

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment)
MODULE M9 – SECTION A

1966/2339A

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

Geometrical instruments
Tracing Paper (optional)

TIME 30 minutes

Candidate Name	Centre Number	Candidate Number												
	<table border="1" style="width: 100%; height: 100%;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>							<table border="1" style="width: 100%; height: 100%;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>						

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the space provided on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for correct working even if the answer is incorrect.

INFORMATION FOR CANDIDATES

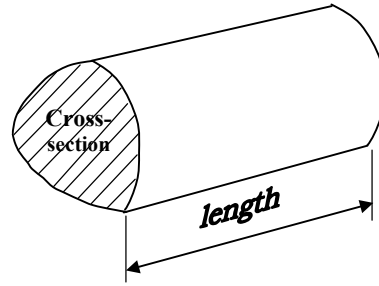
- The number of marks is given in brackets [] at the end of each question or part question.
- The total mark available for this Section is 25.

For Examiner's Use	
Section A	
Section B	
Total	

WARNING
You are not allowed to use a calculator in Section A of this paper.

FORMULA SHEET: HIGHER TIER

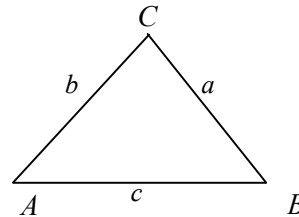
Volume of prism = (area of cross section) \times length



In any triangle ABC

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

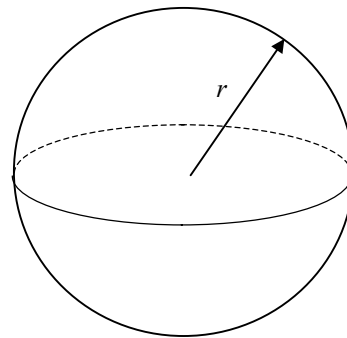
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$



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

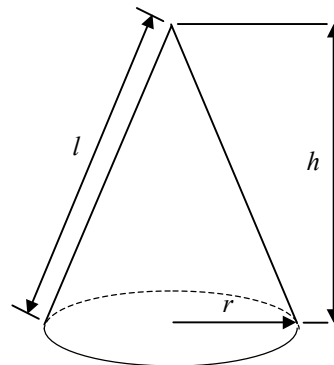
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



The Quadratic Equation

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

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

1 Each of the following calculations is wrong.

Show clearly, without working out the exact answer, how you can tell they are wrong.

(a) $\frac{32 \cdot 03}{9 \times 0 \cdot 1} = 29 \cdot 7$

[1]

(b) The area of a circle of radius 10 cm is 295 cm^2 .

[1]

2

2 (a) A formula used in science is $T = 2\pi\sqrt{\frac{\ell}{g}}$.

Rearrange this formula to make ℓ the subject.

(a) $\ell =$ _____ [3]

(b) Simplify the following fraction as much as possible.

$$\frac{x^2 - 5x + 6}{x^2 - 3x + 2}$$

(b) _____ [4]

7

3 Work out the following, giving your answer in standard form.

$$\frac{3 \times 10^4}{6 \times 10^{-3}}$$

_____ [2]

2

4 The weather forecast for London gives a 60% chance of a shower, and for Brighton gives a 70% chance of a shower.

(a) Find the probability of showers falling in either London or Brighton but not both.

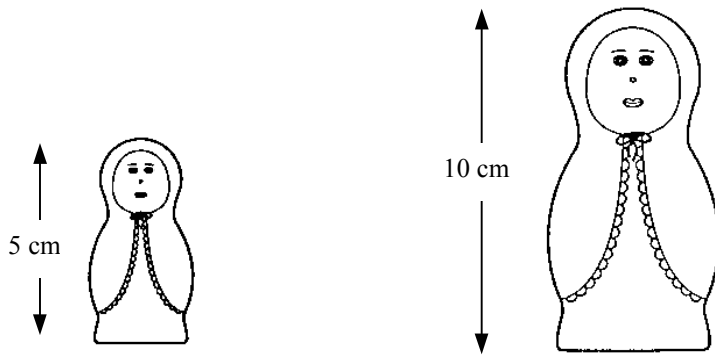
(a) _____ [3]

(b) What assumption is made in this calculation?

