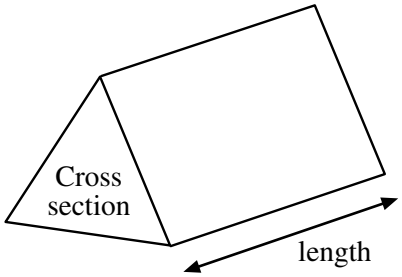
STEMUP.CO.UK

Formula Sheet

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



Volume of prism = area of cross section × length

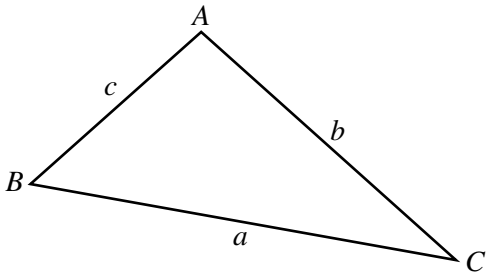


In any triangle ABC

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

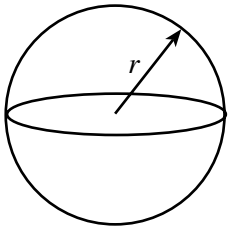
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



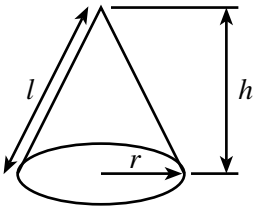
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

Examiner Only	
Marks	Remark

1 15% of a population is known to be left-handed.
200 members are chosen at random from the population.

Estimate how many you would expect to be left-handed.

Answer _____[2]

---

2 **(a)** Given that $93 \times 126 = 11\,718$, find

(i) 9.3×1.26

Answer _____[1]

(ii) $11\,718 \div 930$

Answer _____[1]

(b) Write down the two numbers which are the square roots of 64.

Answer _____[1]

(c) Write down the meaning of $0.\dot{3}\dot{7}$

Answer _____ [1]

---

3 A man travels 240 km in $2\frac{1}{2}$ hours.

Calculate his average speed on the journey.

Answer _____ km/h [3]

STEMUP.CO.UK

4 **(a)** $S = \dfrac{a}{1-r}$ Find S when $a = 12$ and $r = \frac{1}{2}$

Answer $S =$ _____[2]

(b) $T - mg = ma$

Find the value of T when $m = 8$, $g = 10$ and $a = -2$

Answer $T =$ _____[3]

(c) List the values of the **integer** n such that

$-4 < 3n < 9$

Answer _____ [3]

Examiner Only	
Marks	Remark

5 Some of the ingredients required to make 30 chocolate muffins are listed below.

600 g plain flour
540 g caster sugar
300 g chocolate chips
24 fl oz milk
6 medium eggs

Calculate the corresponding amounts of ingredients required to make 20 chocolate muffins.

