Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Module N6 Paper 1
(Non-calculator)
Higher Tier

GMN61

[GMN61]

MONDAY 6 JUNE

1.30 pm – 2.45 pm

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
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11	
12	
13	
14	
15	
16	
17	
18	
Total Marks	

Examiner Number

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 eighteen** 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.

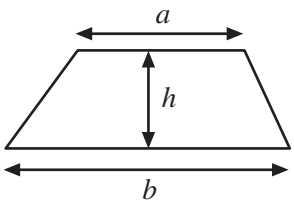
INFORMATION FOR CANDIDATES

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.

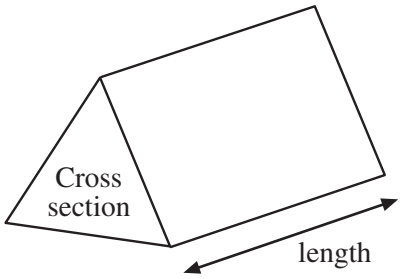
JUNE11GMN61

Formula Sheet

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



Volume of prism = area of cross section × length

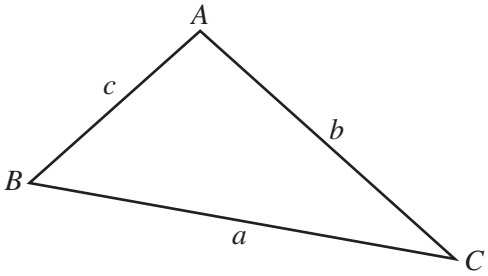


In any triangle *ABC*

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

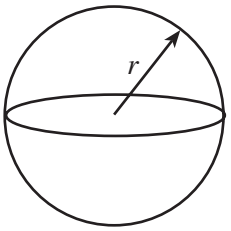
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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



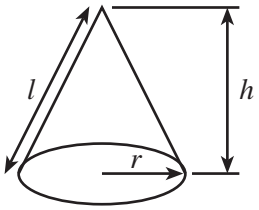
Volume of sphere = $\frac{4}{3}\pi r^3$

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 Rewrite $c - 2 = 10 - b$ to make b the subject.

Write your answer in its simplest form.

Answer $b =$ _____ [2]

Total Question 1

2 **(a)** Given that $84 \times 356 = 29904$, find

(i) $\dfrac{29904}{8.4}$

Answer _____ [1]

(ii) 0.84×3560

Answer _____ [1]

(b) Write down the two numbers which are the square roots of 144

Answer _____, _____ [1]

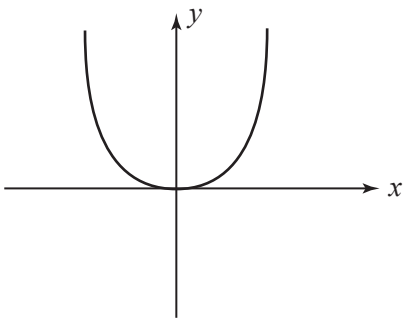
(c) **Estimate** $\dfrac{4.9 \times 30.1}{7.8 - 3.85}$

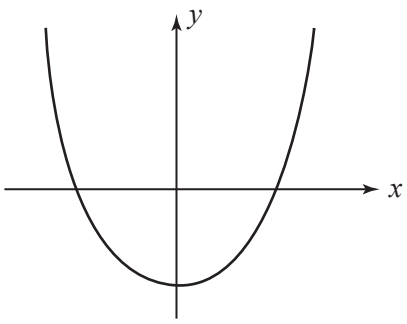
Answer _____ [2]

Total Question 2

3 $y = x^2 + 2$ $y = x^2 - 2$ $y = x^2$

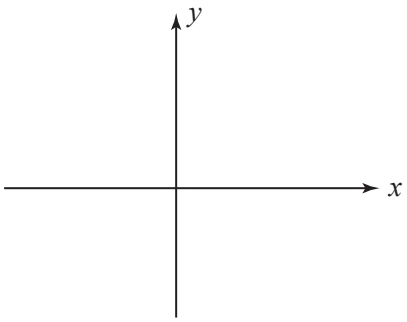
(a) Below are two graphs. Choose the correct equation from the three listed above to match each graph.