_____ [1]

4

5



The two Russian dolls shown are mathematically similar.

Each doll is to be painted.

The amount of paint used on each doll is proportional to its surface area.

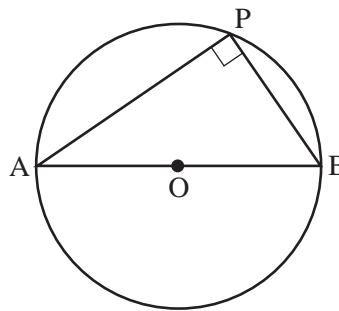
1 ml of red paint is used on the 5 cm doll.

Work out the amount of red paint used on the 10 cm doll.

_____ ml [2]

2

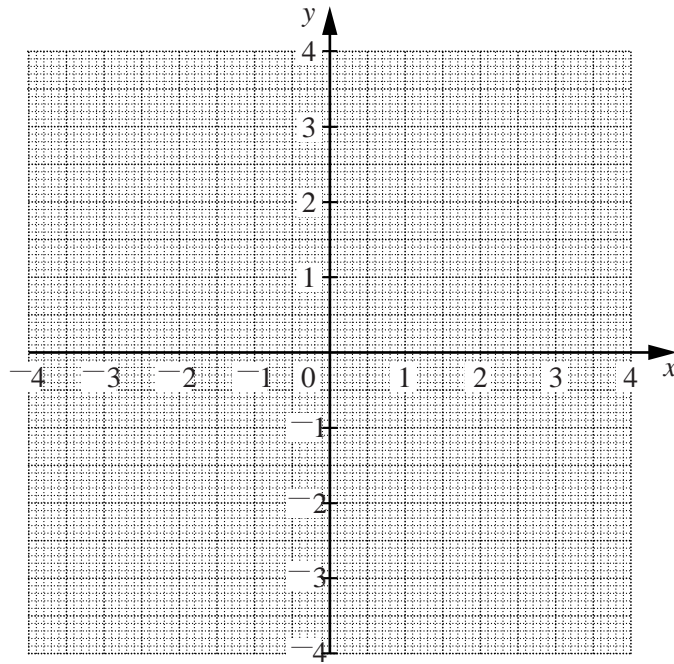
6 “The angle in a semi-circle is a right angle”.



Prove this statement, giving clear geometrical reasoning.

[2]

2



(a) On the graph paper draw the graph of $x^2 + y^2 = 4$. [2]

(b) By adding a straight line to your graph solve these simultaneous equations.

$$x^2 + y^2 = 4$$

$$2x - y = 1$$

Give your answers correct to 1 decimal place.

(b) $x =$ _____ [4]

(b) $y =$ _____

and

$x =$ _____

$y =$ _____

6	
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Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

Mathematics C (Graduated Assessment)
 MODULE M9 – SECTION B

1966/2339B

Specimen Paper 2003

Candidates answer on the question paper.

Additional materials:

- Geometrical instruments
- Tracing Paper (optional)
- Scientific or Graphical Calculator

TIME 30 minutes

Candidate Name

Centre Number

Candidate Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
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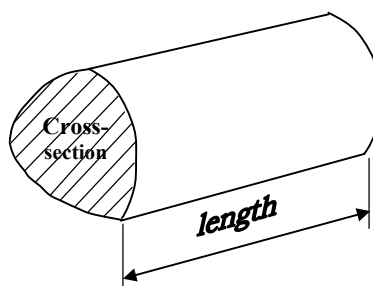
INFORMATION FOR CANDIDATES

- You are expected to use a calculator in Section B of this paper
- The number of marks is given in brackets [] at the end of each question or part question.
- The total mark available for this Section is 25.