_____ g plain flour

_____ g caster sugar

_____ g chocolate chips

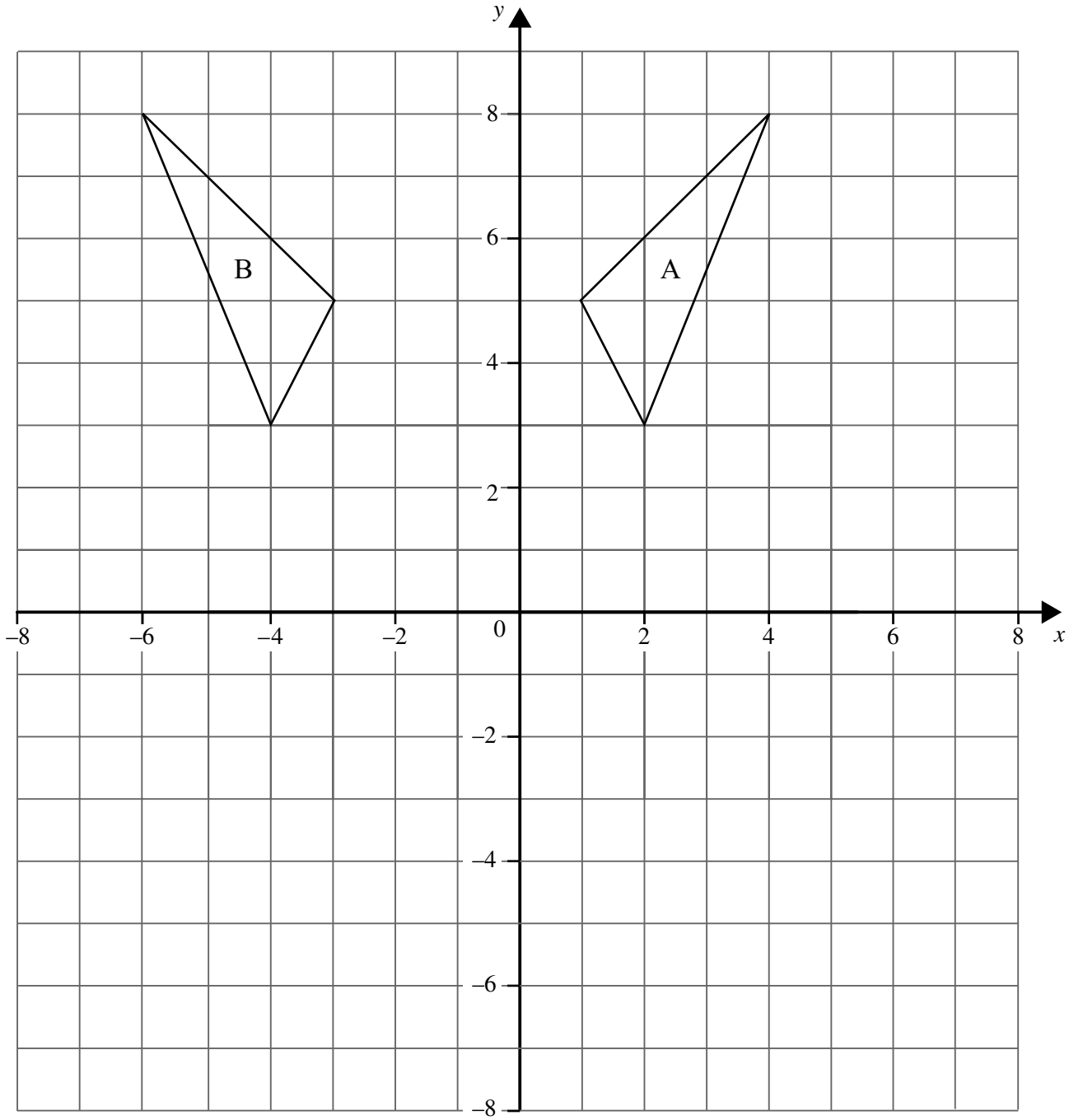
_____ fl oz milk

_____ medium eggs [3]

Examiner Only	
Marks	Remark

STEMUP.CO.UK

6



Examiner Only	
Marks	Remark

(a) Describe fully the **single** transformation which maps triangle A to triangle B.

_____

_____[2]

STEMUP.CO.UK

(b) Translate triangle A by $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$. Label the new triangle C.

[2]

(c) Rotate triangle A 90° clockwise about the point (0, 2). Label the new triangle D. [2]

Examiner Only

Marks	Remark

---

7 **Estimate** $\dfrac{720 \times 4.89}{0.212}$

Answer _____ [3]

---

8 Simplify

(a) $m^2 \times m^5$

Answer _____[1]

(b) $\dfrac{a \times a^6}{a^2}$

Answer _____[1]

(c) $\dfrac{y^3}{y^7}$

Answer _____[1]

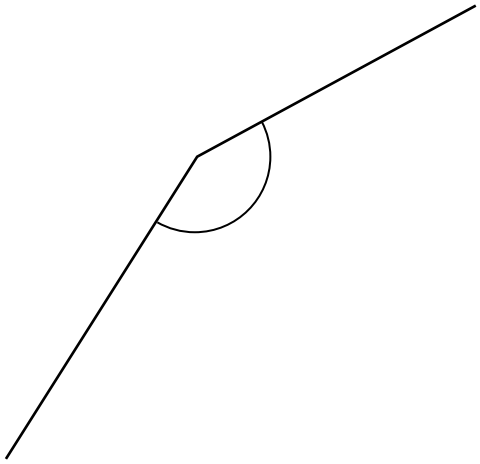
(d) $2b^4c^2 \times c^3b$

Answer _____[2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

9 **(a)** Bisect the angle using a ruler and compasses only.
Do not rub out your construction lines.



