CCEA GCSE MATHEMATICS (MODULAR)

MATHS



EXAM QUESTION PACK

MODULE N4 PAPER 2 (CALCULATOR) HIGHER TIER GMN42 PAPERS

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2012

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

GMN42

WEDNESDAY 11 JANUARY

10.30 am–11.30 am

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

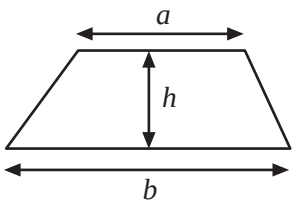
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

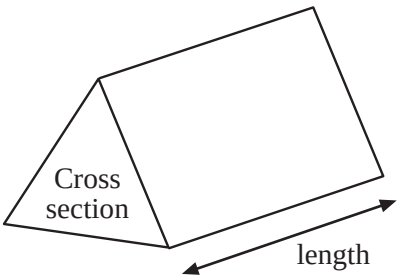
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Formula Sheet

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



Volume of prism = area of cross section × length

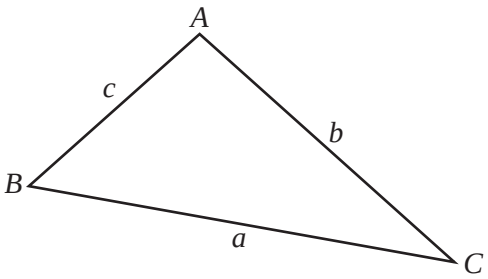


In any triangle *ABC*

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

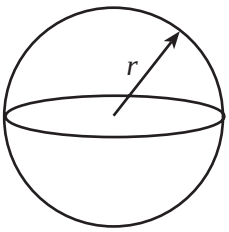
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



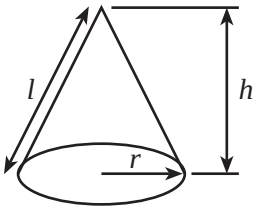
Volume of sphere = $\frac{4}{3}\pi r^3$

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)** Jane attends both piano and flute lessons on August 31st.
She attends flute lessons every 8 days and piano lessons every 10 days.
On what date will she next attend both lessons?

Answer _____ [2]

(b) An electric fire cost £135.66 including VAT at 20%.

How much VAT was payable on the bill?

Answer £ _____ [3]

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2 Fifty-five pupils in Year 11 do an end of year French test.

Their data is recorded in the table below.

Mark	0–20	21–40	41–60	61–80	81–100
Frequency	6	17	20	9	3

(a) Complete the cumulative frequency table below.

Mark (less than or equal to)	20	40	60	80	100
Cumulative Frequency	6				

[1]

(b) Draw a cumulative frequency graph opposite to illustrate this information. [3]

The pass mark for the examination was 52.

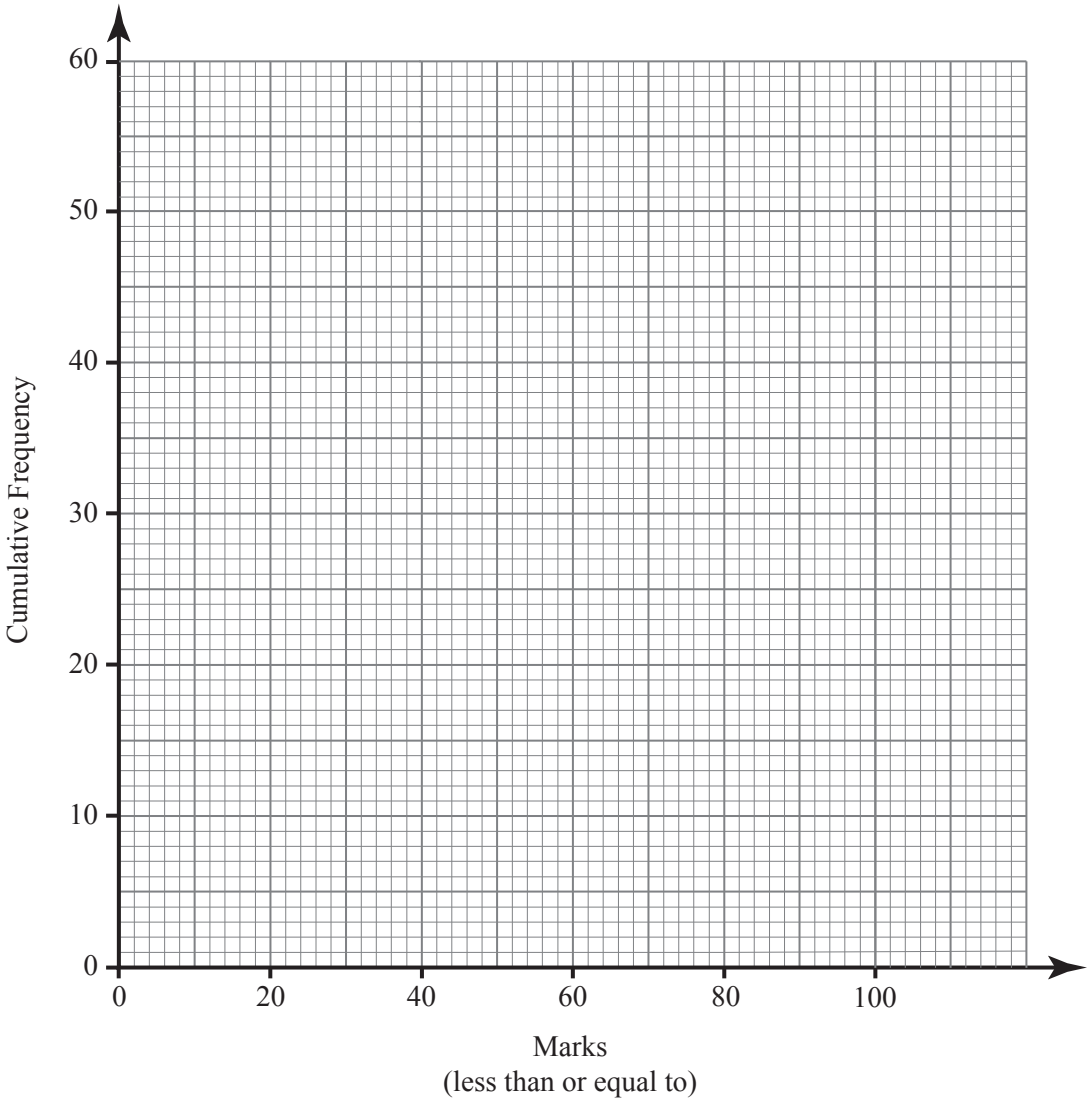
(c) Use your graph to estimate the number of students who passed the examination.

Answer _____ [2]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

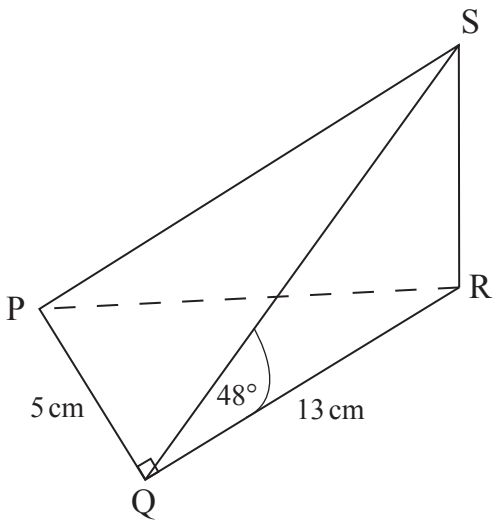
3 Solve the simultaneous equations $7x + 3y = 15$
$4x + 3y = 6$

Answer $x =$ _____, $y =$ _____ [2]

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Examiner Only	
Marks	Remark

4 The diagram shows a pyramid PQRS in which RS is at right angles to the horizontal base PQR. PQ = 5 cm, QR = 13 cm, angle PQR = 90° and angle RQS = 48°.



Calculate the length SR.

Answer _____ [4]

5 Expand and simplify $(3p + 2q)(4p - 7q)$.

Answer _____ [3]

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Examiner Only	
Marks	Remark

6 A field ABCD has straight sides. AB = 80 m.

An underground pipeline crosses the field from B to D and is 264 m long.

Angle ABD = 44°.

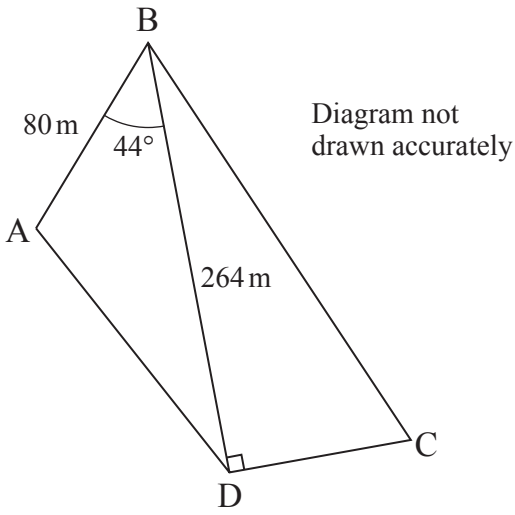


Diagram not drawn accurately

(a) Calculate the area of ABD.

Answer _____ m^2 [2]

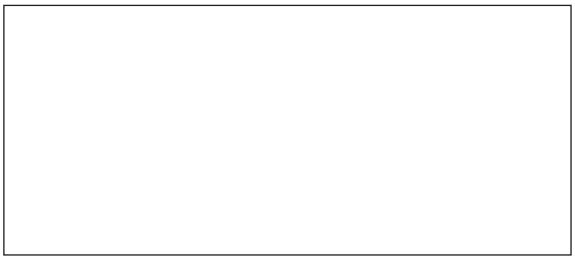
A safety shutoff valve is placed at the midpoint of BD.

(b) Calculate the distance from the corner A to the valve.

Answer _____ m [3]

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7 The length of a rectangle, x, is 5 cm more than the breadth. Its diagonal is 12 cm long.



x

Diagram not drawn accurately

(a) Show that x is a solution of the equation $2x^2 - 10x - 119 = 0$ [3]

(b) Solve the equation to find the length of the rectangle.

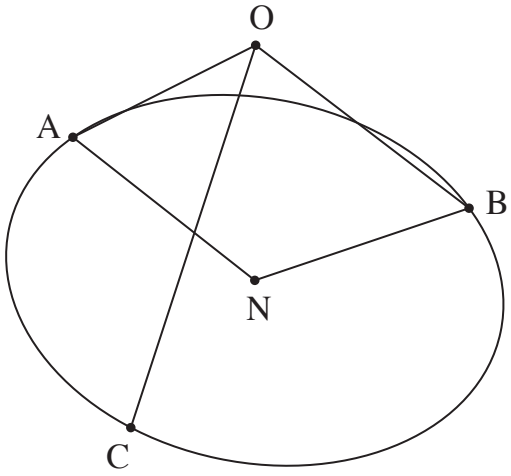
Give your answer correct to 1 decimal place.

Answer $x =$ _____ cm [3]

Examiner Only	
Marks	Remark

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8 In a circular circus ring, centre N, three wires OA, OB and OC of **equal** length are attached from A, B, C on the circumference of the ring floor to the top of the tent O. The angles BOC, COA and AOB are each equal to 90° and the angle ANB = 120°. The chords AB, BC and CA are each 25 m in length.



(a) Explain why angle NAB = 30°.

[1]

(b) Calculate the radius of the circus ring.

Answer _____ m [3]

(c) Calculate the length of one of the wires.

Answer _____ m [2]

Examiner Only

Marks	Remark

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9 Solve $\frac{2}{x+1}+\frac{6}{3x-2}=1$

Answer $x =$ _____ [7]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

Centre Number

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Candidate Number

General Certificate of Secondary Education
2011

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 31 MAY
10.30 am – 11.30 am

GMN42

TIME

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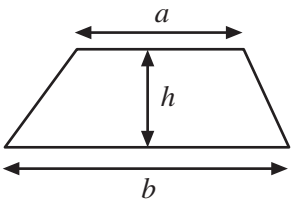
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Total Marks	

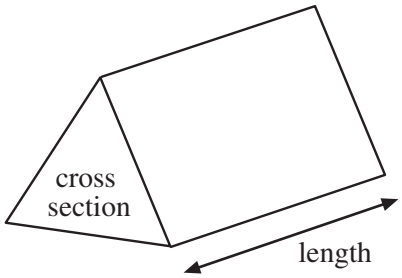
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Formula Sheet

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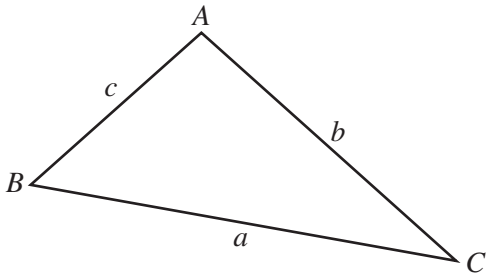


In any triangle *ABC*

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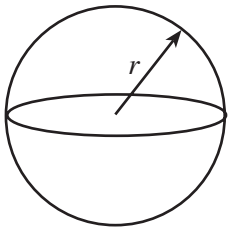
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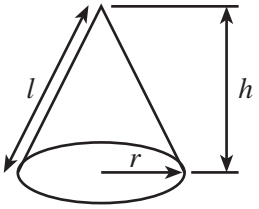
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Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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

Examiner Only	
Marks	Remark

1 A large spherical glass marble has a radius of 2.5 cm.

Calculate the volume of glass in this marble correct to 2 decimal places.



© *iStockphoto/Thinkstock*

Answer _____ [3]

---

2 A tea set has a sale price of £63.36 which is a saving of 12% on the original price.

What was the original price of the tea set?

Answer £ _____ [3]

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3 The graph opposite shows the cumulative frequency of scores obtained in a darts tournament.

