Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2017

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

ML

[GMT62]

WEDNESDAY 11 JANUARY, 10.45am–12 noon

TIME

1 hour 15 minutes, plus your additional time allowance.

INSTRUCTIONS TO CANDIDATES

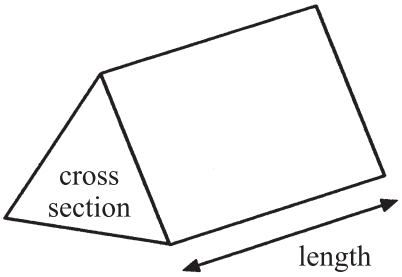
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only.
Answer **all sixteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

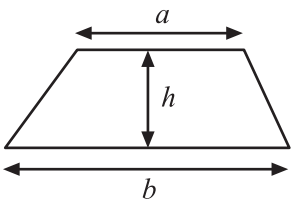
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in Question **6**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on page 2.

Formula Sheet

Volume of prism = area of cross section × length

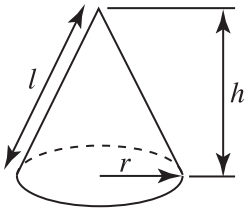


Area of trapezium $= \frac{1}{2}(a+b)h$



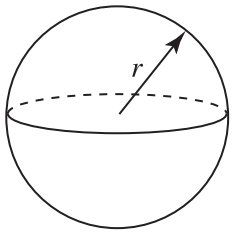
Volume of cone $= \frac{1}{3}\pi r^2 h$

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

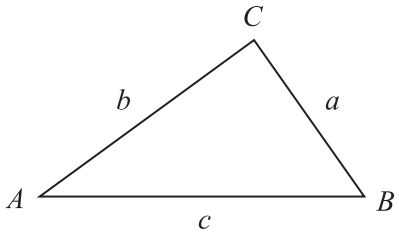


Volume of sphere $= \frac{4}{3}\pi r^3$

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



In any triangle *ABC*



Quadratic Equation

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

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

Sine Rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

1 A train journey from Belfast to Dublin takes 2 hours and 15 minutes.

The distance travelled by the train is 144 kilometres.

Work out the average speed of the train in kilometres per hour.

Answer _____ km/h [2]

[Turn over

2 A bag contains a number of counters.

They are either red, green, black or white.

In the bag the number of black counters is the same as the number of white counters.

The table shows some of the probabilities of taking a counter at random from the bag.

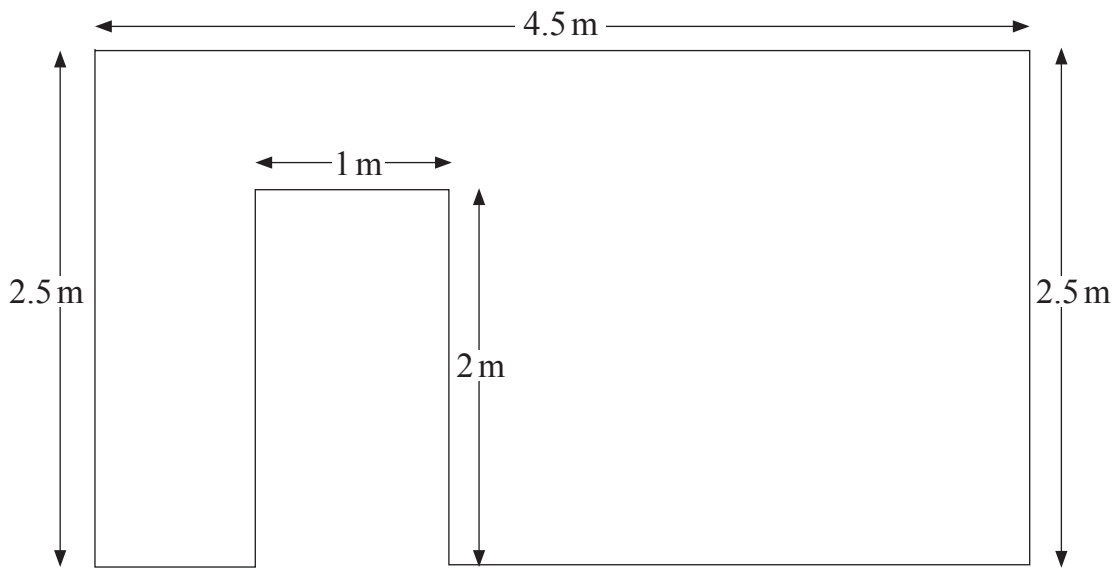
Colour	red	green	black	white
Probability	0.3	0.4		