[2]

(b) Draw the locus of the point which is a fixed distance of 4 cm from the line PQ.

P Q

[2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

10 The letters r and x represent lengths.

Which two expressions could represent areas?

$\frac{\pi r^2}{x}$ $\quad \pi(r+x)$ $\quad \frac{\pi r^3}{x}$ $\quad \pi r + r$ $\quad \pi r^2 + rx$

Answers _____ and _____ [2]

---

11 **(a)** Write 0.000000652 in standard form.

Answer _____ [1]

(b) Express $\frac{4}{11}$ as a recurring decimal.

Answer _____[1]

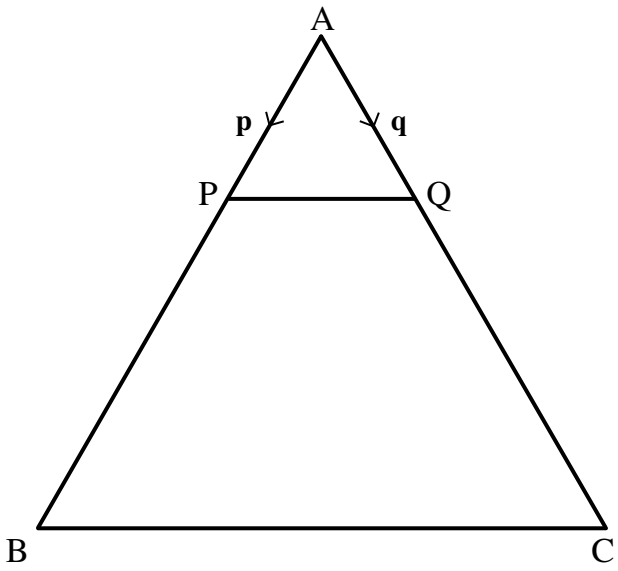
(c) Change the recurring decimal $0.\dot{5}\dot{1}$ into a fraction.

Answer _____ [2]

STEMUP.CO.UK

Examiner Only	
Marks	Remark

12 ABC is a triangle.
P is a point on AB such that AP = $\frac{1}{3}$ AB
Q is a point on AC such that AQ = $\frac{1}{3}$ AC
AP = **p** and AQ = **q**



(a) Write $\overrightarrow{PC}$ in terms of **p** and **q**.

Answer _____ [1]

(b) Use vectors to prove that PQ is parallel to BC.

[3]

---

13 Given that $r = \sqrt{3}$, $s = \sqrt{6}$ and $t = \sqrt{27}$, simplify the following:

(a) rt

Answer _____ [2]

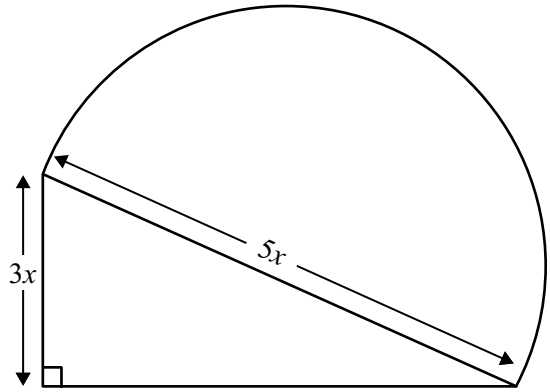
STEMUP.CO.UK

(b) $(r + s)^2$

Answer _____ [2]

Examiner Only	
Marks	Remark

14 Pat marks out an area in his garden for a vegetable patch.
It takes the shape of a right angled triangle and a semi-circle as shown in the diagram. Some of its dimensions are given in terms of x.