For Examiner's Use	
Section B	

FORMULA SHEET: HIGHER TIER

Volume of prism = (area of cross section) \times length

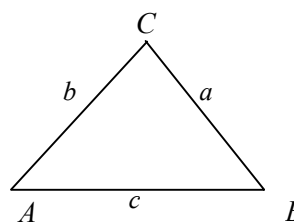


In any triangle ABC

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

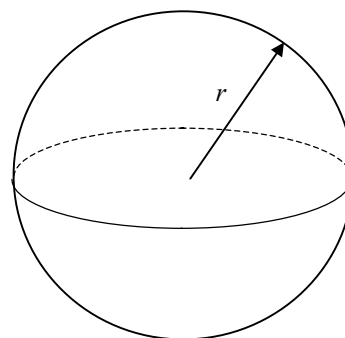
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



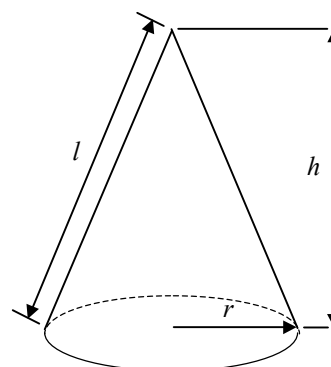
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



The Quadratic Equation

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

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

8 (a) Factorise $4 - x^2$.

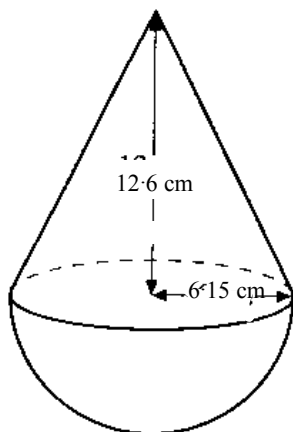
(a) _____ [2]

(b) Multiply out and simplify $(3x + 2)(x - 7)$.

(b) _____ [2]

4

9



A child's solid wooden toy is in the form of a cone on top of a hemisphere.
The radius of the base of the cone is 6.15 cm and the height of the cone above the centre of its base is 12.6 cm.

Calculate the volume of the toy.

_____ [4]

4

10 In the table below, x and y are connected by an equation of the form $y = kx^n$.

x	2	4	6	p
y	12	48	108	147

(a) Find the values of k and n .

(a) $k =$ _____ [1]

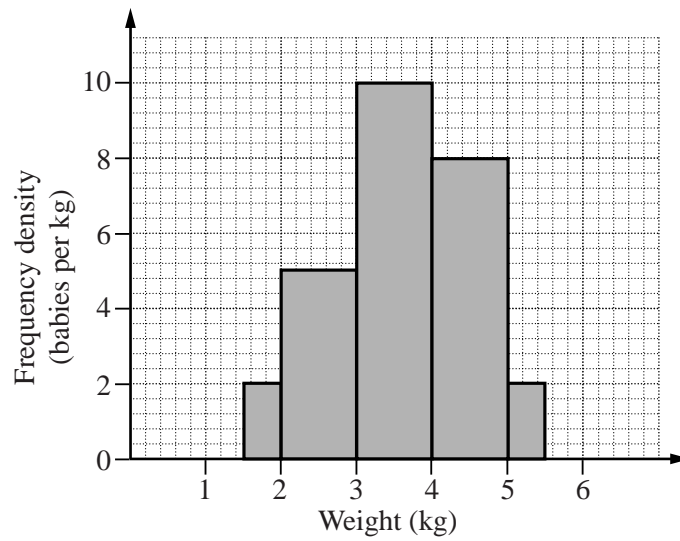
$n =$ _____ [1]

(b) Find the value of p .

(b) $p =$ _____ [1]

3

- 11 The following graph is a histogram showing the weights of babies born during one week at a maternity hospital.



- (a) How many babies weighed more than 5 kg?

(a) _____ [1]

- (b) Show that the following statements are true.

- (i) There are 25 babies in the sample.