Jane takes a counter at random from the bag.

What is the probability that Jane takes a white counter?

Answer _____ [2]

3



The diagram above represents a wall with an open entrance.

All the lines are either horizontal or vertical.

(a) Work out the perimeter.

Answer _____ m [1]

(b) Work out the area.

Answer _____ m^2 [2]

[Turn over

4 A woman is paid £32 000 a year for her job.

The first £10 800 of her pay is tax free.

She pays income tax at a rate of 20%.

How much money has she left after paying her tax?

Answer £ _____ [3]

5 The angles in a quadrilateral are 120°, A°, B° and C°.

The angles A, B and C are in ratio 3 : 5 : 4

Calculate the size of the angle B.

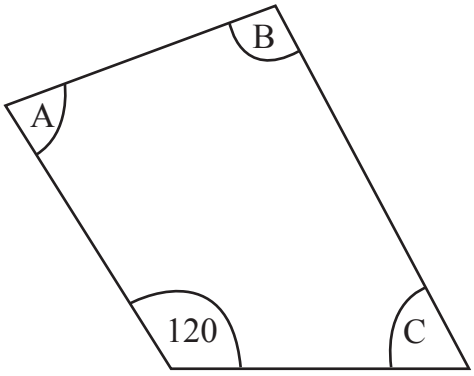


Diagram not drawn to scale

Answer Angle B = _____° [3]

Quality of written communication will be assessed in this question.

6 CHOCOLATE ICE CREAM

250 g Dark Chocolate

100 g Butter

120 g Caster Sugar

150 ml Water

3 Eggs

500 ml Double Cream

This ice cream recipe will serve **4 people**.

(a) How much caster sugar is needed in a recipe for 7 people?

Answer _____ g [2]

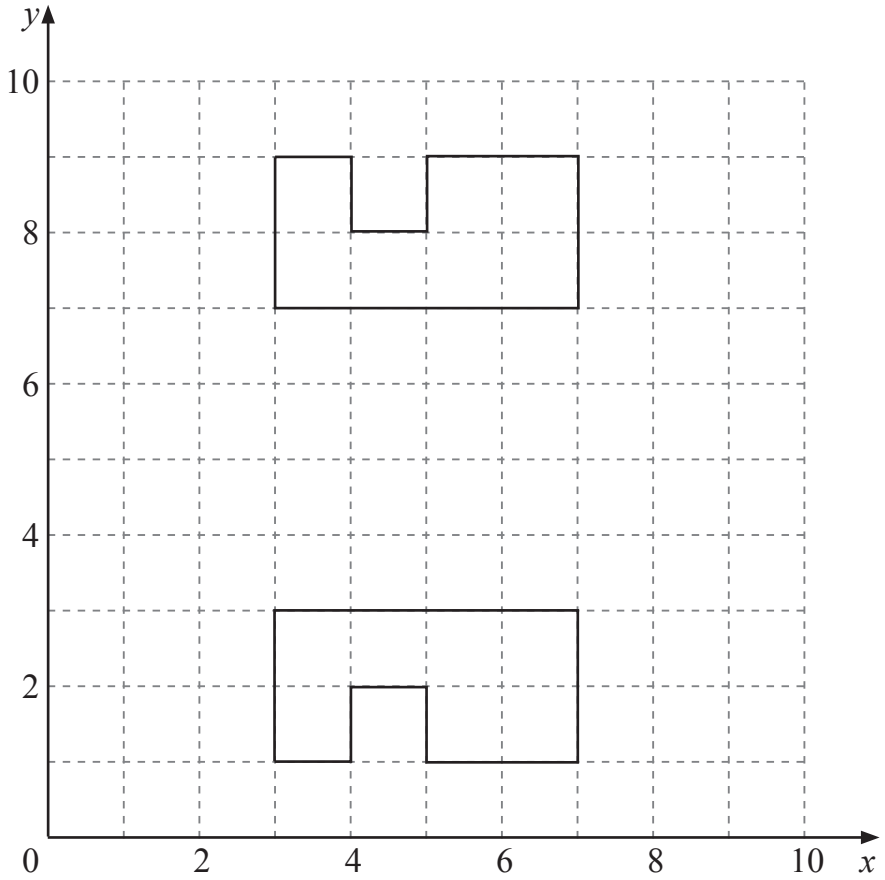
(b) Ann has 13 eggs and needs to make chocolate ice cream for 17 people.