Show that a formula for calculating the area of the vegetable patch is given as

$$\text{Area} = (6 + \frac{25}{8}\pi)x^2$$

[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 1

(Non-calculator)

Higher Tier

[GMN61]

WEDNESDAY 14 JANUARY

1.30 pm – 2.45 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	$200 \times 0.15 = 30$	M1, A1	2
2	**(a)** **(i)** 11.718	A1	
	(ii) 12.6	A1	
	(b) 8, –8	A1	
	(c) 0.373737 . . .	A1	4
3	$\text{Speed} = 240 \div 2\frac{1}{2}$	MA1	
	$= 240 \times \frac{2}{5}$	MA1	
	$= 96$	A1	3
4	**(a)** $S = \frac{12}{\left(1-\frac{1}{2}\right)}$		
	$= \frac{12}{\frac{1}{2}}$	MA1	
	$= 24$	A1	
	(b) $T - 80 = 8 \times -2$	MA1	
	$T = -16 + 80$	MA1	
	$T = 64$	A1	
	(c) $-\frac{4}{3} < n < 3$	MA1	
	$n = -1, 0, 1, 2$	A2	8
5	400 or $\frac{2}{3}$ 360 200 16 4	MA1 A1 A1	3

STEMUP.CO.UK

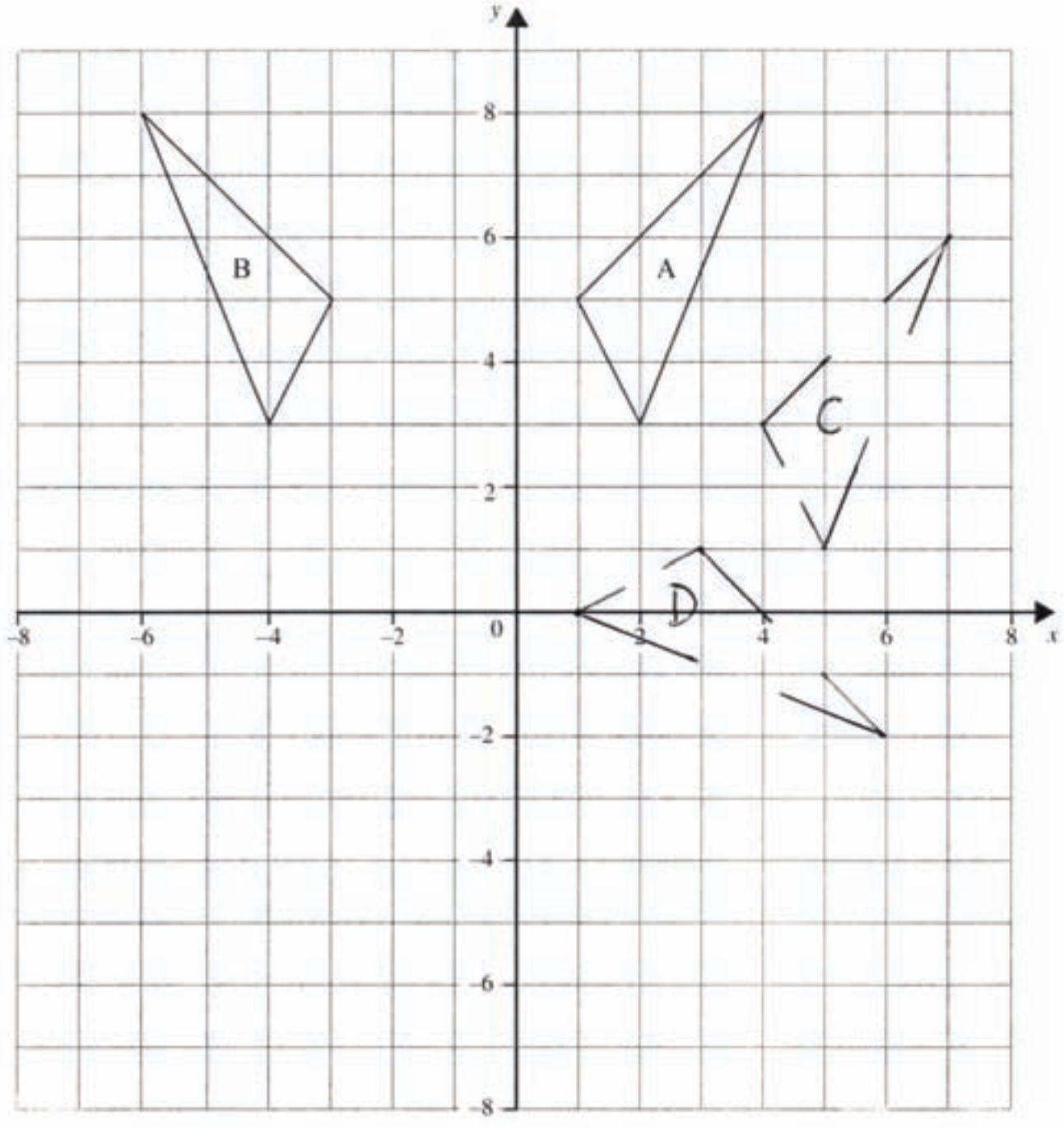
			AVAILABLE MARKS
6	**(a)** Reflection in line $x = -1$	A1, A1	
	(b) Correct translation	A1, A1	
	(c) See overlay 90° clockwise, correct centre used	A1, A1	6
7	$\frac{700 \times 5}{0.2}$ 17 500	MA1 MA2	3
8	**(a)** m^7	A1	
	(b) a^5	A1	
	(c) y^{-4}	A1	
	(d) $2b^5c^5$ A1 for 2 and 1 power correct; A1 for second power correct		5
9	**(a)** See overlay Construction of angle bisector	M1, A1	
	(b) 4 cm parallel to and on either side of line	MA1, MA1	4
10	$\frac{\pi r^3}{x}$ and $\pi r^2 + rx$	A1, A1	2
11	**(a)** 6.52×10^{-7}	MA1	
	(b) $0.363636\ldots$ or $0.\dot{3}\dot{6}$	MA1	
	(c) $100x = 51.515151\ldots$ $x = 00.515151\ldots$ $99x = 51$ $x = \frac{51}{99}$ or $\frac{17}{33}$	MA1 MA1	4