Equation: _____ Equation: _____ [2]

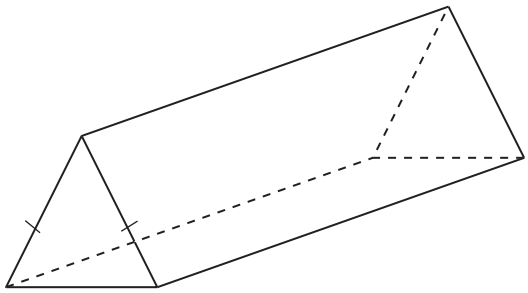
(b) Sketch the graph of the remaining equation.



[1]

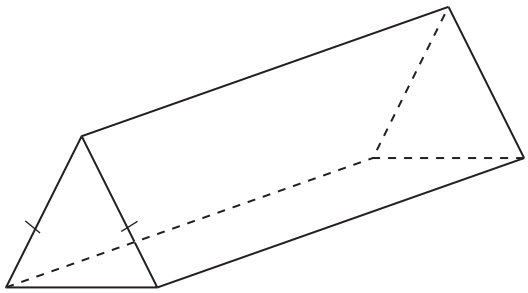
Examiner Only	
Marks	Remark
Total Question 3	

4 **(a)** Draw a plane of symmetry on the prism below.



[1]

(b) Draw a **different** plane of symmetry on the prism below.



[1]

Examiner Only	
Marks	Remark
Total Question 4	

5 **(a)** Use the formula $A = B^2(8 - C)$ to find the value of A when $B = -3$ and $C = 2$.

Answer _____ [2]

(b) n is an integer. From the expressions

$2n$ $\quad n^2 + 1$ $\quad 2n - 1$ $\quad 2n + 2$ $\quad n - 1$ $\quad 2n + 3$

choose

(i) an expression which will always give an even number,

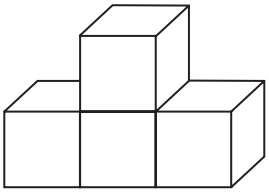
Answer _____ [1]

(ii) an expression which could give an odd or even number.

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 5	

6 Below is a sketch of a 3-D shape.



SIDE

FRONT

Draw **(a)** the plan,

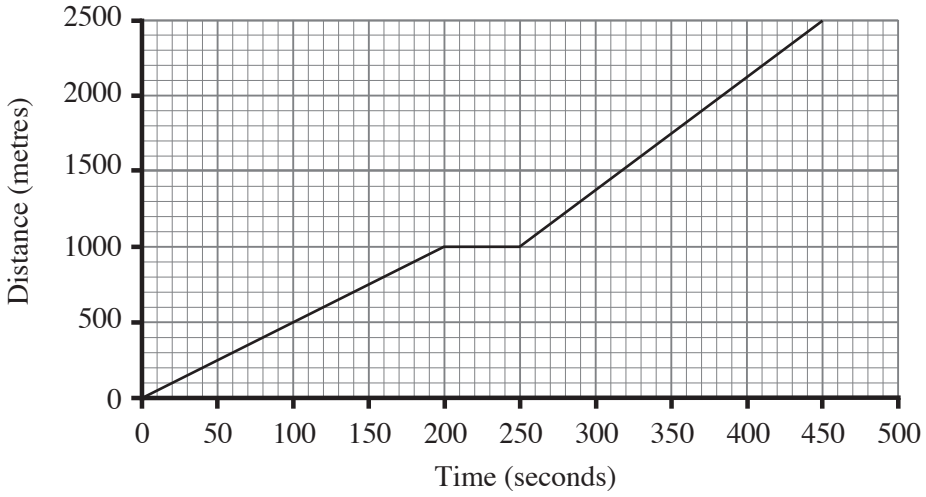
[1]

(b) the side elevation.