Examiner Only	
Marks	Remark

(a) Use the graph to estimate

(i) the median,

Answer _____ [1]

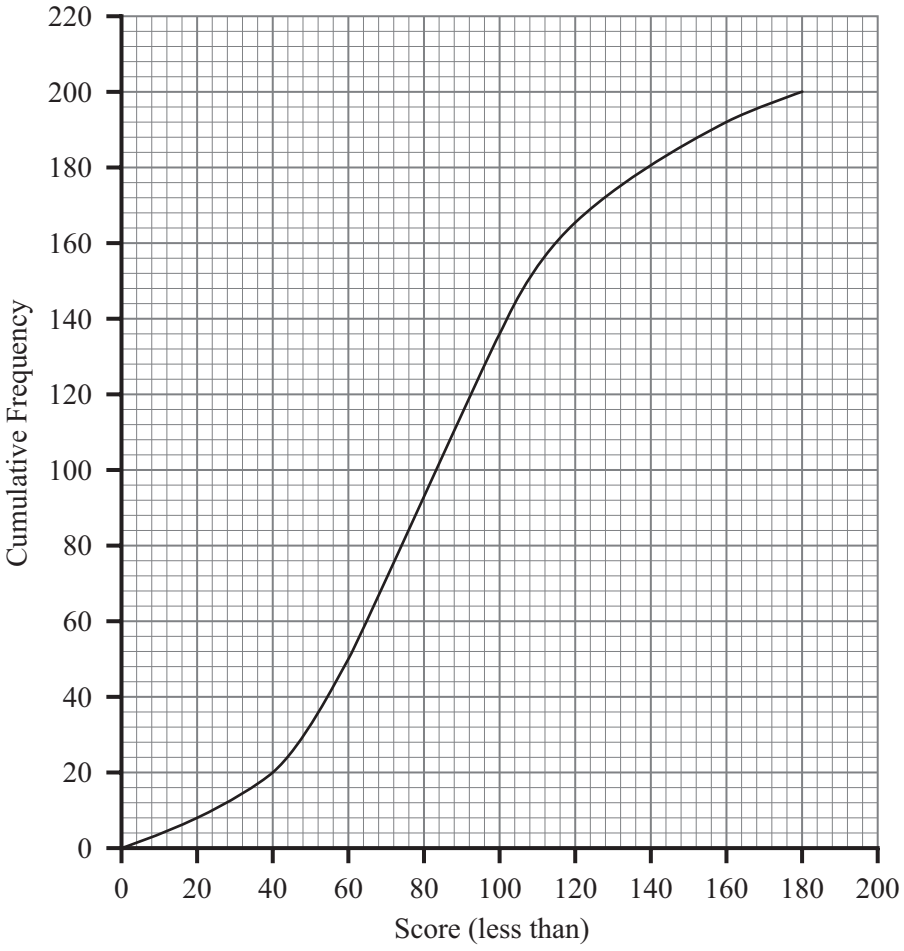
(ii) the inter-quartile range,

Answer _____ [2]

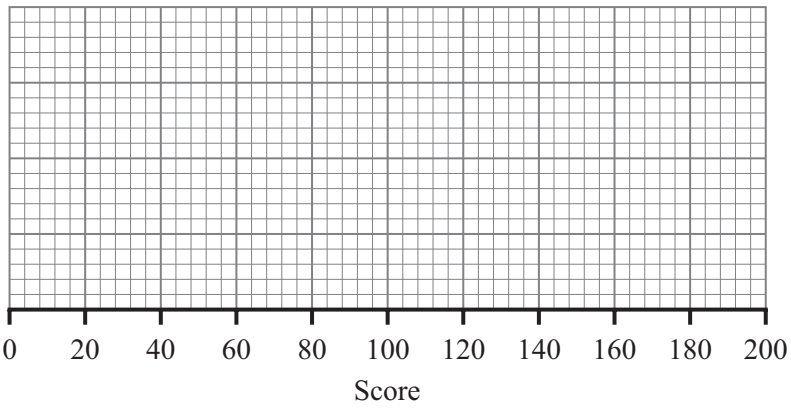
(iii) how many scores were more than 150

Answer _____ [2]

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(b) From the graph draw a box plot. [3]



Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

4 **(a)** Simplify $\frac{2}{3c} - \frac{1}{4c}$

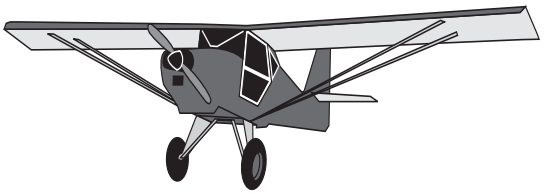
Answer _____ [2]

(b) Factorise $4x^2 - 25y^2$

Answer _____ [2]

---

5 A small aircraft, located at position A in the sketch diagram, develops an engine fault while flying between two landing strips located at positions X and Y in the diagram.



The angles from X and Y to the aircraft are 50° and 35° respectively. The aircraft must land as quickly as possible. How much closer is X than Y from A?

Show all working.

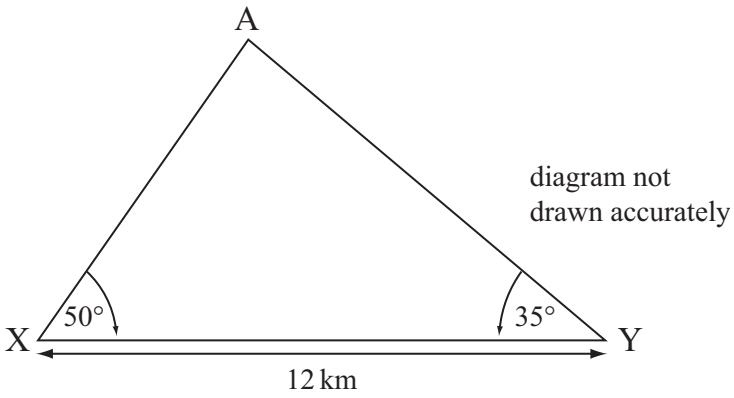
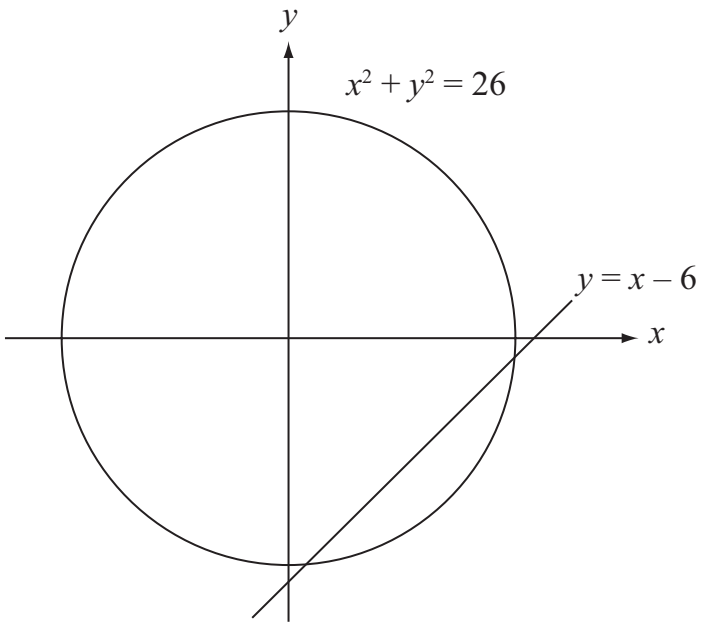


diagram not drawn accurately

Answer _____ km [4]

Examiner Only	
Marks	Remark

6 The diagram shows the intersection of the line $y = x - 6$ with the circle with equation $x^2 + y^2 = 26$



(a) Show that the x co-ordinates of the points of intersection of the line with the circle can be found from the solutions to the equation $x^2 - 6x + 5 = 0$

[3]

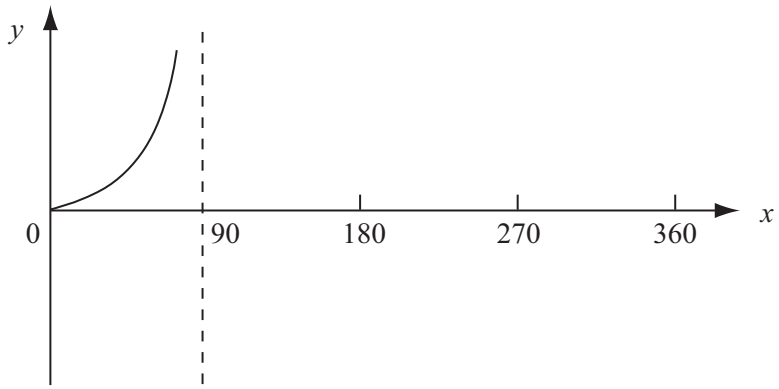
(b) Hence find the co-ordinates of the points of intersection of the line and the circle.

Answer (____,____) (____,____) [3]

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Examiner Only	
Marks	Remark

7 **(a)** Complete this sketch for $y = \tan x°$ for $0 \leq x \leq 360$



[1]

(b) Solve the equation

$3 \tan x° = 4$ for $0 \leq x < 360$

Answer _____ [2]

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8 The table shows information about 600 workers in a factory.

Age, a years	Number of Males	Number of Females
$20 \leq a < 30$	99	26
$30 \leq a < 40$	142	48
$40 \leq a < 50$	124	64
$50 \leq a < 60$	55	22
$60 \leq a < 70$	20	0

The manager wants to carry out a survey of the workers' views on the workplace. He decides to choose a sample of 80 workers to take part in the survey.

(a) From an alphabetical list of workers' names, he selects every 5th name until he has 80 names.

Explain why this may not produce a fair sample.

Answer _____

_____ [2]

(b) If the manager decides to use a stratified sample, how many males aged under 40 should be in his sample of 80 workers?

Answer _____ [2]

Examiner Only

Marks	Remark

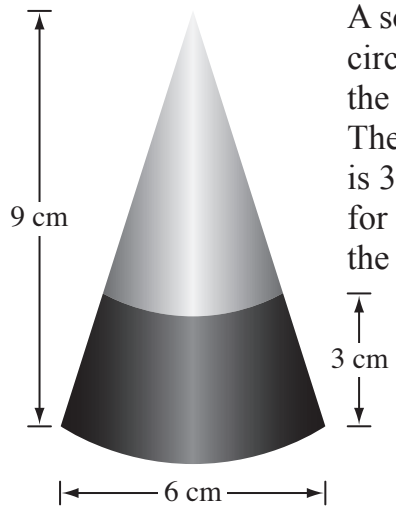
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9 Simplify $\dfrac{x^2 + 3xy - 5x - 15y}{2x^2 - 10x}$ fully.

Answer _____ [4]

Examiner Only	
Marks	Remark

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10 

A solid paper weight is made in the shape of a right circular cone. Its height is 9 cm and the diameter of the base is 6 cm.
The top section is glass and the base section, which is 3 cm high, is made of metal which weighs 14 g for each cubic centimetre. Calculate the weight of the metal in the base.

Answer _____ g [5]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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Rewarding Learning

General Certificate of Secondary Education
2011

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 31 MAY
10.30 am – 11.30 am

MARK SCHEME

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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).

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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.

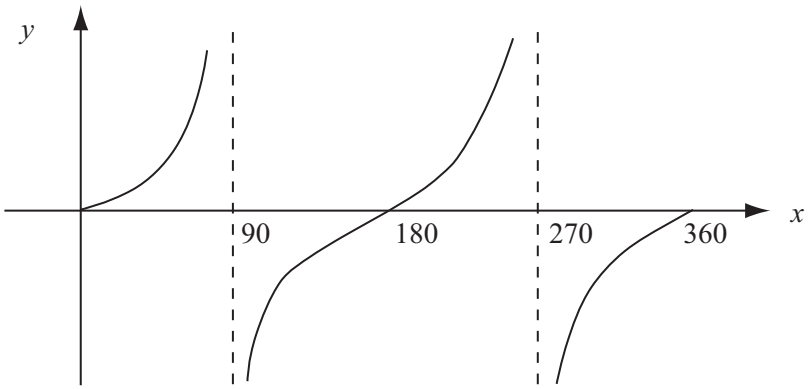
(ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.

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

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			AVAILABLE MARKS
1	Volume $= \dfrac{4 \times \pi \times 2.5^3}{3}$	MA1	
	$= 65.45\ \text{cm}^3$	A1, A1 units	3
2	$88\% = £63.36$	M1 A1	
	$63.36 \div 0.88 = 72$	MA1	3
3	**(a) (i)** 84	MA1	
	(ii) $108 - 60$	MA1	
	48	A1	
	(iii) $200 - 186$	MA1	
	14	A1	
	(b) median at 84	A1	
	quartiles at 60 and 108	A1	
	range ends	A1	8
4	**(a)** $\dfrac{8-3}{12c}$	MA1	
	$= \dfrac{5}{12c}$	A1	
	(b) $(2x - 5y)(2x + 5y)$	A2	4
5	$\dfrac{12}{\sin 95} = \dfrac{AX}{\sin 35} = \dfrac{AY}{\sin 50}$	MA1	
	$AX = \dfrac{12 \sin 35}{\sin 95}$ $\quad AY = \dfrac{12 \sin 50}{\sin 95}$	MA1	
	$= 6.9$ km $\quad = 9.2$ km	MA1	
	Answer 2.3	A1	4

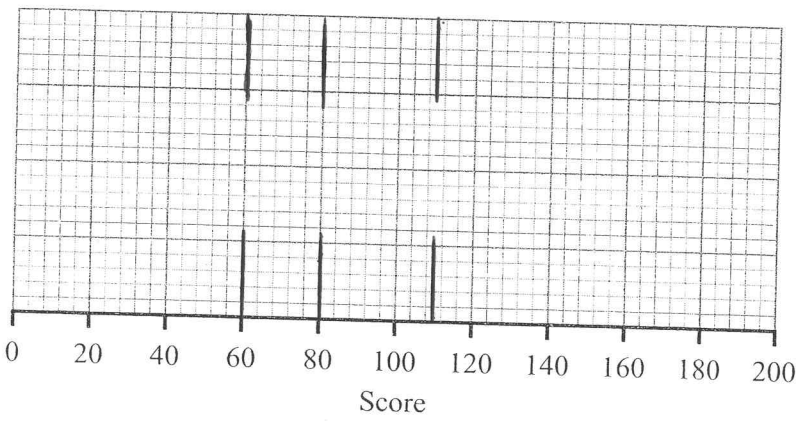
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			AVAILABLE MARKS
6	**(a)** $x^2 + (x - 6)^2 = 26$		
	$x^2 + x^2 - 12x + 36 = 26$	MA1	
	$2x^2 - 12x + 10 = 0$	MA1	
	$x^2 - 6x + 5 = 0$	MA1	
	(b) $(x - 5)(x - 1) = 0$	MA1	
	$x = 5\ x = 1$	MA1	
	$(5, -1)$ and $(1, -5)$	MA1	6
7	**(a)** 	A1	
	(b) $\text{Tan}\, x^\circ = \frac{4}{3}$		
	$x^\circ = \text{Tan}^{-1}\left(\frac{4}{3}\right)$	MA1	
	$x = 53.13$ or 233.13	A1	3
8	**(a)** suitable explanation e.g. workers with names at the end of the alphabet have no chance of being in the sample e.g. some of the groups in the table may not be fairly represented, it is not a random sample, all workers do not have an equal chance of being in sample.	A2	
	(b) $\frac{80}{600}$	MA1	
	$241 \times \frac{80}{600} = 32$	A1	4

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			AVAILABLE MARKS
9	$x(x+3y)-5(x+3y)$	MA1	
	$\frac{(x-5)(x+3y)}{2x(x-5)}$	MA1 MA1	
	$\frac{x+3y}{2x}$	A1	4
10	9/3 = 6/2 Radius of base of top Cone = 2 cm	MA1	
	Volume of Large Cone – Volume of Small Cone		
	$= \frac{1}{3}\pi(3^2 \times 9 - 2^2 \times 6)$	MA1	
	$= \frac{1}{3}\pi \times 57$	MA1	
	$= 19\pi$	A1	
	Weight of metal		
	$= 19\pi \times 14$		
	$= 266\pi = 835.66$	MA1	5
		Total	**44**

GCSE MATHEMATICS SUMMER 2011
MODULE N4-2
OVERLAYS QUESTION 3B



Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
January 2011

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 11 JANUARY
10.30 am – 11.30 am

GMN42

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

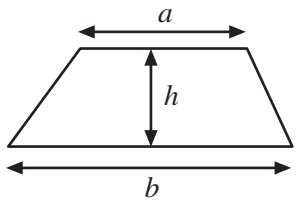
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

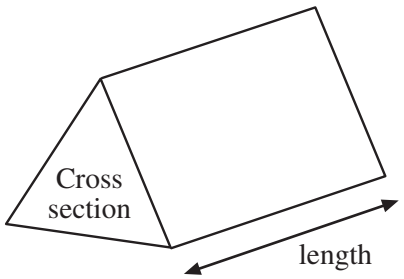
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Formula Sheet

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



Volume of prism = area of cross section × length

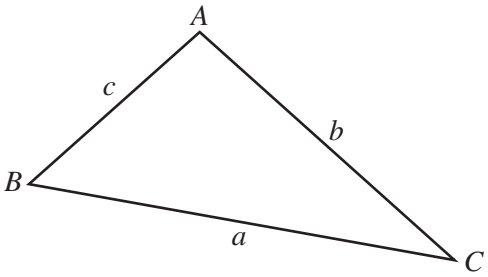


In any triangle ABC

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

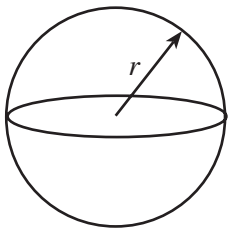
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



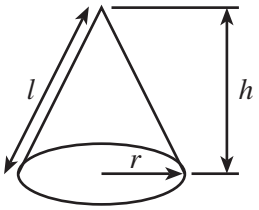
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



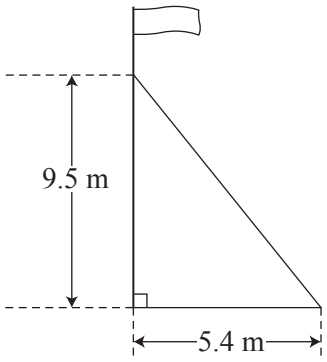
Quadratic equation:

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 flagpole is held vertically by a wire fixed to a point 9.5 m above the horizontal ground, and to a point on the ground 5.4 m from the foot of the pole.