STEMUP.CO.UK

			AVAILABLE MARKS
12	**(a)** $\overrightarrow{PC} = -\mathbf{p} + 3\mathbf{q}$	MA1	
	(b) $\overrightarrow{PQ} = \mathbf{q} - \mathbf{p}$	MA1	
	$\overrightarrow{BC} = 3\mathbf{q} - 3\mathbf{p}$	MA1	
	$\overrightarrow{BC} = 3(\mathbf{q} - \mathbf{p})$ (which is parallel to PQ)	A1	4
13	**(a)** $\sqrt{3} \times \sqrt{27} = \sqrt{81} = 9$	M1, A1	
	(b) $\left(\sqrt{3} + \sqrt{6}\right)\left(\sqrt{3} + \sqrt{6}\right) = 3 + \sqrt{18} + \sqrt{18} + 6$	MA1	
	$9 + 2\sqrt{18} = 9 + 6\sqrt{2}$	MA1	4
14	Total area $= \frac{1}{2}(4x)(3x) + \frac{1}{2}\pi\left(\frac{5}{2}x\right)^2$	MA1 for $4x$, MA1, MA1 for 2 areas	
	$= 6x^2 + \frac{1}{2}\left(\frac{25}{4}\right)\pi x^2$		
	$= 6x^2 + \frac{25}{8}\pi x^2$	A1	
	$= \left(6 + \frac{25}{8}\pi\right)x^2$		4
		Total	**56**

STEMUP.CO.UK

GCSE MATHEMATICS JANUARY 2009
MODULE N6-1
OVERLAY QUESTION 6



GCSE MATHEMATICS JANUARY 2009
MODULE N6-1
OVERLAY QUESTION 9



incl arcs.

(b) Draw the locus of the point which is a fixed distance of 4 cm from the line PQ.



STEMUP.CO.UK