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General Certificate of Secondary Education

January 2009

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| 71 | |
| Candidate Number | |
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Mathematics

Module N6 Paper 1
(Non-calculator)
 Higher Tier

[GMN61]



GMN61



WEDNESDAY 14 JANUARY
1.30 pm – 2.45 pm

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
 Write your answers in the spaces provided in this question paper.
 Answer **all fourteen** questions.
 Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
 You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

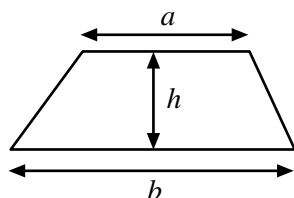
The total mark for this paper is 56.
 Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
 You should have a ruler, compasses, set-square and protractor.
 The Formula Sheet is on page 2.

| For Examiner's use only | |
|-------------------------|-------|
| Question Number | Marks |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
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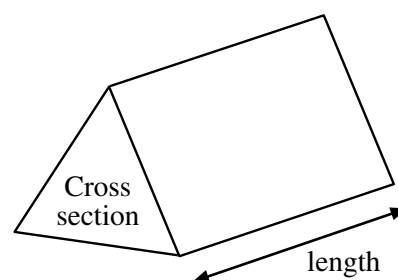
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| Total Marks | |
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Formula Sheet

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



Volume of prism = area of cross section \times length

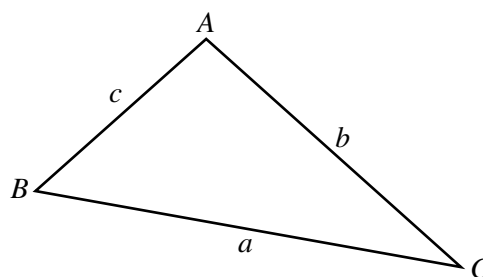


In any triangle ABC

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

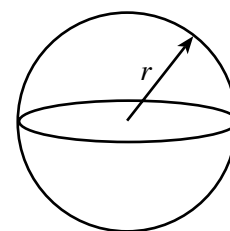
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



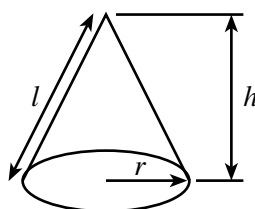
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

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

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

Answer _____ [2]

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

(i) 9.3×1.26

Answer _____ [1]

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

Answer _____ [1]

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

Answer _____ [1]

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

Answer _____ [1]

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

Calculate his average speed on the journey.

Answer _____ km/h [3]

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

Answer $S =$ _____ [2]

(b) $T - mg = ma$

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

Answer $T =$ _____ [3]