Calculate the angle that the wire makes with the ground.

Answer _____ ° [3]

---

2 **(a)** Factorise fully $21xy - 7y^2$

Answer _____ [2]

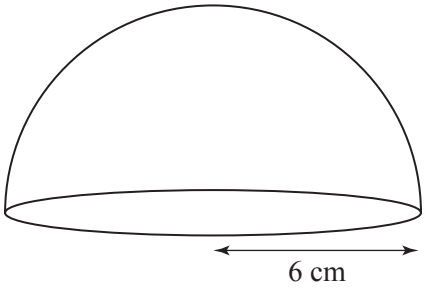
(b) Express $\frac{1}{4v} + \frac{2}{3v}$ as a single fraction in its simplest form.

Answer _____ [3]

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Examiner Only	
Marks	Remark

3



A solid glass paperweight in the shape of a hemisphere is shown above.

Calculate the volume of the paperweight.

Answer _____ [3]

---

4 Every time a ball is dropped it rises to a height which is $\frac{3}{4}$ of the height it dropped from.

A ball is dropped from a height of 4 metres and is allowed to bounce repeatedly.

What is the least number of bounces until its rebound height is less than 2 metres?

Show your working.

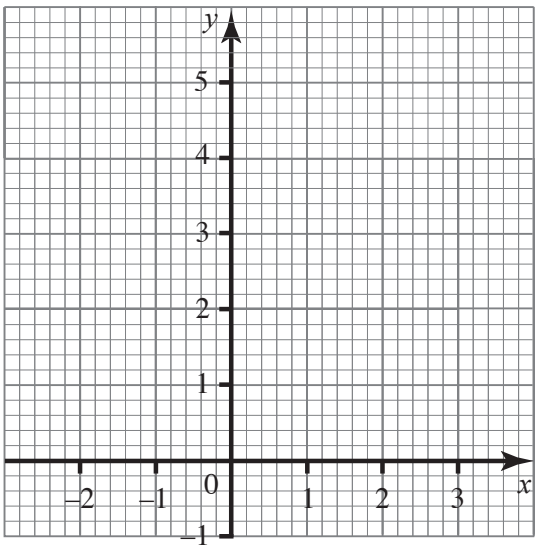
Answer _____ bounces [2]

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Examiner Only	
Marks	Remark

5 A straight line with gradient 2 passes through the points (–2, –1) and (1, b).

(a) Using the axes below, or otherwise, find the value of b.



Answer b = _____ [1]

(b) Find the equation of this line.

Answer _____ [2]

---

6 Two spheres have volumes in the ratio 27 : 125

(a) The radius of the larger sphere is 22.5 cm. Calculate the radius of the smaller sphere.

Answer _____ cm [3]

(b) Show that the surface area of the smaller sphere is exactly 36% that of the larger sphere.

[2]

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Examiner Only	
Marks	Remark

7 Factorise completely $3a^2 - 27b^2$

Answer _____ [3]

8 School reports for students sometimes show the student's mark and the average mark for the year group.

Which of the three measures of "average" do you think they should use?

Give a reason for your answer.

Answer _____ because _____

_____

_____ [2]

9 Evaluate

$$\sqrt[5]{\frac{9.3^2}{6.2+\sqrt{59.7}}}$$

Answer _____ [2]

10 **(a)** A factory has 300 workers of whom 250 are women. 80 women earn less than £300 per week. 50 women earn between £300 and £400 per week. The rest of the women earn more than £400 per week.

Describe clearly how you would take a stratified sample of 60 women.

[2]

(b) To test job satisfaction, it is decided to interview the first 30 to arrive at work. Explain why this may not give a 10% random sample.

_____

_____ [2]

Examiner Only	
Marks	Remark

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11

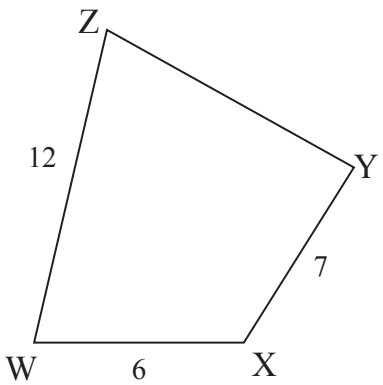


Diagram not drawn accurately

In a quadrilateral WXYZ, WX = 6 cm, XY = 7 cm and WZ = 12 cm.

Angle WXY = 120° and angle WYZ = 70°

Calculate angle WZY.

Answer _____ ° [5]

Examiner Only	
Marks	Remark

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12 A wire of length 24 cm is cut into **two** pieces, each of which is bent into the form of a square.

Examiner Only	
Marks	Remark

(a) If the length of the side of one square is x centimetres, show that the length of the side of the other square is $(6 - x)$ centimetres.

[2]

(b) The **total** area of the two squares is 18.5 cm^2

Find the lengths of the two pieces of wire.

Answer _____ cm, _____ cm [5]

THIS IS THE END OF THE QUESTION PAPER

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111522

Rewarding Learning

General Certificate of Secondary Education
January 2011

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 11 JANUARY
10.30 am – 11.30 am

MARK SCHEME

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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).

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			AVAILABLE MARKS
1	Tan α = 9.5/5.4 60.4°	M1, A1 A1	3
2	**(a)** $7y(3x - y)$	A1, A1	
	(b) $\frac{3}{12v} + \frac{8}{12v}$ $= \frac{11}{12v}$	MA1, MA1 A1	5
3	$\frac{2}{3} \times \pi \times 6^3 = 452.4\ \text{cm}^3$	MA1, A1, A1 units	3
4	$4 \times \frac{3}{4} = 3, \quad 3 \times \frac{3}{4} = 2.25$ $2.25 \times \frac{3}{4}$ (= 1.6875), 3	MA1 A1	2
5	**(a)** $b = 5$	A1	
	(b) $c = 3$ $y = 2x + 3$	A1 A1	3
6	**(a)** Volumes 27 : 125 Lengths 3 : 5 (22.5 ÷ 5) × 3 = 13.5	 MA1 M1 A1	
	(b) Areas 9 : 25 $\frac{9}{25} \times 100 = 36\%$	A1 MA1	5
7	$3(a^2 - 9b^2)$ $= 3(a - 3b)(a + 3b)$	A1 A2	3
8	Mean − Average performance − shows ability Median − top half or bottom half of year group	MA2	2
9	$\sqrt[5]{6.2104275}$ 1.44(0868)	A1 A1	2

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			AVAILABLE MARKS
10	**(a)** Fraction required $= \frac{60}{250}$	MA1	
	Take $\frac{60}{250}$ of each group rounded to nearest whole no + adjusted to give total of 60	MA1	
	(b) Suitable reason Partial reason A1	A2	4
11	$WY^2 = 6^2 + 7^2 - 2(6)(7) \cos 120$	M1, A1	
	$WY = \sqrt{127}$ (11.269428)	A1	
	$\frac{\text{Sin } Z}{\sqrt{127}} = \frac{\text{Sin } 70°}{12}$	M1	
	$Z = 61.9°$	A1	5
12	**(a)** $\frac{24-4x}{4} = 6 - x$	M1, A1	
	(b) $x^2 + (6 - x)^2 = 18.5$	A1	
	$x^2 + 36 - 12x + x^2 = 18.5$	MA1	
	$2x^2 - 12x + 36 - 18.5 = 0$		
	$4x^2 - 24x + 35 = 0$	MA1	
	$(2x - 5)(2x - 7) = 0$		
	$x = 3.5$ or 2.5	A1	
	Lengths of wire are 10 cm and 14 cm	A1	7
		Total	44

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Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2010

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

GMN42

TUESDAY 1 JUNE

10.30 a.m. – 11.30 a.m.

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

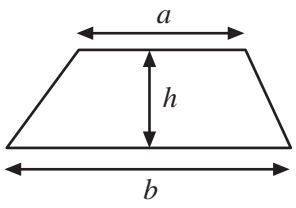
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

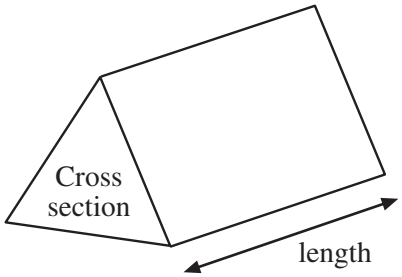
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Formula Sheet

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



Volume of prism = area of cross section × length

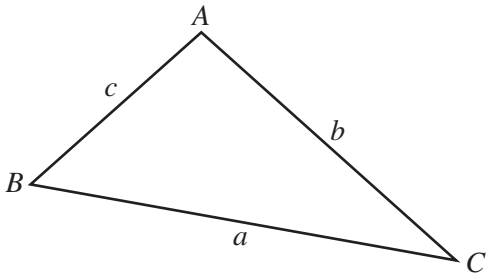


In any triangle ABC

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

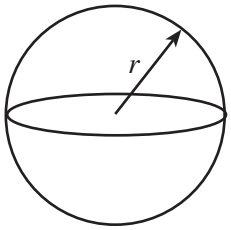
Sine rule : $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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



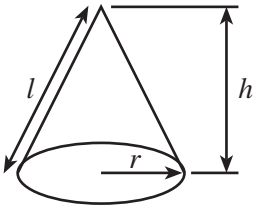
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



Quadratic equation:

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

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

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Examiner Only	
Marks	Remark

1 One hundred and twenty men in a city company have their blood pressure taken. The results are shown in the frequency table.

Frequency table

Blood pressure (P)	Number of men
$P < 100$	4
$100 \leqslant P < 120$	28
$120 \leqslant P < 140$	49
$140 \leqslant P < 160$	28
$160 \leqslant P < 170$	8
$170 \leqslant P < 180$	3

Cumulative frequency table

Blood pressure (P) (less than)	Number of men
100	4
120	
140	
160	
170	
180	

(a) Complete the cumulative frequency table. [1]

(b) Draw a cumulative frequency graph to illustrate this information. [3]

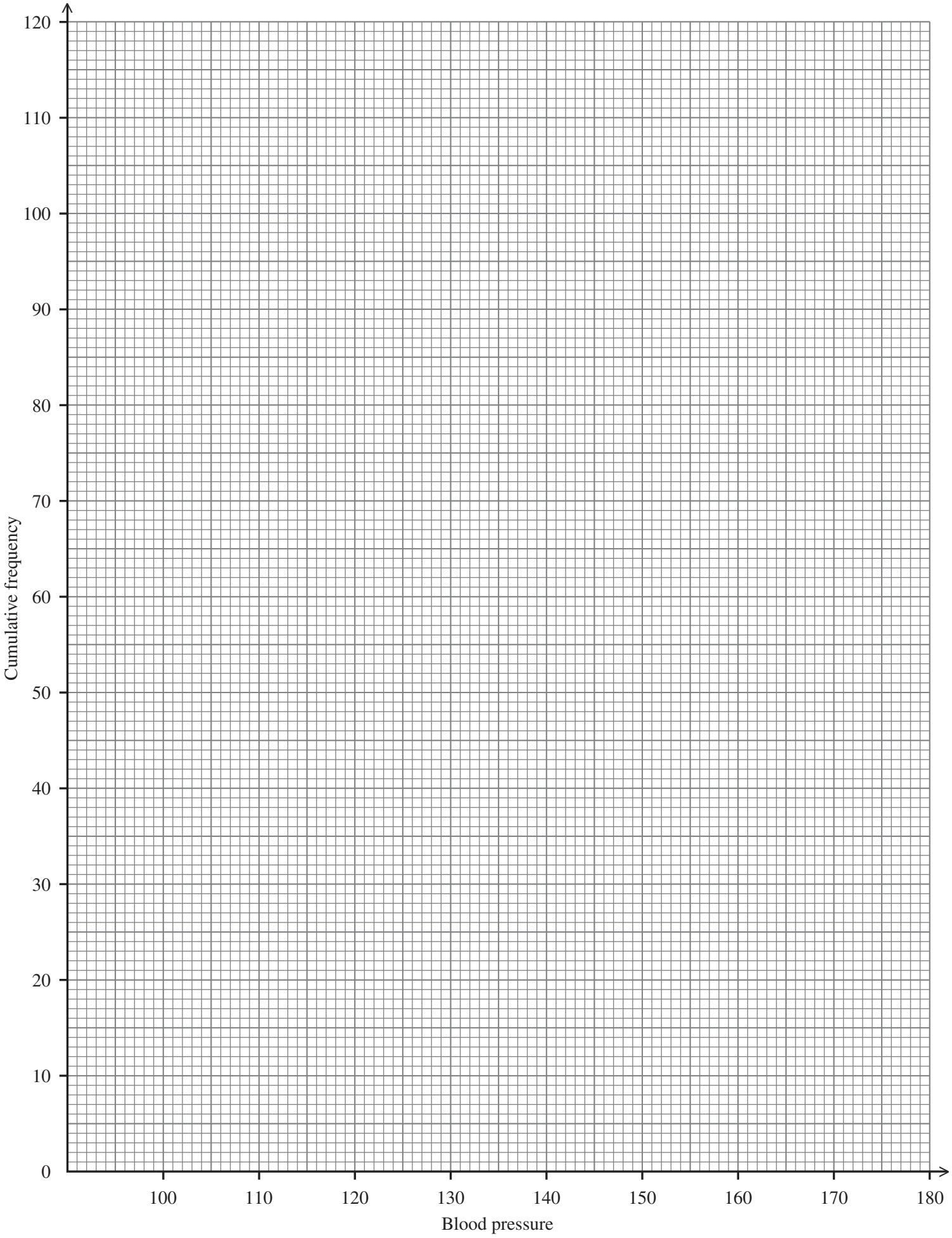
(c) Use your graph to estimate the interquartile range.