 _____ [1]

- (ii) Of the babies in the sample, 20% weighed between 2 and 3 kilograms.

 _____ [1]

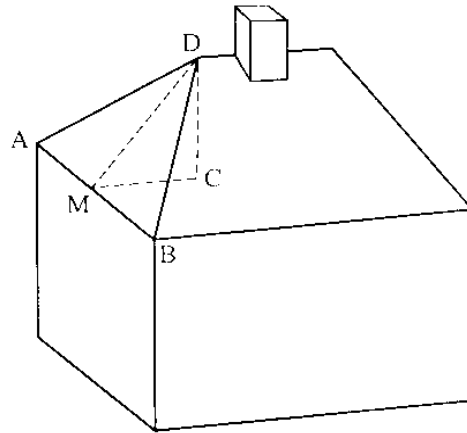
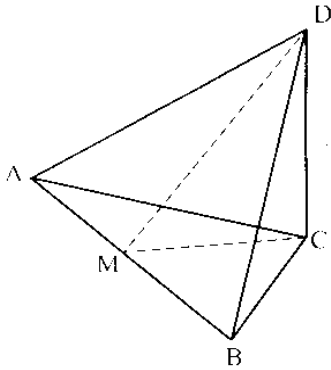
3	
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12 The diagram shows the end of a house roof.

The plane ABC is horizontal and the line CD is vertical.

M is the midpoint of the line AB.

$AD = BD = 7.5$ m. $CD = 3.8$ m and $AB = 9.0$ m.

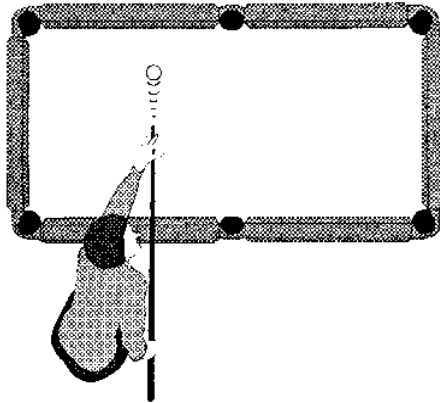


Calculate angle DMC.

_____ ° [6]

6	
---	--

13



When a snooker ball hits the cushion at right-angles it is given an *impulse*, l . This can be calculated by the formula

$$l = mv + mu.$$

m is the mass of the ball in kilograms

u is its speed before impact in metres per second

v is its speed after impact in metres per second.

- (a) Show clearly that the formula can be rewritten as

$$v = \frac{l}{m} - u.$$

[1]

- (b) m is measured as 0.24 kg
 u is measured as 0.85 m/s
 l is measured as 0.63 units

Each measurement is given correct to two decimal places.

Use the fomula $v = \frac{l}{m} - u$. to find the greatest possible value of v .

Show your calculation clearly.

(b) _____ m/s [4]

5	

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General Certificate of Secondary Education

Mathematics C (Graduated Assessment)
MODULE M9

1966/2339A

MARK SCHEME

Specimen Paper 2003

SECTION A

1	(a)	Divide by 0.9 would increase number	[1]	
	(b)	$\pi \times 10^2 > 300$ as $\pi > 3$	[1]	
			[2]	
<hr/>				
2	(a)	$\frac{gT^2}{4\pi^2}$ or equal	[3]	M2 for squaring and divide 2π , M1 for one of above or multiply g
	(b)	$\frac{x-3}{x-1}$	[4]	Denom factors correct M2 (M1 if signs wrong) plus M1 for cancelling seen
			[7]	
<hr/>				
3		5×10^6	[2]	M1 for 0.5×10^7
			[2]	
<hr/>				
4	(a)	0.46	[3]	M1 for either 0.6×0.3 or 0.7×0.4 plus M1 for addition
	(b)	Independent o.e. in candidate's words	[1]	
			[4]	
<hr/>				
5		4	[2]	M1 for s.f = 2^2
			[2]	
<hr/>				
6		\angle at centre = $2 \times \angle$ at circle	[1]	
		\angle s on straight line add to 180°	[1]	
			[2]	
<hr/>				
7	(a)	Circle, centre (0,0) radius 2	[2]	M1 if radius wrong
	(b)	Line through (0, -1) grad 2 (1.3, 1.5) and (-0.5, -0.9)	[2] [2]	M1 for either W1 for each f.t. candidate's graph
			[6]	
<hr/>				