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

$$-4 < 3n < 9$$

Answer _____ [3]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

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

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

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

_____ g plain flour

_____ g caster sugar

_____ g chocolate chips

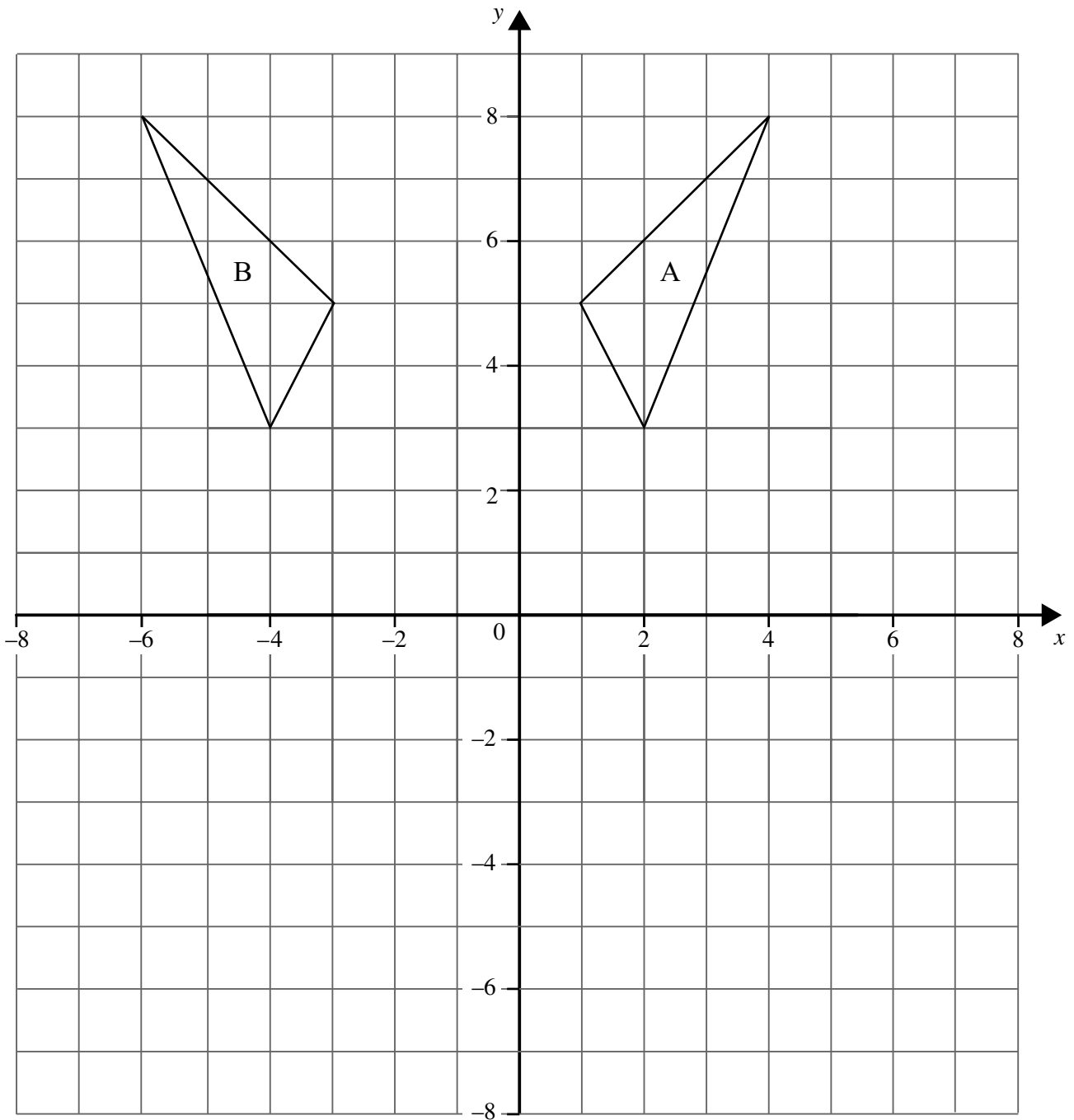
_____ fl oz milk

_____ medium eggs

[3]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

6

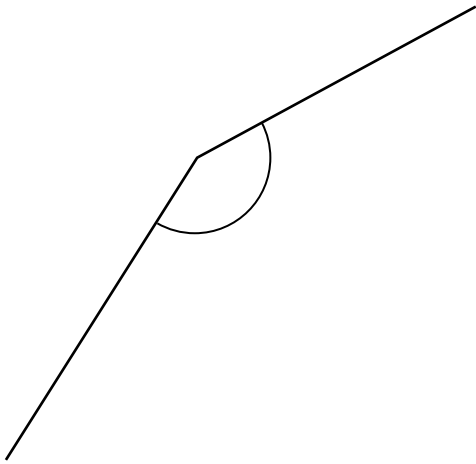


(a) Describe fully the **single** transformation which maps triangle A to triangle B.

_____ [2]

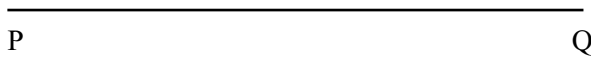
| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

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



[2]

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



[2]

Examiner Only

| Marks | Remark |
|-------|--------|
| | |

10 The letters r and x represent lengths.

Which two expressions could represent areas?

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

Answers _____ and _____ [2]

11 (a) Write 0.000000652 in standard form.

Answer _____ [1]

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

Answer _____ [1]

(c) Change the recurring decimal $0.5\dot{1}$ into a fraction.

Answer _____ [2]

| Examiner Only | |
|---------------|--------|
| Marks | Remark |
| | |

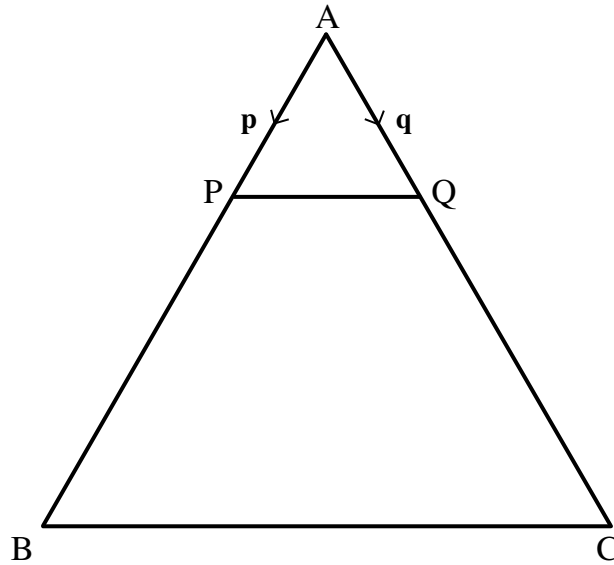
| Examiner Only | |
|---------------|--------|
| Marks | Remark |

12 ABC is a triangle.

P is a point on AB such that $AP = \frac{1}{3} AB$

Q is a point on AC such that $AQ = \frac{1}{3} AC$

$AP = \mathbf{p}$ and $AQ = \mathbf{q}$



(a) Write \vec{PC} in terms of \mathbf{p} and \mathbf{q} .

Answer _____ [1]

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

[3]

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

(a) rt

Answer _____ [2]