[1]

Examiner Only	
Marks	Remark
Total Question 6	

7 The graph illustrates Pete's journey as he cycled from home to school.



(a) Between what times was he cycling at his fastest average speed?

Answer _____ and _____ [1]

(b) He stopped at a shop on the way to school.
Calculate his average speed for the journey **between the shop and the school**.

Answer _____ m/s [2]

(c) Pete's sister Jade, left home **4 minutes** after him, and travelled to the same school by car.
She arrived in school **1 minute** before him.

(i) Show Jade's journey on the graph above. [2]

(ii) How far were they **from the school** when Jade overtook Pete?

Answer _____ m [1]

Examiner Only	
Marks	Remark
Total Question 7	

Examiner Only	
Marks	Remark

8 Jack divided marbles between himself and Jill in the ratio 4 : 3

Jack then had 84 marbles.

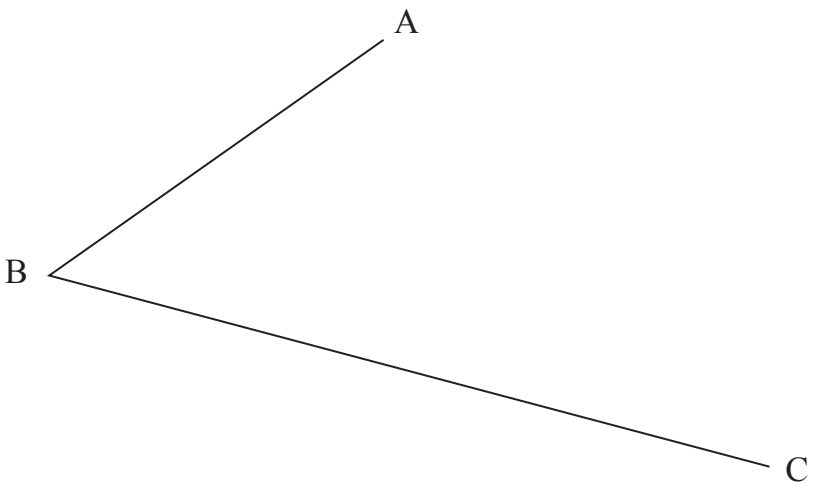
How many marbles were there in total?

Answer _____ [2]

Total Question 8

9 Use ruler and compasses to construct the bisector of the angle ABC.

You must show all construction lines.



[2]

Total Question 9

10 Simplify

(a) $\dfrac{m^7}{m \times m^2}$

Answer _____ [2]

(b) $(p^3)^2$

Answer _____ [1]

Total Question 10

11 Terry and Trev counted how many car number plates contained the letter Z. They recorded their results as shown.

Terry		Trev	
Number of cars	Number with Z	Number of cars	Number with Z
100	80	261	207

Whose results give the best estimate of the probability of a car number plate containing the letter Z?
Give a reason for your answer.

Answer _____ because _____

_____ [2]

Examiner Only	
Marks	Remark
Total Question 11	

12

Examiner Only	
Marks	Remark

P × ×Q

P and Q are two points which are 7 cm apart.

(a) Using ruler and compasses only, draw the locus of points that are the same distance from P as from Q.

Show all construction lines. [2]

(b) Shade the region which contains those points which are both closer to P than to Q, and less than 5 cm from Q. [2]

Total Question 12	

Examiner Only	
Marks	Remark

13 **(a)** k, m and n are all lengths.

Decide whether each of the expressions below represent length, area, volume or none of these.

(i) $\dfrac{\pi k^2}{m-n}$

Answer _____ [1]

(ii) $\frac{1}{2}k\sqrt{m^2 + n^2}$

Answer _____ [1]

(b) Find the value of x if $\dfrac{m^x}{n(n + k)}$ represents a length.

Answer $x =$ _____ [1]

Total Question 13

14 **(a)** Write 0.0000624 in standard form.

Answer _____ [1]

(b) Write down a fraction which is a recurring decimal.