Answer _____ [2]

(d) All those men with readings less than 100 or more than 150 must have a retest the following week.
How many men must have a retest?

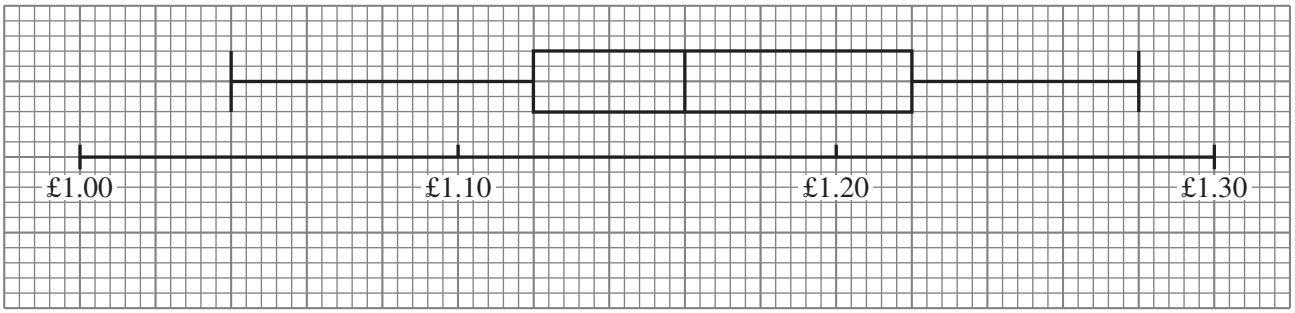
Answer _____ [2]

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Cumulative frequency
0
10
20
30
40
50
60
70
80
90
100
110
120
100
110
120
130
140
150
160
170
180
Blood pressure

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2 The boxplot shows information about the price of a litre of diesel in a number of garages in England.



(a) What is the range of these prices?

Answer _____p [1]

(b) In the same number of garages in Northern Ireland the interquartile range was 8 pence.
How does this value compare with the interquartile range in the boxplot shown?

_____

_____ [1]

Examiner Only

Marks	Remark

3 A headmaster is concerned about the speed of vehicles passing his school.
He sends a questionnaire to the parents of the children at the school.
It includes this question.
"Don't you agree that vehicles drive far too fast past our school?"
Explain why this question is unsuitable.

_____

_____[1]

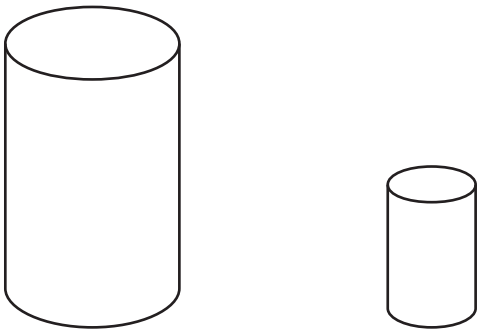
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Examiner Only	
Marks	Remark

4 The total bill in a restaurant is £49.22, including a service charge of 15%.
Calculate the bill before the service charge.

Answer £ _____ [3]

5

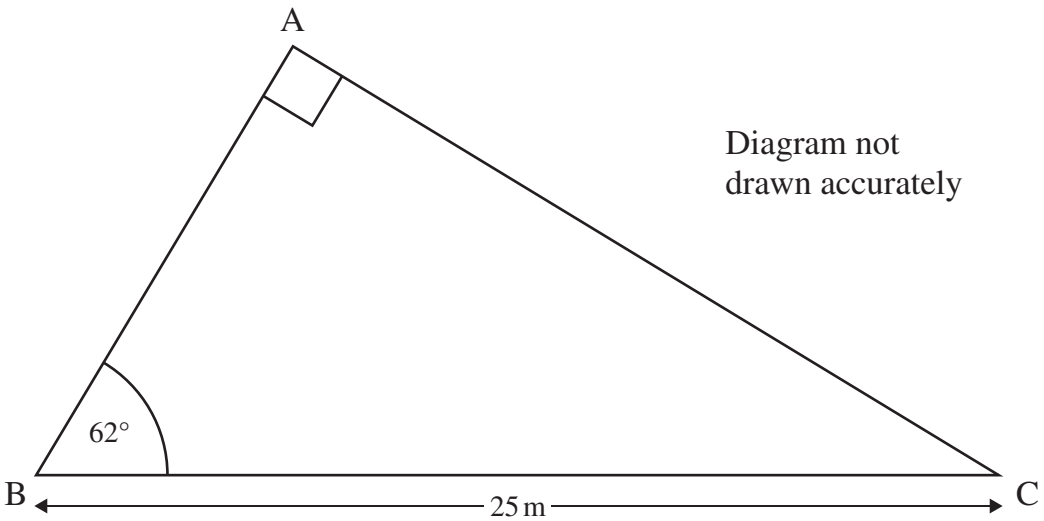


The two cylinders shown above are similar.
The dimensions of the smaller cylinder are half those of the larger cylinder.
The volume of the smaller cylinder is 30 cm^3.
Find the volume of the larger cylinder.

Answer _____ [3]

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6 (a)



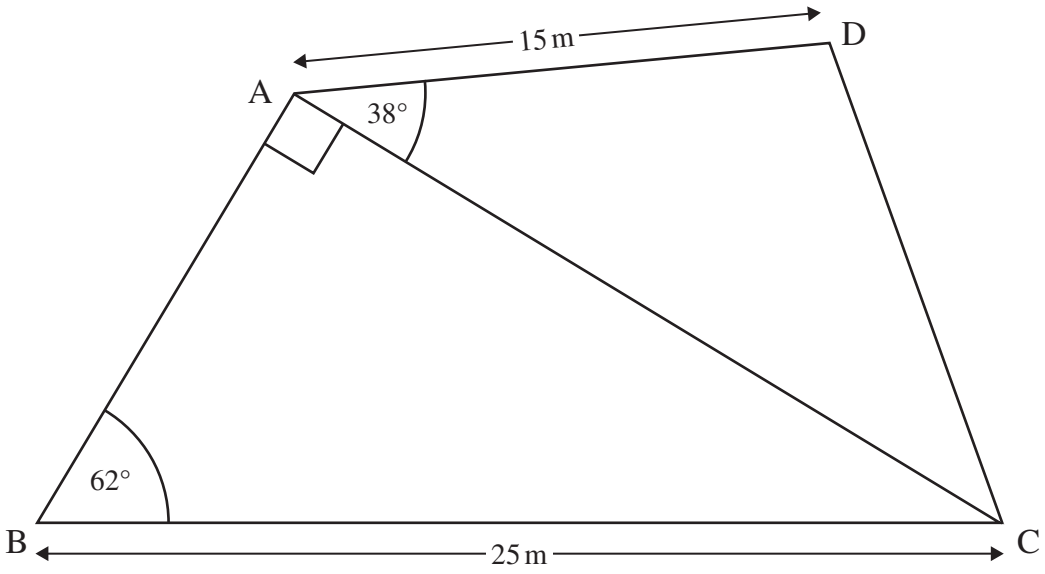
Calculate the length of the side AC.

Answer _____ m [3]

Examiner Only	
Marks	Remark

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(b)



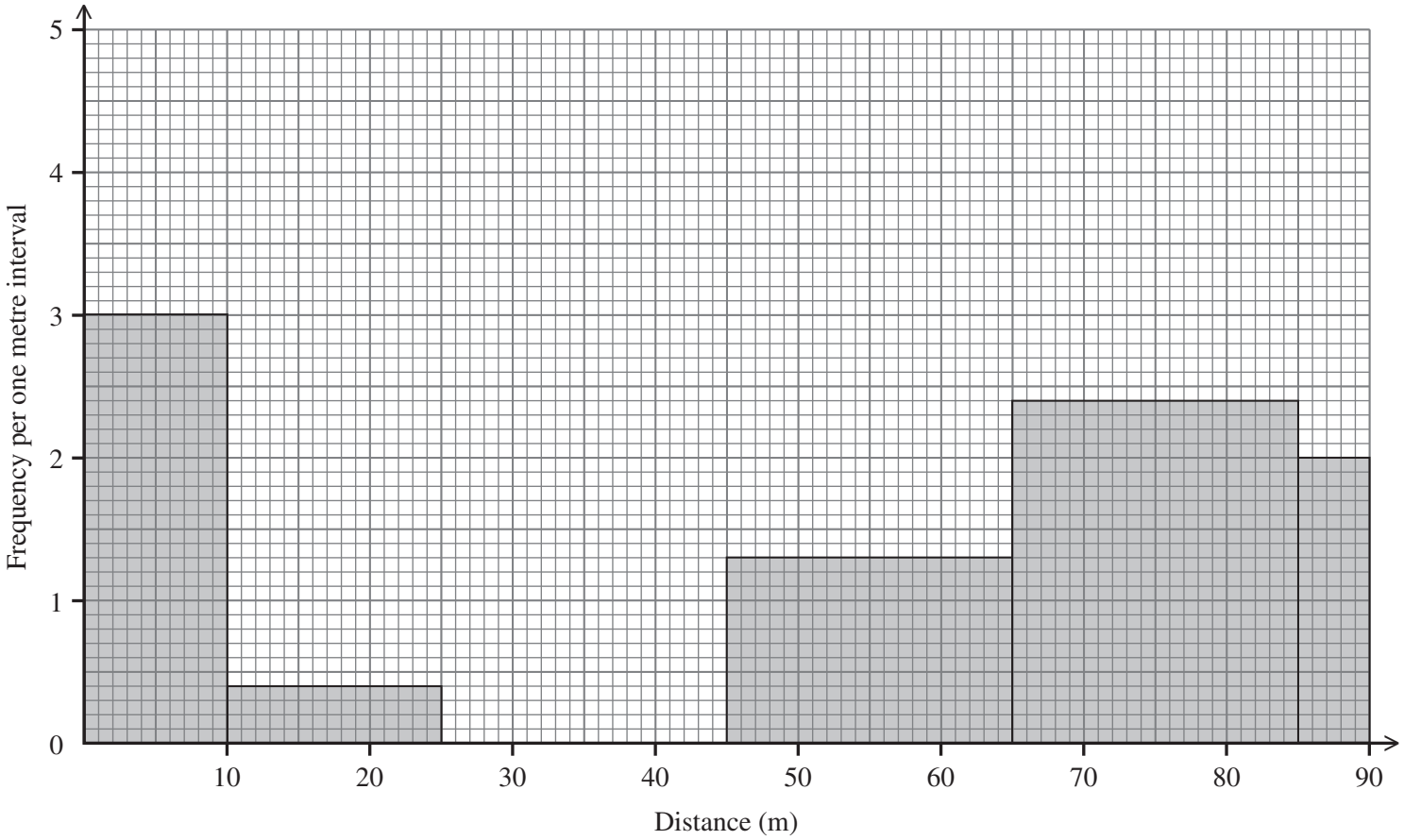
A new triangle ADC is now joined to the triangle ABC with AD = 15 m and the angle DAC = 38°.
Calculate the length of the side DC.
All working must be shown.

Answer _____ m [3]

Examiner Only	
Marks	Remark

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7 The histogram shows the distribution of distances thrown in three Olympic qualifying events: Shot, Discus and Javelin.



Examiner Only	
Marks	Remark

(a) No competitor in the Shot threw further than 25 metres.
No competitor in the other events threw less than 45 metres.
How many competitors took part in the Shot event?

Answer _____ [2]

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(b) Two-thirds of the competitors who threw further than 45 metres were in the Javelin event.
How many competitors took part in the Discus?

Answer _____ [2]

(c) Some of the competitors were asked to take a drugs test. As part of a stratified sample, five of those who threw less than 10 metres took the test.

(i) How many were there in the stratified sample?

Answer _____ [2]

(ii) How many competitors who threw between 65 metres and 85 metres were in the sample?

Answer _____ [1]

Examiner Only	
Marks	Remark

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8 **(a)** Expand and simplify $(3x + 4y)(2x - 5y)$

Answer _____ [3]

(b) Simplify $\dfrac{x^2 + 3x}{2x^2 - 18}$

Answer _____ [3]

(c) Factorise $8x^2 - 10xy + 3y^2$

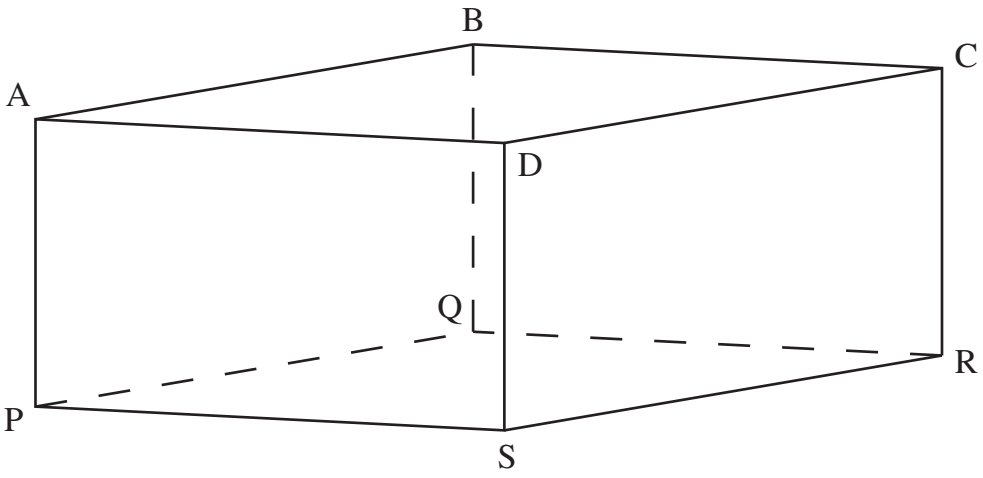
Answer _____ [2]

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

9



ABCDPQRS is a cuboid with PQ = 9 cm, QR = 7 cm and RC = 4 cm.
Calculate the angle between the line PC and the base PQRS.

Answer _____° [3]

10 Rubin claims that if the length and breadth of a rectangle are both irrational, then it is possible for the perimeter to be **either** rational **or** irrational.
Give examples to justify his claim.