Section A Total: 25

SECTION B

8	<p>(a) $(2 - x)(2 + x)$</p> <p>(b) $3x^2 - 19x - 14$</p>	<p>[2]</p> <p>[2]</p> <p>[4]</p>	<p>M1 for $(2 + x)(2 + x)$</p> <p>M1 for $3x^2 + 2x - 19x - 14$ or two of final three terms correct</p>
9	<p>986 to 987</p> <p>units of cm^3</p>	<p>[3]</p> <p>[1]</p> <p>[4]</p>	<p>M2 for either vol 487.() or 499.(...)</p> <p>M1 for $\frac{2}{3}\pi 6^3$ or $\frac{1}{3}\pi 6^2 \cdot 12$</p>
10	<p>(a) $k = 3$</p> <p>$n = 2$</p> <p>(b) $p = 7$</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[3]</p>	
11	<p>(a) 1</p> <p>(b) evidence of $1 + 5 + 10 + 8 + 1$</p> <p>evidence of $\frac{5}{25} = 20\%$</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[3]</p>	
12	<p>39 or 39.3 or f.t. their DM</p>	<p>[6]</p> <p>[6]</p>	<p>M2 for $\sqrt{(7.5)^2 - (4.5)^2}$</p> <p>or M1 for $\text{DM}^2 + (4.5)^2 = (7.5)^2$ or M3 for $\text{DM} = 6$</p> <p>M2 for $\sin = \frac{3.8}{6}$ f.t</p> <p>M1 for sin involving DC and DM</p>
13	<p>(a) $mv = l - mu$ or $l = m(v + u)$</p> <p>or $\frac{l}{m} = v + u$ seen</p> <p>(b) $\frac{0.635}{0.235} - 0.845$</p> <p>1.85... or 1.86</p>	<p>[1]</p> <p>[M3]</p> <p>[A1]</p> <p>[5]</p>	<p>M1 for each term (this must be seen)</p>

Section B Total: 25

Total mark available: 50

MODULE: M9

Question	Topic	Syll Ref	Mod Ref								Grades									
				7	15	6	14	7	3	2	2	7	Units	Acc	B	A	A*			
				N	Man A	nMan A	SSM	HD	UA1	UA2	UA3	Multi-s								
1	Checking Calculation	2/4b,2/1i	N9.2	2						2									2	
2a	Rearranging equation	2/5g	A9.1		3															3
2b	Simplify expression	2/5b	A9.3		4															4
3	Standard form	2/3m	N8.5	2															2	
4	Probability	4/4g,4/1g,4/1b	D9.1					4	3		1	3								4
5	3D similarity	3/3d	S9.4				2													2
6	Angle in a circle	3/2h,3/1f	S9.1				2				2									2
7	Intersection of line/circle	2/6h	A9.4			6														6
	Section A total			4	7	6	4	4	3	2	3	3							4	21
8a	Difference of 2 squares	2/5b	A9.3		2															2
8b	Expand 2 brackets	2/5b	A9.3		2															2
9	Volume of cone/sphere	3/2i,3/1b	S9.3				4		3			3	1							4
10	Proportion	2/5h	A9.2		3															3
11	Interpret histogram	4/5d,4/1c	D9.2					3		2										3
12	3D Pythagoras and trig	3/2f,3/2g,3/1b	S9.2				6		5			6								6
13a	Rearrange form	2/5g	A8.1		1														1	
13b	Bounds	2/3q	N9.1	4																4
	Section B total			4	8		10	3												
	Total			8	15	6	14	7	10	4	3	12	1						7	43