Answer _____ [1]

(c) Rationalise the denominator of $\dfrac{10}{\sqrt{2}}$

Answer _____ [2]

Total Question 14

15 A bag contains 5 red grapes and 7 green grapes.
Florence and Ann each choose a grape at random from this bag.

(a) What is the probability that they choose the same colour?

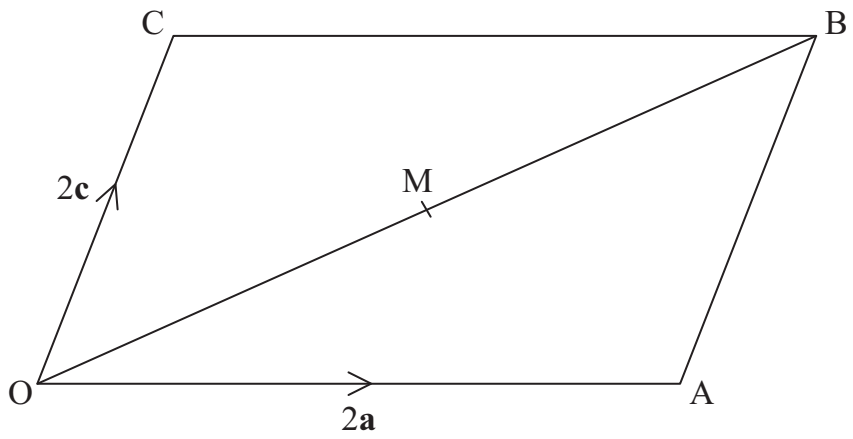
Answer _____ [3]

(b) What is the probability that they choose different colours?

Answer _____ [1]

Examiner Only	
Marks	Remark
Total Question 15	

16



OABC is a parallelogram.

M is the mid-point of the diagonal OB.

$\overrightarrow{OA} = 2\mathbf{a}$ and $\overrightarrow{OC} = 2\mathbf{c}$.

(a) Express $\overrightarrow{OM}$ in terms of **a** and **c**.

Answer $\overrightarrow{OM}$ = _____ [1]

(b) Use vectors to prove that M is also the mid-point of AC.

[3]

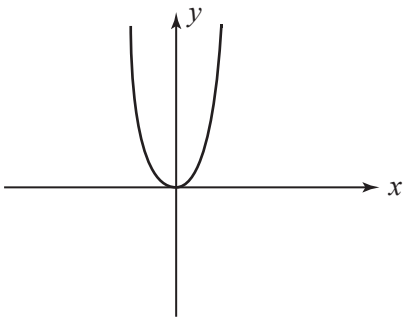
Examiner Only	
Marks	Remark
Total Question 16	

17 Expand $(7 - \sqrt{3})^2$ giving your answer in the form $a + b\sqrt{3}$

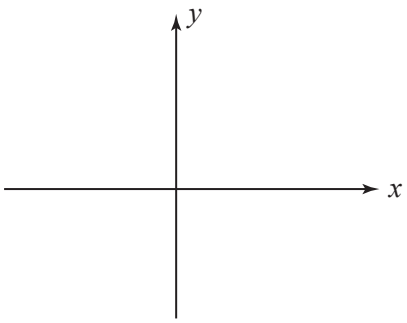
Answer _____ [2]

Examiner Only	
Marks	Remark
Total Question 17	

18 The diagram shows the graph of $y = f(x)$

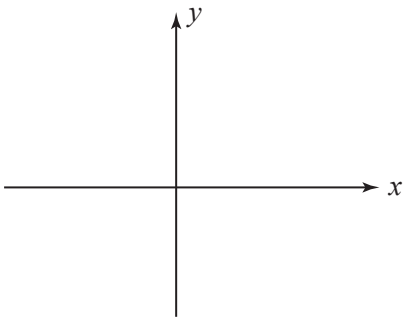


(a) Sketch the graph of $y = f(x) - 1$ on the axes below.



[1]

(b) Sketch the graph of $y = f(x + 1)$ on the axes below.



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Examiner Only	
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Total Question 18	

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