[3]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

Summer 2010

Mark Schemes

Issued: October 2010

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Rewarding Learning

General Certificate of Secondary Education
2010

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 1 JUNE

10.30 am – 11.30 am

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)**	Cumulative Number of Men		
		(4) 32, 81, 109, 117, 120	A1	
	(b)	See overlay 6 points correct (allow MA1 for 4 points correct) curve	 MA2 MA1	
	(c)	Reading from graph	M1, A1	
	(d)	4 + (120 – correct reading from graph) = number retested	M1, A1	8
2	**(a)**	£1.28 – £1.04 = 24 pence	MA1	
	(b)	It is less because the inter-quartile range for England is 10	A1	2
3		Suitable reason	A1	1
4		115% = £49.22	MA1	
		$100\% = \frac{49.22}{115} \times 100$	M1	
		£42.80	A1	3
5		$30 \times 8 = 240\ cm^3$	M1, A1, A1(units)	3
6	**(a)**	$\sin 62° = AC/25$	MA1	
		$25 \sin 62° = AC$	MA1	
		$AC = 22.07(368...)$	A1	
	(b)	$DC^2 = 15^2 + 22.07^2 - 2(15)(22.07) \cos 38°$	MA1	
		$= 190.34298$	MA1	
		$DC = 13.796$	A1	6

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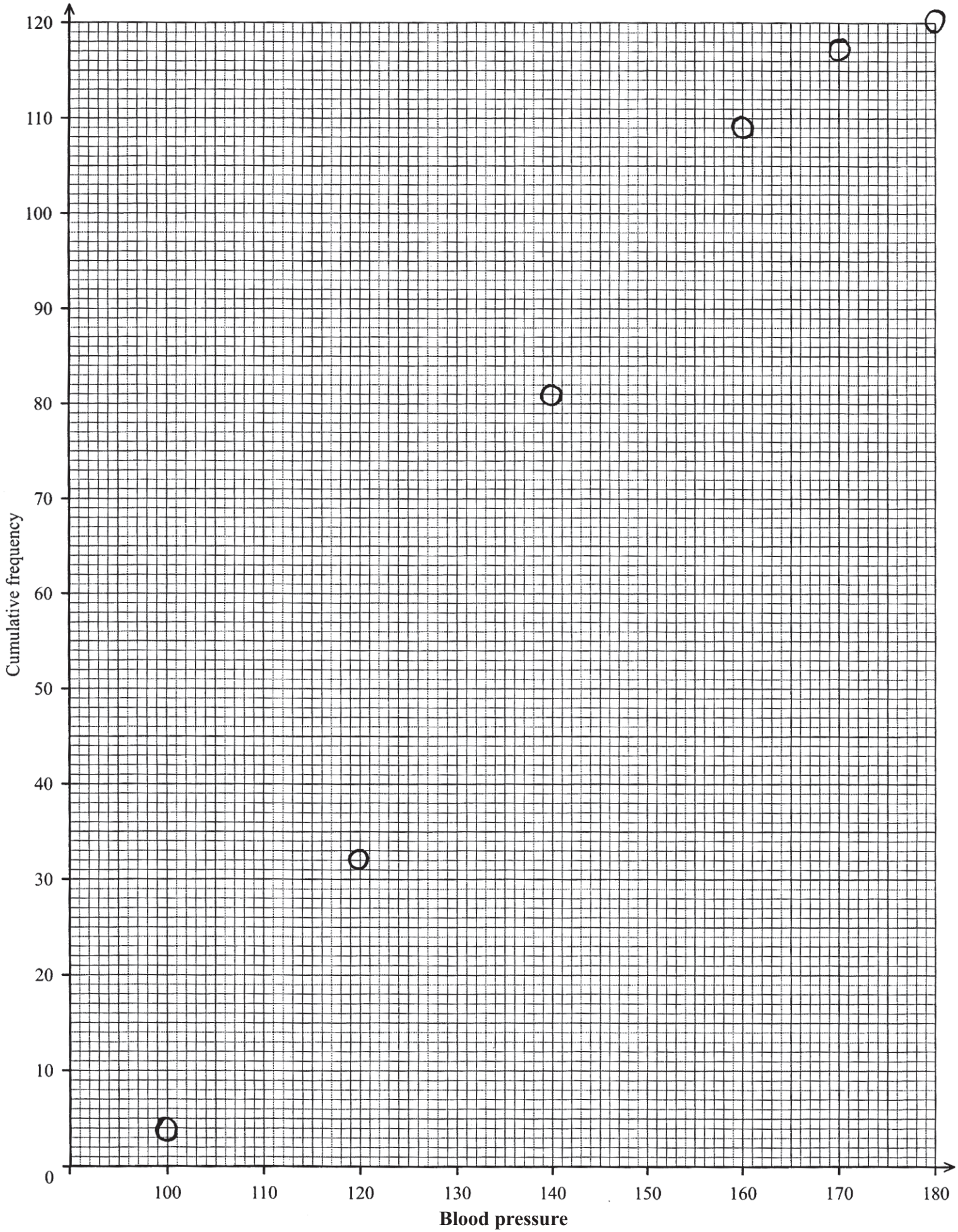
			AVAILABLE MARKS
7	**(a)** $10 \times 3 + 15 \times 0.4$ $= 30 + 6$ $= 36$	MA1 A1	
	(b) $20 \times 1.3 + 20 \times 2.4 + 5 \times 2 = 84$	MA1	
	$\frac{1}{3}$ of $84 = 28$	MA1	
	(c) **(i)** $\frac{5}{30} = \frac{1}{6}$	MA1	
	$\frac{1}{6}$ of $120 = 20$	A1	
	(ii) $\frac{1}{6}$ of $48 = 8$	MA1	7
8	**(a)** $6x^2 - 15xy + 8xy - 20y^2$	M1, A1	
	$6x^2 - 7xy - 20y^2$	MA1	
	(b) $\frac{x(x+3)}{2(x^2-9)}$	MA1	
	$\frac{x(x+3)}{2(x+3)(x-3)}$	MA1	
	$\frac{x}{2(x-3)}$	MA1	
	(c) $(4x - 3y)(2x - y)$	MA2	8
9	Angle required CPR	M1	
	$PR^2 = 9^2 + 7^2$		
	$PR = \sqrt{130}$	MA1	
	Tan CPR = $\frac{4}{\sqrt{130}}$		
	CPR = 19.33	MA1	3

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			AVAILABLE MARKS
10	e.g. to prove irrational – length π and breadth 2π: perimeter 6π	A1	
	e.g. to prove rational – length π and breadth $6 - \pi$: perimeter 12	A2	3
		Total	**44**

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GCSE MATHEMATICS SUMMER 2010
MODULE N4-2
OVERLAY QUESTION 1



STEMUP.CO.UK

Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2010

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 12 JANUARY

10.30 am–11.30 am

GMN42

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

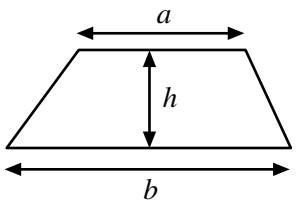
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

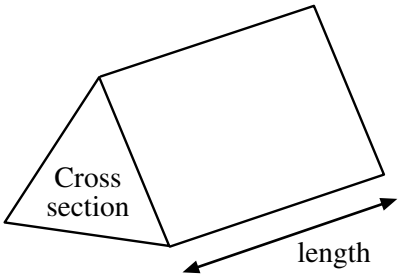
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Formula Sheet

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



Volume of prism = area of cross section × length

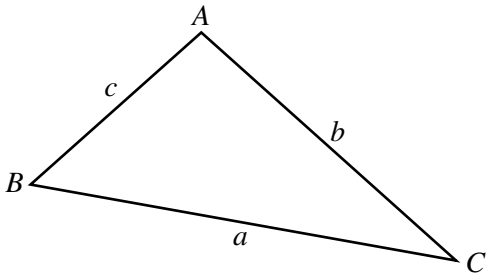


In any triangle ABC

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

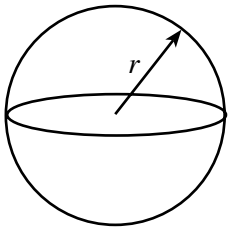
Sine rule : $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



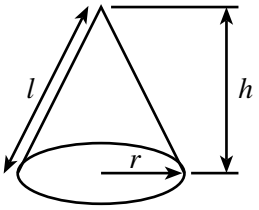
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

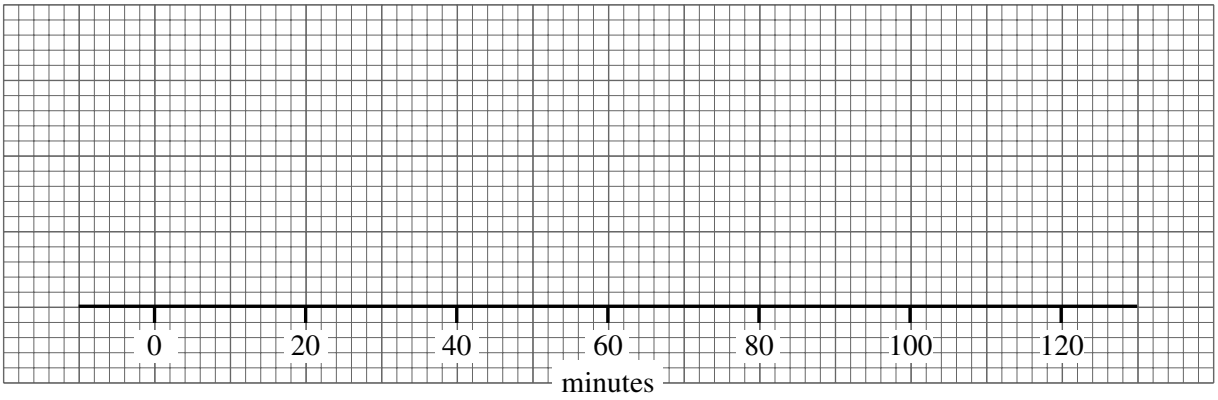
Examiner Only	
Marks	Remark

1 A tennis club holds a Junior Tournament.
The time taken to complete each match is recorded.

(a) The statistical data for the girls' matches is:

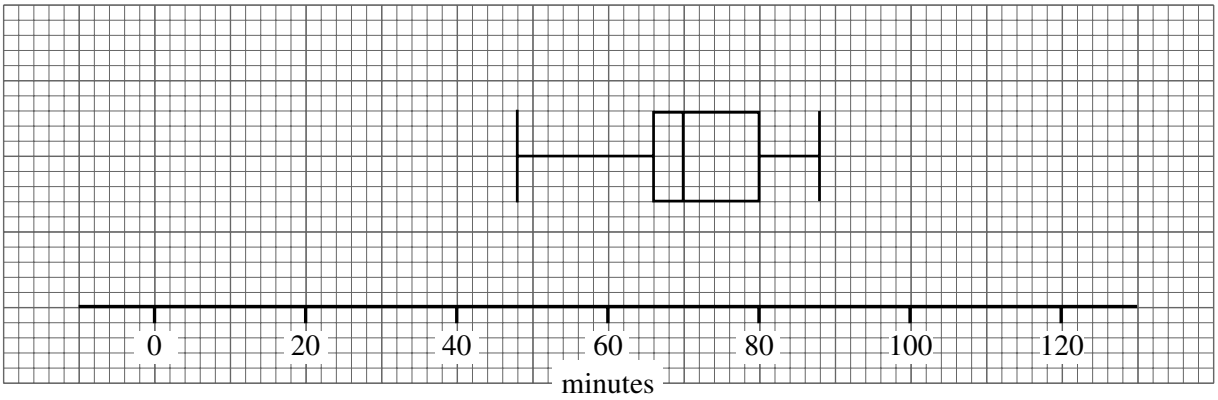
Minimum time	42 minutes
Maximum time	104 minutes
Lower quartile	68 minutes
Upper quartile	90 minutes
Median time	84 minutes

Draw a box plot to illustrate this data.



[2]

(b) Similar data is recorded for the boys' matches and a box plot drawn.



Give **two** comments on the times taken to complete the girls' matches compared to the times taken to complete the boys' matches.

_____ [1]

_____ [1]

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Examiner Only	
Marks	Remark

2 St Elsewhere High School had an 8% absence rate on a particular day.

If there were 989 pupils present, how many pupils were absent?

Answer _____ [3]

3

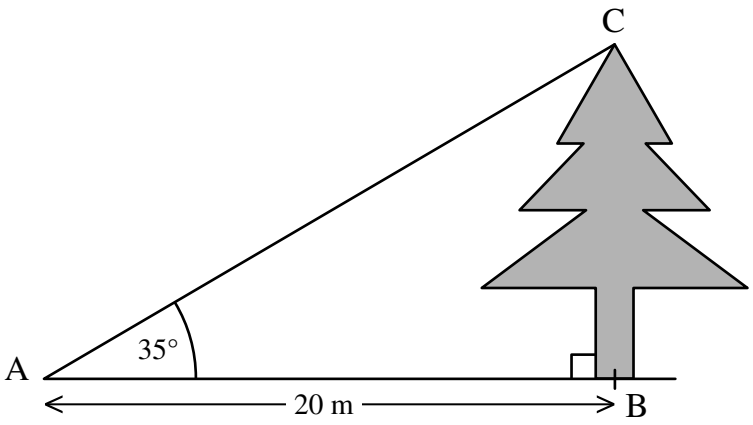


Diagram not drawn accurately

The angle of elevation from A to the top of the tree C is 35°
The distance AB = 20 m.

Calculate the height BC of the tree.

Answer _____ m [3]

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4 Find the volume of a spherical ball of radius 10 cm.

Answer _____ [3]

5 **(a)** Expand and simplify $(3x + 5)(4x - 2)$

Answer _____ [2]

(b) Factorise $x^2 - 3x - 40$

Answer _____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 Write down the equation of the straight line which passes through the point (0, –3) and is perpendicular to the line $y = 4x + 1$

Answer _____ [2]

---

7 Calculate the distance between the points with coordinates (3, 1, –4) and (7, 4, 8).

Answer _____ [2]

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8 **(a)** Solve the equation $6m^2 + 7m + 2 = 0$

Answer _____ [3]

(b) Solve the following equation, giving your answers correct to two decimal places.

$$x^2 - 5x - 3 = 0$$

Answer _____ [3]

Examiner Only	
Marks	Remark

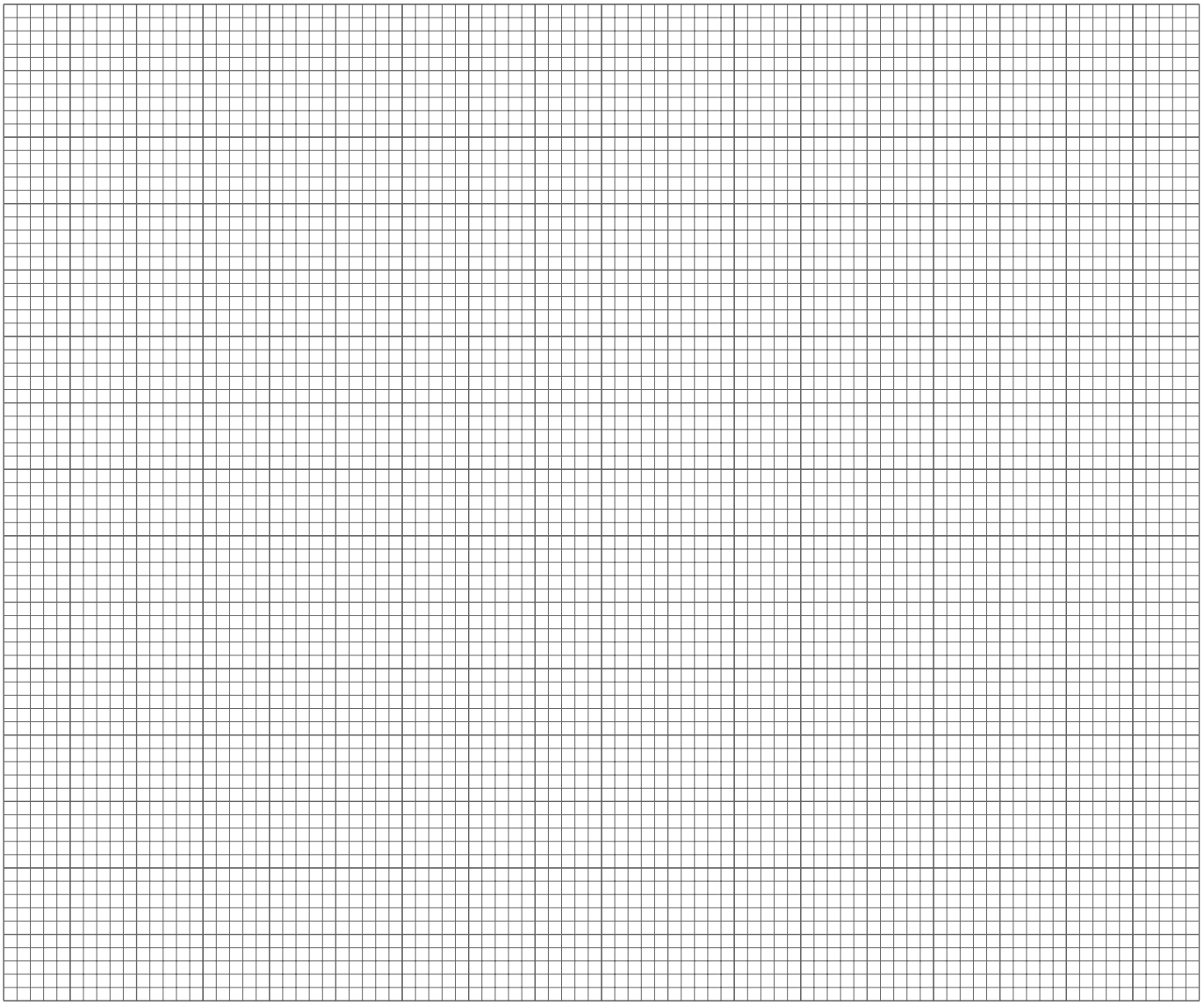
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9 The table shows the distribution of the heights of all sixth formers in a school.

