![cea logo] **Rewarding Learning**

Centre Number

71

Candidate Number

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

[GMN61]

FRIDAY 14 JANUARY 2011

9.15 am – 10.30 am

GMN61

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
Total Marks	

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

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

INFORMATION FOR CANDIDATES

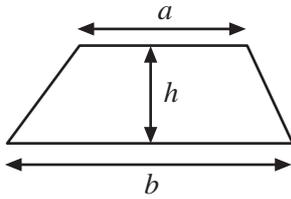The total mark for this paper is 56.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
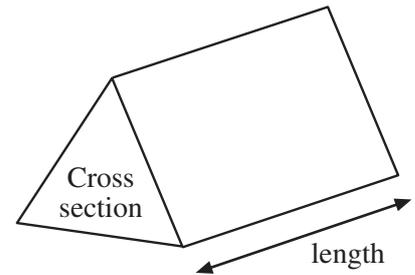You should have a ruler, compasses, set-square and protractor.
The Formula Sheet is on page 2.

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Formula Sheet

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

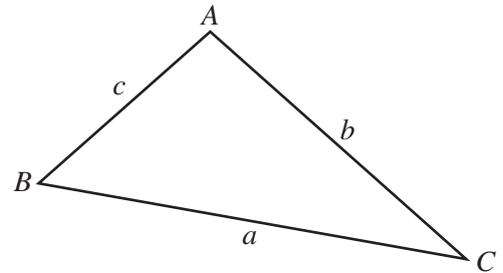**Volume of prism** = area of cross section × length

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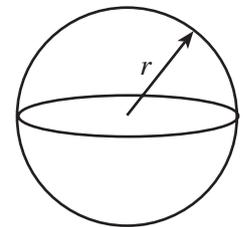
Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
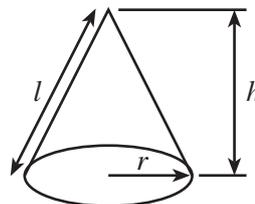
Cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$

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

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

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

Answer $E =$ _____ [3]

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2 **(a)** Three solids are shown below.
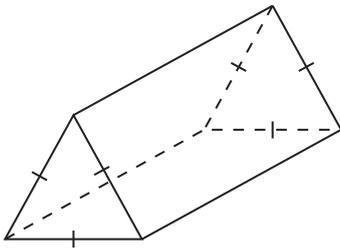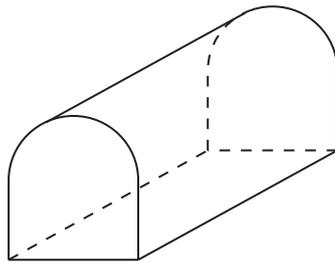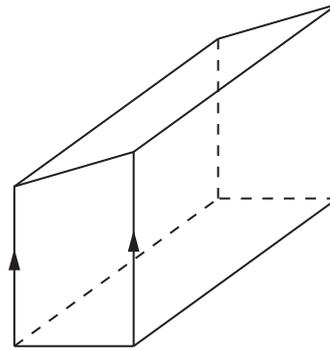
    A   **B**   **C**

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

Answer _____ [1]

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

Answer _____ [1]

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

2.3 cm   2.7 cm

1.5 cm
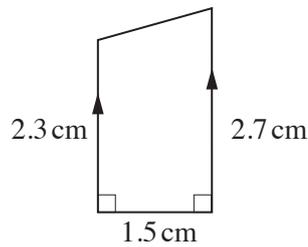
Calculate the area of the cross-section.

Answer _____ cm^2 [2]

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

Each ticket costs 5p.

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

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

Answer _____ [4]

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

Answer $x =$ _____ [2]

Examiner Only	
Marks	Remark

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

Answer _____ [2]

(b) Find the reciprocal of 2.2

Answer _____ [2]

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

    (i) 46.7×0.634

Answer _____ [1]

    (ii) $296.078 \div 6340$

Answer _____ [1]

Examiner Only	
Marks	Remark

6 (a)

