



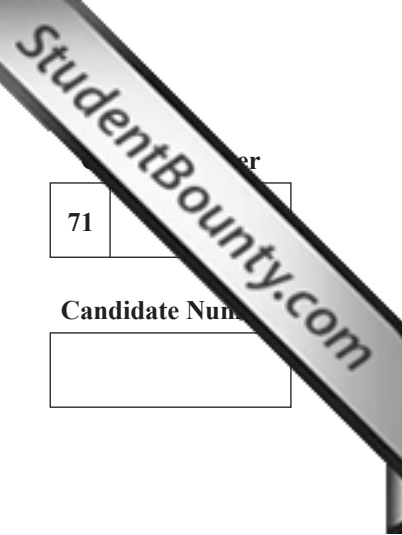
General Certificate of Secondary Education  
January 2011

## Mathematics

Module N4 Paper 2  
(With calculator)  
Higher Tier

[GMN42]

TUESDAY 11 JANUARY  
10.30 am – 11.30 am



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71	
Candidate Number	
<input type="text"/>	

### 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.

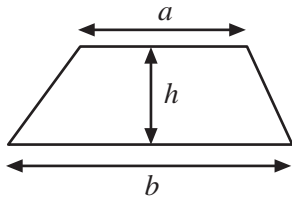
The Formula Sheet is on page 2.

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

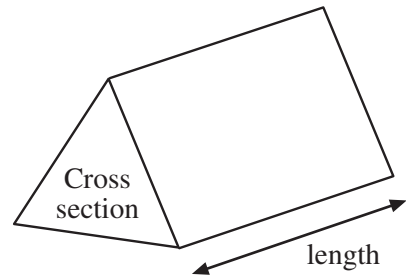


# Formula Sheet

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



**Volume of prism** = area of cross section  $\times$  length

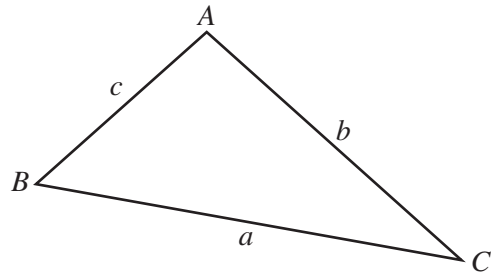


**In any triangle ABC**

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

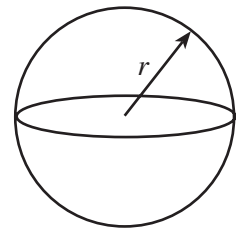
**Sine rule:**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



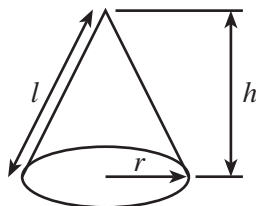
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

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

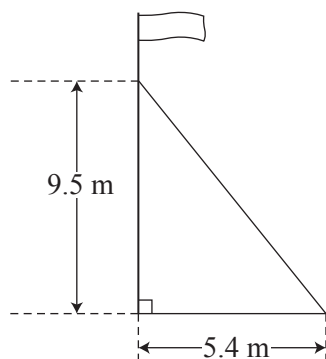


**Quadratic equation:**

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

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

- 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]

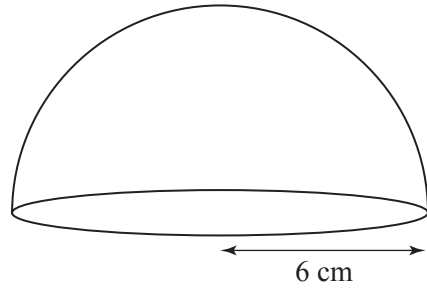
- (b) Express  $\frac{1}{4v} + \frac{2}{3v}$  as a single fraction in its simplest form.

Answer \_\_\_\_\_ [3]

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?

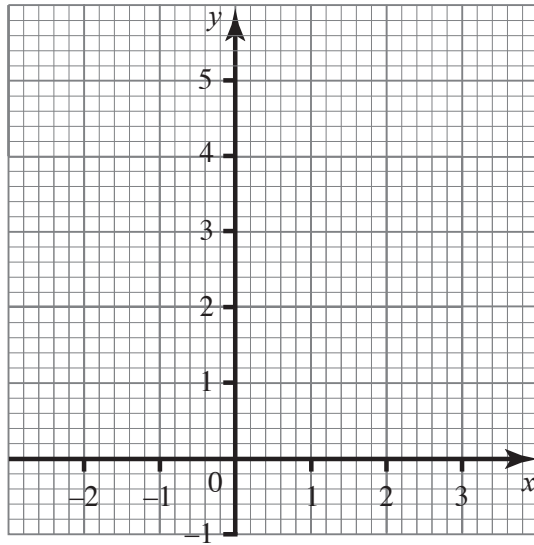
**Show your working.**

Answer \_\_\_\_\_ bounces [2]

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]

Examiner Only	
Marks	Remark

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

Examiner Only

Marks Remark

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

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

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

11

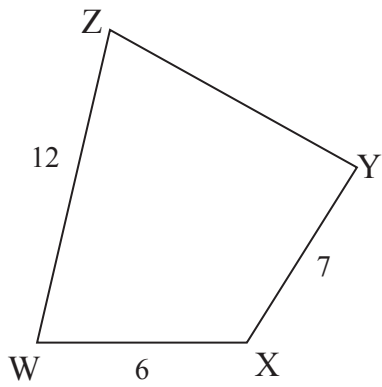


Diagram not drawn accurately

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

Angle  $WXY = 120^\circ$  and angle  $WYZ = 70^\circ$

Calculate angle  $WZY$ .

Answer \_\_\_\_\_  $^\circ$  [5]

Examiner Only	
Marks	Remark



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

(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  $18.5 \text{ cm}^2$

Find the lengths of the two pieces of wire.

Answer \_\_\_\_\_ cm, \_\_\_\_\_ cm [5]

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**THIS IS THE END OF THE QUESTION PAPER**

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Examiner Only	
Marks	Remark





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