Examiner Only	
Marks	Remark

Height (h cm)	Number of students
$150 \leqslant h < 165$	45
$165 \leqslant h < 175$	75
$175 \leqslant h < 180$	36
$180 \leqslant h < 185$	66
$185 \leqslant h < 195$	18

(a) Show this information on a histogram on the graph paper below. [3]



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(b) Students at least H cm tall are considered for the basketball team. A stratified sample of 40 students is selected from this group. Six of the stratified sample are at least 185 cm tall.

Calculate the value of H.

Answer H = _____ [3]

Examiner Only	
Marks	Remark

10

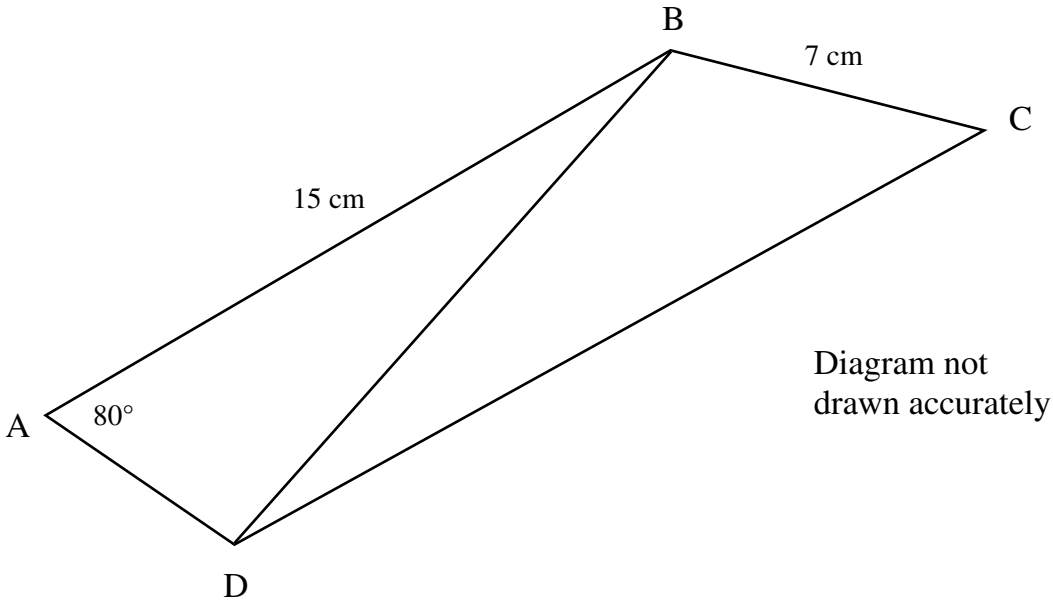


Diagram not drawn accurately

ABD is an isosceles triangle with angle A = 80° and AB = BD.
AB = 15 cm and BC = 7 cm. Angle ABC = 115°
Calculate the length of CD.

Answer _____ cm [4]

Examiner Only	
Marks	Remark

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11 Solve $\frac{1}{2x-3}+\frac{4}{x+1}=1$

A solution by trial and improvement will not be accepted.

Examiner Only	
Marks	Remark

Answer _____ [7]

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

January 2010

Mark Schemes

Issued: April 2010

Rewarding Learning

General Certificate of Secondary Education
January 2010

Mathematics

Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

TUESDAY 12 JANUARY

10.30am – 11.30am

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 2010

Introduction

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(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)** Box plot drawn	M1, A1	
	(b) Boys' matches completed quicker – lower median and quartiles	A1	
	Greater range of times in girls' matches	A1	4
2	$989 = 92\%$	MA1	
	$8\% = \frac{989}{92} \times 8$	MA1	
	$= 86$ absent	A1	3
3	$\text{Tan } 35° = \frac{BC}{20}$	MA1	
	$BC = 20 \text{ Tan } 35°$	MA1	
	14(.00415076)	A1	3
4	$\frac{4}{3} \times \pi \times 10^3$	MA1	
	4188.79(0205) cm^3	A1	
		A1 units	3
5	**(a)** $12x^2 + 20x - 6x - 10$	MA1	
	$12x^2 + 14x - 10$	MA1	
	(b) $(x + 5)(x - 8)$	MA2	4
6	$y = -\frac{1}{4}x - 3$	MA1, MA1	2
7	$\sqrt{(4^2 + 3^2 + 12^2)}$	MA1	
	13	A1	2

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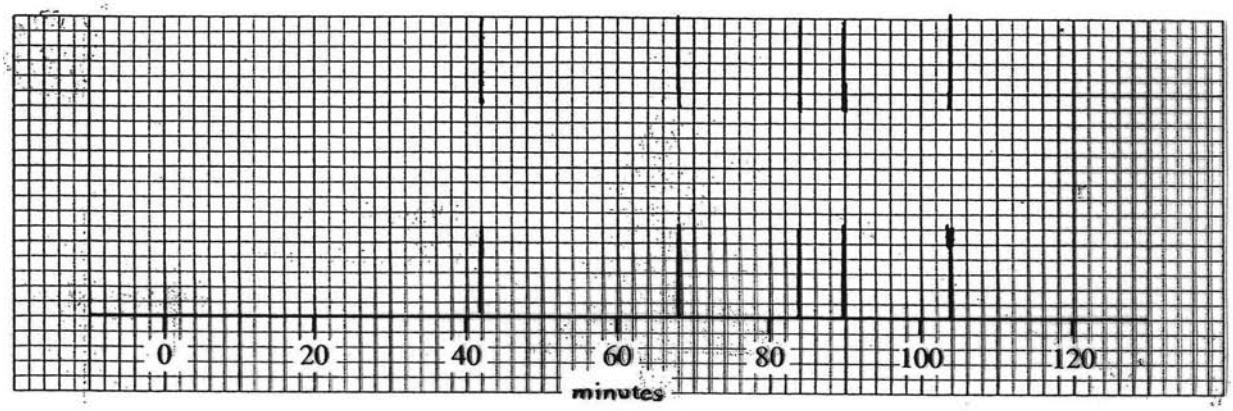
				AVAILABLE MARKS
8	**(a)**	$(3m + 2)(2m + 1) = 0$	MA2	
		$m = -\frac{2}{3}$, $m = -\frac{1}{2}$	A1	
	(b)	$x = \frac{5 \pm \sqrt{37}}{2}$	MA2	
		$x = 5.54$, $x = -0.54$	A1	6
9	**(a)**	3, 7.5, 7.2, 13.2, 1.8	MA1	
		Scaling and 2 bars correct	MA1	
		Remaining 3 correct	MA1	
	(b)	$\frac{6}{18} = \frac{1}{3}$	MA1	
		$\frac{1}{3}$ of 66 = 22		
		$40 - (22 + 6) = 12$	MA1	
		$12 = \frac{1}{3}$ of 36		
		H = 175	MA1	6
10		DBC = 95°	MA1	
		$DC^2 = 15^2 + 7^2 - 2(15)(7)\cos 95° = 292(.302706)$	M1, A1	
		17(.09686)	A1	4

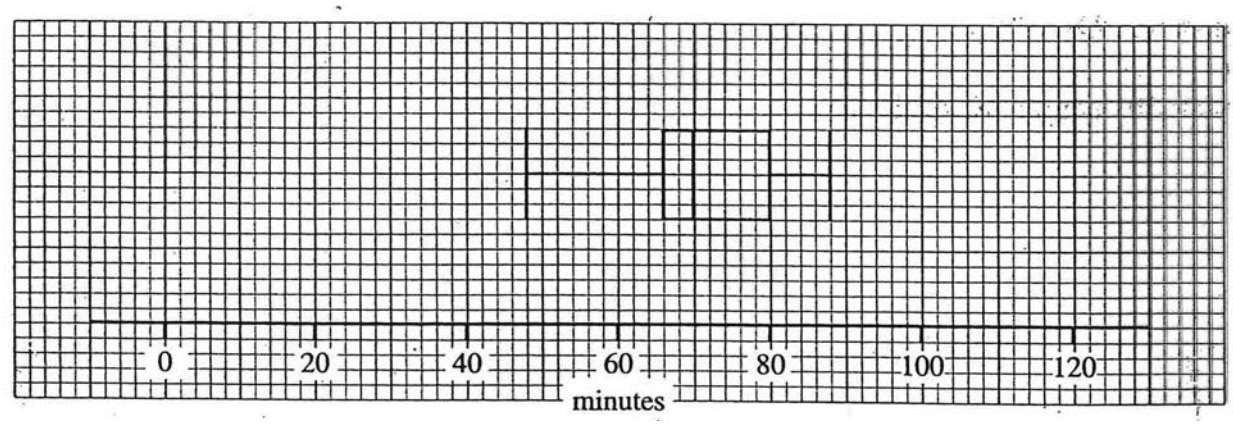
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			AVAILABLE MARKS
11	$x + 1 + 4(2x - 3) = (2x - 3)(x + 1)$	MA1	
	$x + 1 + 8x - 12 = 2x^2 + 2x - 3x - 3$	MA1	
	$9x - 11 = 2x^2 - x - 3$	MA1	
	$2x^2 - 10x + 8 = 0$	MA1	
	$x^2 - 5x + 4 = 0$		
	$(x - 1)(x - 4) = 0$	MA2	
	$x = 1$ **or** $x = 4$	A1	7
		Total	**44**

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GCSE MATHEMATICS JANUARY 2010
MODULE N4-2
OVERLAY QUESTION 1





Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

GMN42

MONDAY 18 MAY

2.45 pm – 3.45 pm

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

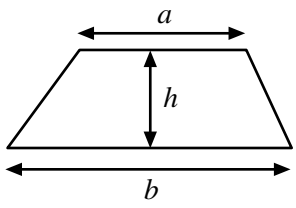
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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

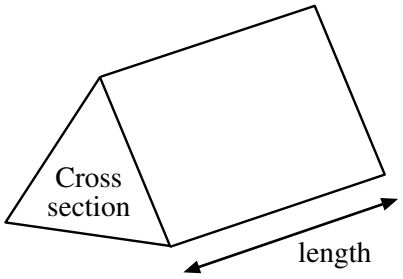
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Formula Sheet

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



Volume of prism = area of cross section × length

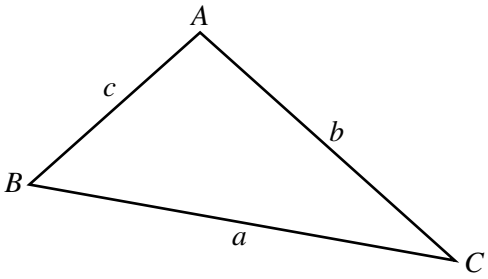


In any triangle ABC

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

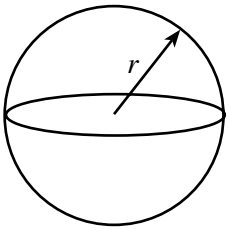
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



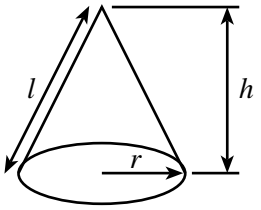
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

Curved surface area of cone = πrl



Quadratic equation:

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

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

1 Calculate the volume of a sphere of diameter 70 cm.

Examiner Only	
Marks	Remark

Answer _____ [3]

2 Peter is a gardener. He recorded how much money he earned each week for 40 weeks.

Examiner Only	
Marks	Remark

Money in £ (m)	Frequency	Money in £	Cumulative Frequency
$180 \leq m < 200$	4	<200	4
$200 \leq m < 220$	7	<220	11
$220 \leq m < 240$	12	<240	
$240 \leq m < 260$	9		
$260 \leq m < 280$	5		
$280 \leq m < 300$	2		
$300 \leq m < 320$	1		

(a) Complete the table. [1]

(b) Draw the cumulative frequency graph on the opposite page. [3]

(c) Use the graph to estimate

(i) the median,

Answer £ _____ [1]