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

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

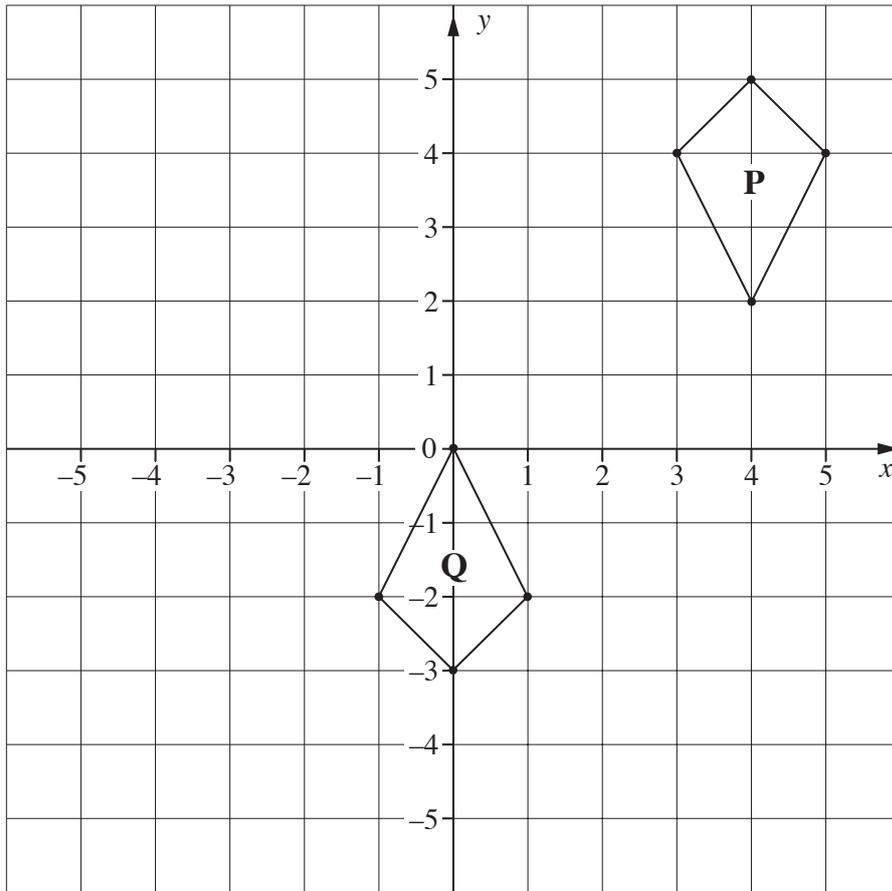**6**

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

Answer _____

_____ [3]

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7

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

<div style="text-align:right">Answer _____ [3]</div>

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8 **(a)** Simplify

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

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

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

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

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

Answer _____ [2]

(c) Complete the identity

$(x + 3)^2 \equiv x^2 + \underline{\quad\quad} + 9$

<div style="text-align:right">[1]</div>

9

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

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

Which formula is correct? Explain your answer.

Formula $V =$ _____ because _____

_____ [2]

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

Answer _____ [2]

9

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

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

[1]
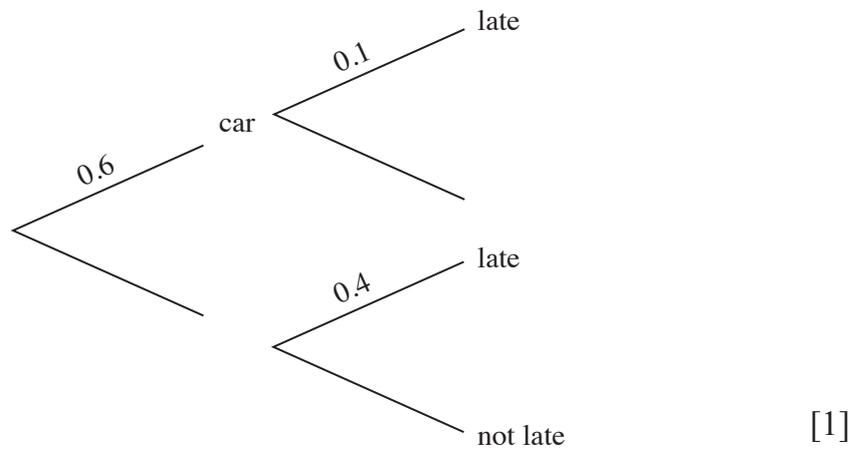
(b) Calculate the probability that on any school day Peter will be late for school.

Answer _____ [2]

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

Answer _____ [1]

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

    (i) find the value of p^2,

Answer _____ [1]

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

[2]

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

Answer $x =$ _____ [3]

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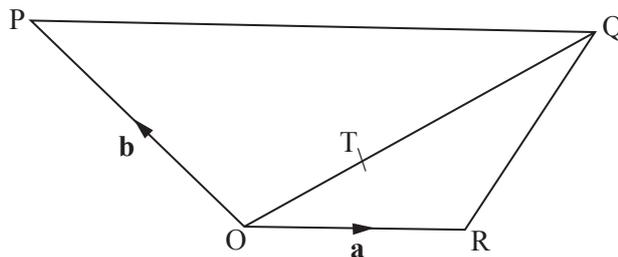
Answer _____ [3]

15 The diagram shows a quadrilateral OPQR.

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

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

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

What is the ratio PT : TR?
Show all your working.

Answer PT : TR = _____ [4]

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