(ii) the inter-quartile range,

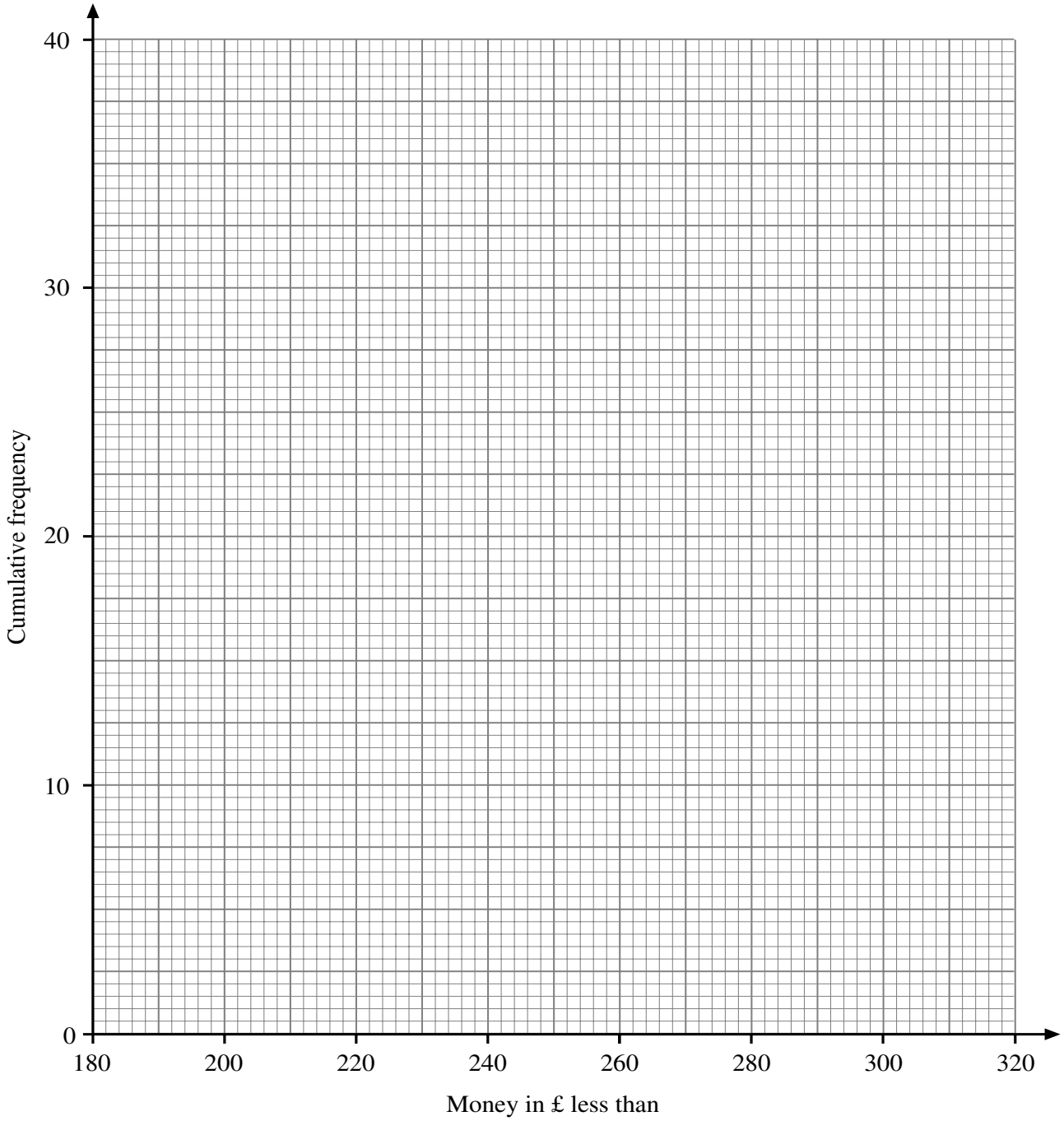
Answer £ _____ [2]

(iii) in how many weeks Peter earned more than £225.

Answer _____ weeks [2]

(d) The lowest amount Peter earned was £185 and the highest amount was £315.

Draw a box plot opposite to illustrate Peter's earnings. [3]


40
30
20
10
0
Cumulative frequency
180
200
220
240
260
280
300
320
Money in £ less than

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Examiner Only	
Marks	Remark

3 Explain the difference between discrete data and continuous data and give one example of each.

_____

_____

_____

_____ [2]

4

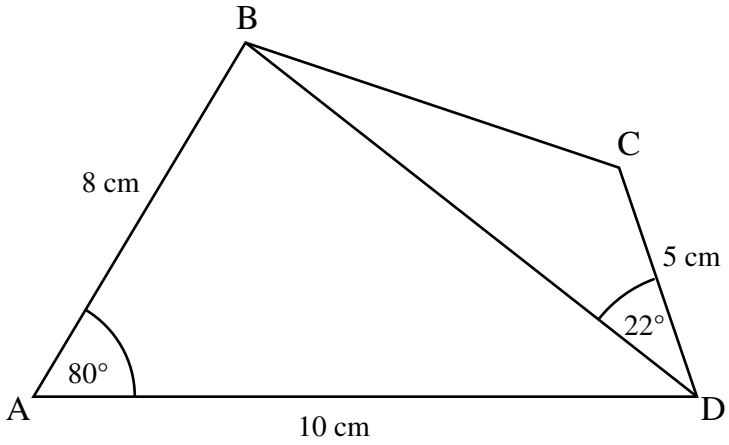


Diagram not drawn accurately

ABCD is a quadrilateral.
AB = 8 cm, AD = 10 cm, CD = 5 cm.
Angle BAD = 80° and angle BDC = 22°.

Calculate

(a) the length of BD,

Answer _____ cm [3]

(b) the area of triangle BCD.

Answer _____ cm^2 [2]

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5 A man walks x km East and then $(x + 8)$ km North.
He is now 12 km from his starting point.

(a) Show that x satisfies the equation $x^2 + 8x - 40 = 0$

[3]

(b) Solve the equation to find x, giving your answer correct to 3 significant figures.

Answer $x =$ _____ [3]

Examiner Only	
Marks	Remark

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6 (a)

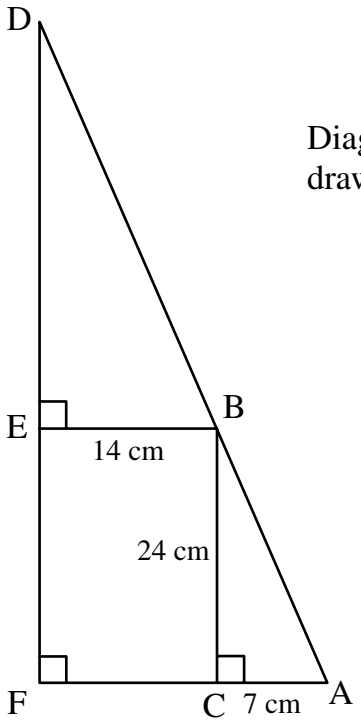


Diagram not drawn accurately

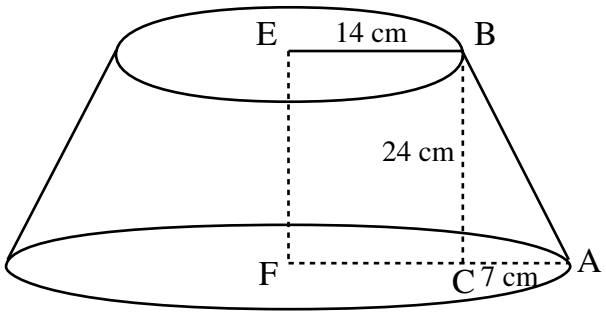
ABC and BDE are similar triangles.
BE = 14 cm, BC = 24 cm, AC = 7 cm
Find the length of DE.

Answer _____ cm [2]

Examiner Only	
Marks	Remark

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(b) The diagram below shows the frustum of a cone.
The circular top of the frustum, centre E, is of radius 14 cm.
The circular base of the frustum, centre F, is of radius 21 cm.



Using the answer found in part **(a)**, find the volume of the frustum of the cone.

Answer _____ cm^3 [4]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 The equation $3x^2 = \frac{1}{N}$ can have rational or irrational solutions.

(a) Write down a value for N which gives rational solutions.

Answer N = _____ [1]

(b) Write down a value for N which gives irrational solutions.

Answer N = _____ [1]

(c) Write down a value for N which gives no solutions.

Answer N = _____ [1]

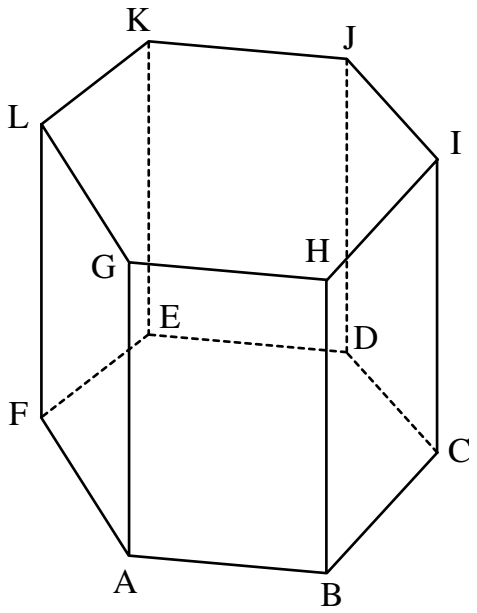
8 Given that $(x + b)^2 \equiv x^2 - 10x + c$, find the values of b and c.

Answer b = _____

c = _____ [3]

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9



ABCDEF, GHIJKL, the base and top of the prism, are regular hexagons.
AB = 20 cm, AG = 30 cm.
Calculate the angle between AJ and the base ABCDEF.

Answer _____° [4]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

Summer 2009

Mark Schemes

Issued: October 2009

Rewarding Learning

General Certificate of Secondary Education

2009

Mathematics

Module N4 Paper 2

(With calculator)

Higher Tier

[GMN42]

MONDAY 18 MAY

2.45 pm – 3.45 pm

MARK SCHEME

STEMUP.CO.UK

GCSE MATHEMATICS 2009

Introduction

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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;

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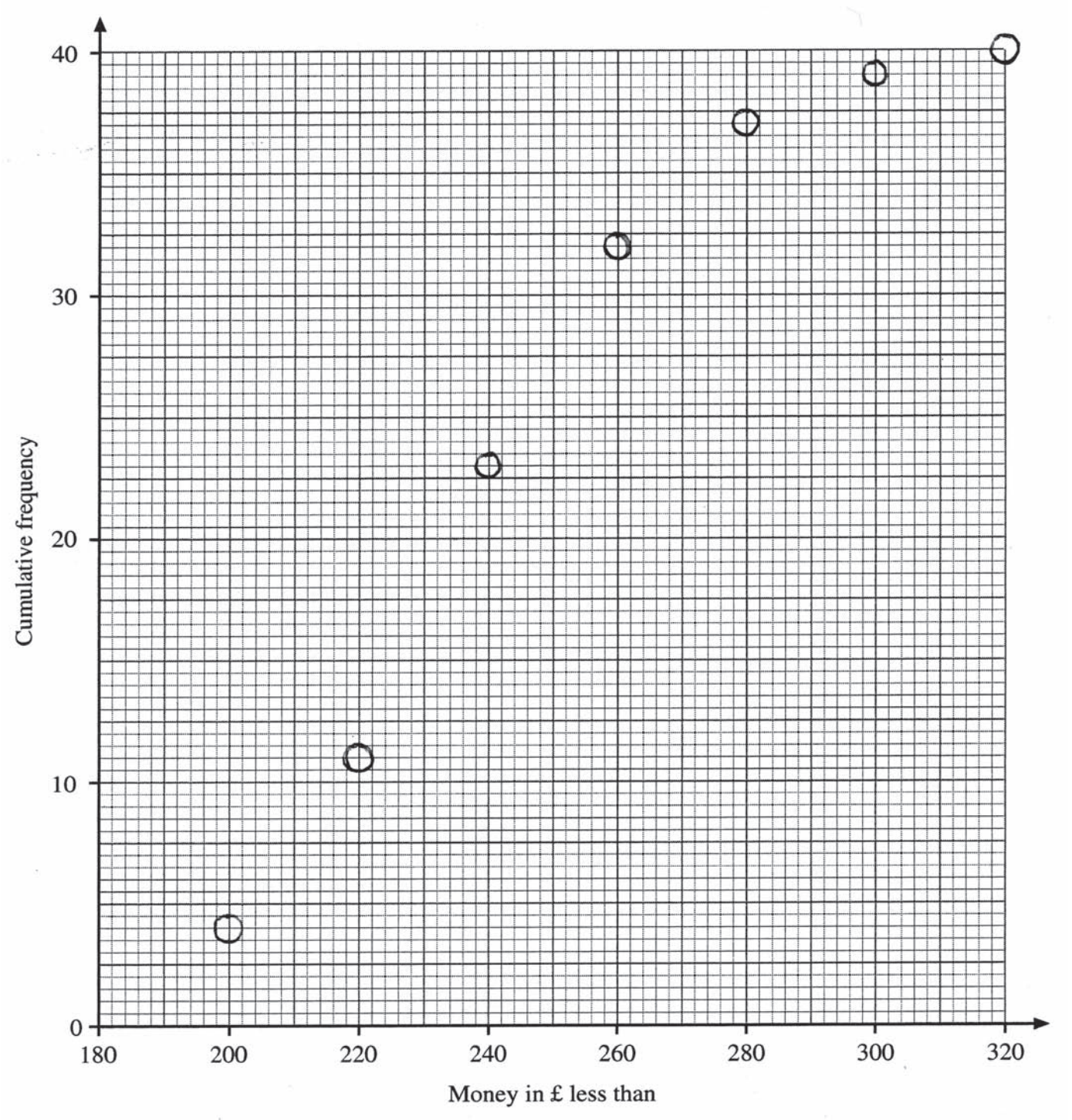
			AVAILABLE MARKS
1	Volume of sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(35)^3$	MA1	
	$= 179\,594.38\,\text{cm}^3$ (180 000)	A1, A1 units	3
2	**(a)**		
	< 260 23		
	< 280 32		
	< 300 37		
	< 320 39		
	40	A1	
	(b) points plotted correctly	MA2	
	smooth curve/lines	A1	
	(c) **(i)** 235 (follow pupil's curve)	MA1	
	(ii) 256 – 217 (follow pupil's curve)	MA1	
	39	A1	
	(iii) from graph	M1, A1	
	(d) Median at 235 (follow pupil's curve)	MA1	
	Quartiles at 217 and 256 (follow pupil's curve)	MA1	
	Range: Start 185, End 315	MA1	12
3	Discrete data is counted, continuous data is measured etc.	A1	
	Suitable example of each	A1	2
4	**(a)** $BD^2 = 8^2 + 10^2 - 2 \times 8 \times 10\cos 80° = 136.216\ldots$	M1, A1	
	$BD = 11.67$	MA1	
	(b) Area $= \frac{1}{2} \times 5 \times 11.67 \sin 22° = 10.93$	M1, A1	5
5	**(a)** $x^2 + (x + 8)^2 = 144$	MA1	
	$x^2 + x^2 + 16x + 64 - 144 = 0$		
	$2x^2 + 16x - 80 = 0$	MA1	
	$x^2 + 8x - 40 = 0$	MA1	
	(b) $x = \frac{-8 \pm \sqrt{64 + 160}}{2}$	MA1	
	$x = \frac{-8 \pm 14.96663}{2}$	A1	
	$x = 3.48$	A1	6

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				AVAILABLE MARKS
6	**(a)**	$\frac{DE}{EB} = \frac{BC}{AC}$		
		$\frac{DE}{14} = \frac{24}{7}$	MA1	
		DE = 48 cm	MA1	
	(b)	Volume of original cone = $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(21)^2(72)$	MA1	
		Volume of cone removed = $\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(14)^2(48)$	MA1	
		Volume of frustum = $\frac{1}{3}\pi(21)^2(72) - \frac{1}{3}\pi(14)^2(48)$	M1	
		= 33 251 – 9852 = 23 399	A1	6
7	**(a)**	suitable example, e.g. 3	A1	
	(b)	suitable example, e.g. 2	A1	
	(c)	suitable example, e.g. –1	A1	3
8		$(x + b)^2 = x^2 + 2bx + b^2$	MA1	
		$2b = -10 \quad b = -5$	MA1	
		$b^2 = c \quad c = 25$	MA1	3
9		angle DAJ	M1	
		AD = 40 cm	MA1	
		$\tan^{-1}\frac{30}{40}$	MA1	
		= 36.9	A1	4
			Total	**44**

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GCSE MATHEMATICS SUMMER 2009
MODULE N4-2
OVERLAY QUESTION 2



Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
January 2009

Mathematics



Module N4 Paper 2
(With calculator)
Higher Tier

[GMN42]

GMN42

FRIDAY 9 JANUARY

10.30 am – 11.30 am

TIME

1 hour.

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

INFORMATION FOR CANDIDATES

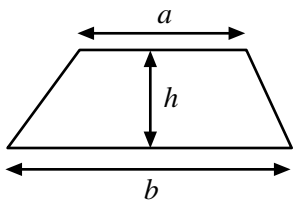
The total mark for this paper is 44.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
You should have a calculator, ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

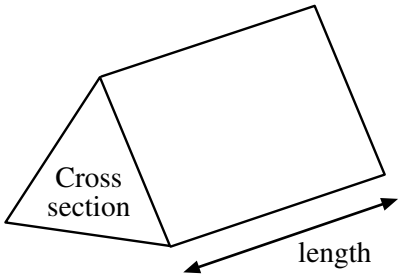
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Formula Sheet

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



Volume of prism = area of cross section × length

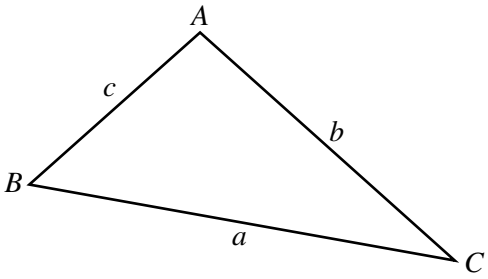


In any triangle ABC

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

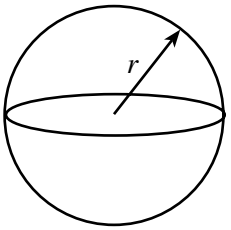
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



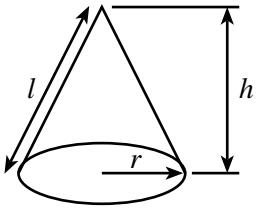
Volume of sphere = $\frac{4}{3}\pi r^3$

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:

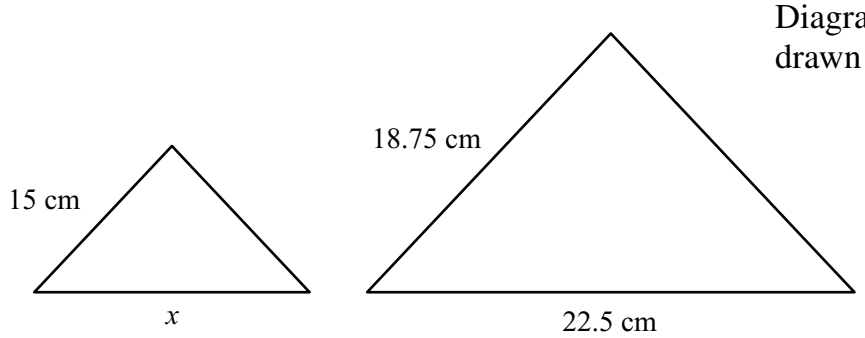
The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

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

Examiner Only	
Marks	Remark

1 Two similar triangles are shown.

Diagrams not drawn accurately



The ratio of the length of the sides is 4 : 5
Find the length of side x.

Answer _____ cm [2]

---

2 A coat has a sale price of £54.40 which is a saving of 15% on the original price.
What was the original price of the coat?

Answer £ _____ [3]

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Examiner Only	
Marks	Remark

3 **(a)** The diagram shows a trapezium.

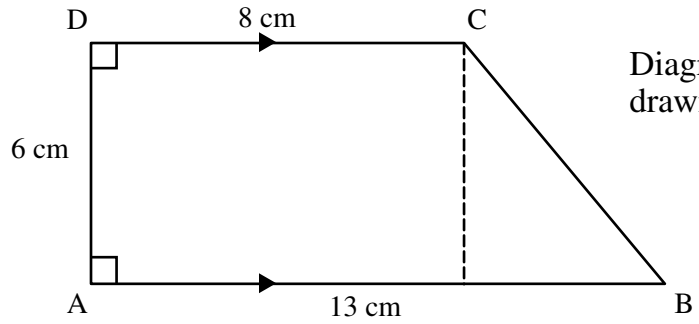


Diagram not drawn accurately

AB is parallel to DC. AB = 13 cm, AD = 6 cm and DC = 8 cm.
Calculate the size of angle B.

Answer _____° [3]

(b) Calculate the volume of a sphere with diameter 10 cm.

Answer _____ [3]

---

4 Factorise $xy + 4y + 5x + 20$

Answer _____ [2]

5

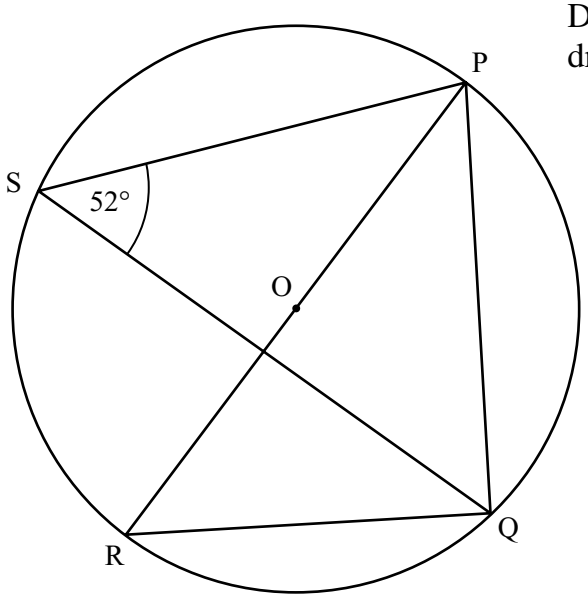


Diagram not drawn accurately

(a) Explain why angle PQR = 90°

_____ [1]

(b) Calculate

(i) angle PRQ Answer _____° [1]

(ii) angle POQ Answer _____° [1]

Examiner Only

Marks	Remark

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Examiner Only	
Marks	Remark

6 A hotel sun terrace has a rectangular swimming pool measuring $x + 16$ metres by $2x + 6$ metres. A patio area on two sides of the swimming pool is x metres wide.

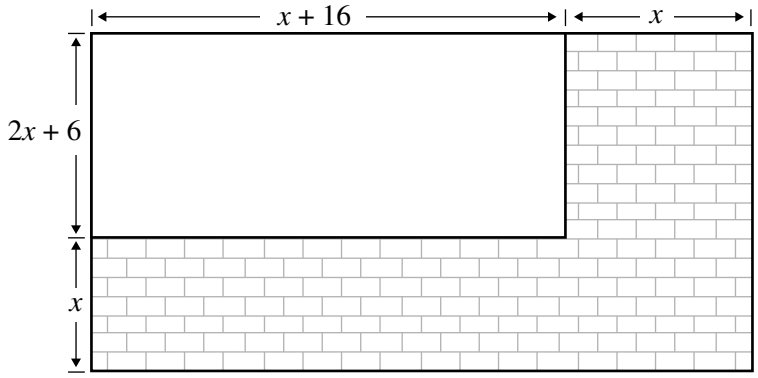


Diagram not drawn accurately

(a) If the terrace has a total area of 504 m^2, show that this total area can be satisfied by the quadratic equation

$x^2 + 10x - 68 = 0$

[3]

(b) Solve this equation to find the width of the patio.

Answer $x =$ _____ m [3]

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(Questions continue overleaf)

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Examiner Only	
Marks	Remark

7 The lengths of time, in minutes, that aircraft spent waiting for clearance at a busy airport were recorded. Some of this information is shown in the table below and in the histogram opposite.

Time (x minutes)	Frequency
$0 < x \leq 10$	28
$10 < x \leq 14$	
$14 < x \leq 20$	
$20 < x \leq 25$	18
$25 < x \leq 32$	7
$32 < x \leq 36$	10

(a) Use the data displayed in the histogram to complete the table. [2]

(b) Use the data displayed in the table to complete the histogram. [2]

(c) Estimate the number of aircraft which waited for a time greater than the mid-value of the modal class.

Answer _____ [3]

(d) Describe what is meant by a 'stratified sample'.

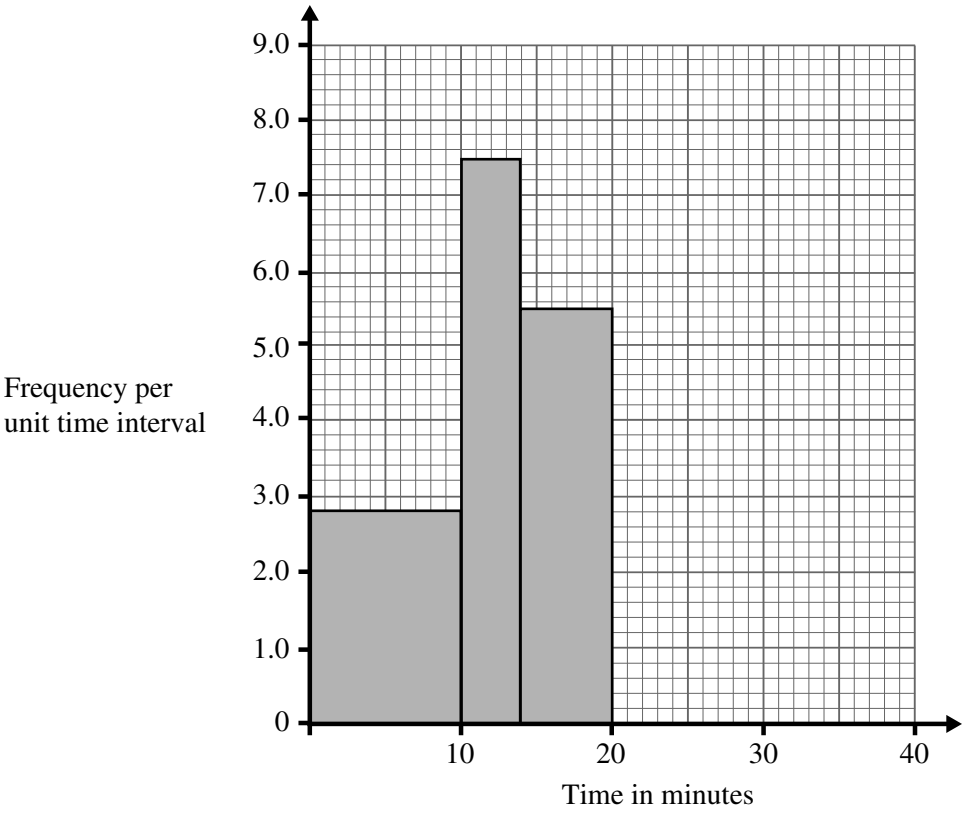
_____

_____

_____

_____ [2]

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(e) A stratified sample of 28 aircraft which waited for more than 10 minutes was taken. How many of the aircraft in this sample waited between 25 and 32 minutes?
Show your working.

Answer _____[3]

Examiner Only

Marks	Remark

8 The diagram shows the position of two trees D and E on the bank of a river.
The river banks are parallel.
F is the position of another tree on the opposite side of the river.

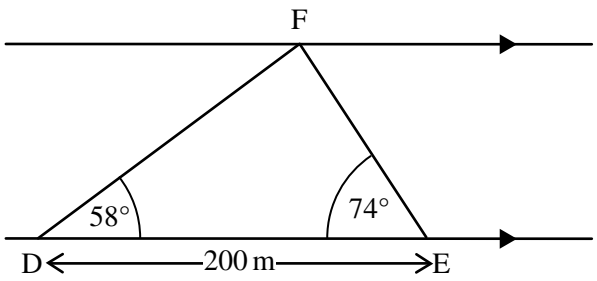


Diagram not drawn accurately

Calculate the width of the river.

Answer _____ m [4]

Examiner Only	
Marks	Remark

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9 Solve

$$2(x-1)+\frac{2}{x-1}=5$$

Show your working.
A solution by trial and improvement will not be accepted.

Answer x = _____ [6]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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GCSE

Mathematics (Modular)

January 2009

Mark Schemes

Issued: April 2009

Rewarding Learning

General Certificate of Secondary Education

January 2009

Mathematics

Module N4 Paper 2

(With calculator)

Higher Tier

[GMN42]

FRIDAY 9 JANUARY

10.30 am – 11.30 am

MARK SCHEME

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			AVAILABLE MARKS
1	$\frac{x}{22.5} = \frac{4}{5}$	MA1	
	$5x = 90$ $x = 18$	MA1	2
2	85% = £54.40 54.40 ÷ 0.85 = £64	MA1 M1A1	3
3	**(a)** $\tan B = \frac{6}{5}$	MA2	
	B = 50.2°	A1	
	(b) $\frac{4}{3} \times \pi \times 5^3$	MA1	
	$= 523.6\,\text{cm}^3$	A1, A1 units	6
4	$y(x + 4) + 5(x + 4)$ $(y + 5)(x + 4)$	MA1 MA1	2
5	**(a)** angle at the circumference of a semicircle is always 90° (angle at circumference standing on a diameter is 90°)	A1	
	(b) **(i)** 52°	A1	
	(ii) 104°	A1	3
6	**(a)** $(2x + 16)(3x + 6) = 504$	A1	
	$6x^2 + 12x + 48x + 96 = 504$	A1	
	$6x^2 + 60x - 408 = 0$		
	$x^2 + 10x - 68 = 0$	A1	
	(b) $x = \frac{-10 \pm \sqrt{(100 - (-272))}}{2}$	A1	
	$x = 4.64\,\text{m}$ or -14.64	A1	
	Width of patio 4.64	A1	6

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			AVAILABLE MARKS
7	**(a)** See overlay 30 33	A1, A1	
	(b) 3 areas correct (2 areas MA1)	MA2	
	(c) mid-modal class value 17 minutes Number of aircraft = 16 (or 17) + 18 + 7 + 10 = 51 (or 52)	MA1 M1 A1	
	(d) description	A2	
	(e) $\frac{28}{98} \times 7 = 2$	M1, A2	12
8	$\frac{200}{\sin 48°} = \frac{DF}{\sin 74°}$ **or** $\frac{200}{\sin 48°} = \frac{FE}{\sin 58°}$	MA1	
	DF = 258.7 FE = 228.2	MA1	
	$\sin 58° = \frac{\text{width}}{258.7}$ $\sin 74° = \frac{\text{width}}{228.2}$	MA1	
	width = 219.4 m width = 219.4 m	MA1	4
9	$2(x-1)^2 + 2 = 5(x-1)$	MA1	
	$2(x^2 - 2x + 1) + 2 = 5x - 5$	MA1	
	$2x^2 - 9x + 9 = 0$	A1	
	$(2x - 3)(x - 3) = 0$	MA1	
	$x = \frac{3}{2}$ or 3	A1, A1	6
	Total		**44**

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GCSE MATHEMATICS JANUARY 2009
MODULE N4-2
OVERLAY QUESTION 7