Does she have enough eggs? Explain your answer.

[2]

[Turn over

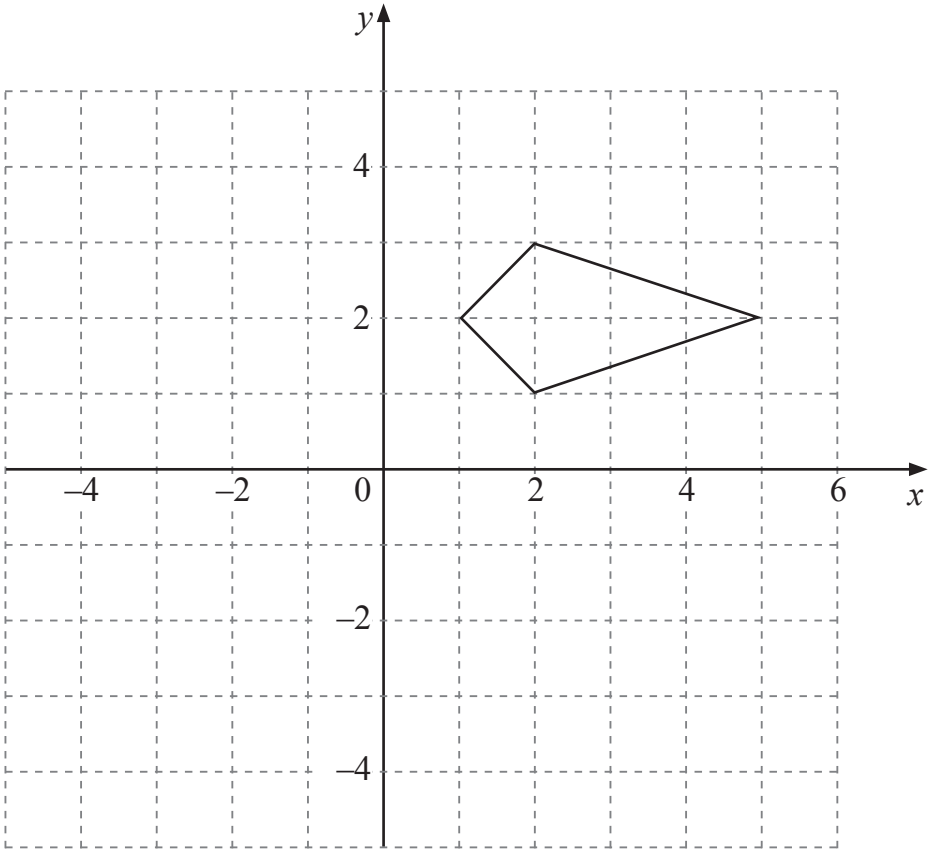
7 **(a)** The diagram shows two identical shapes.



Describe fully the single transformation which maps one shape onto the other.

Answer _____ [2]

(b)



Rotate the shape 90° clockwise about the point (0, 4). [2]

[Turn over

8 Mark has 16 blue and 12 green marbles in a bag.

What is the smallest number of blue and green marbles he must take out of the bag to make the probability of getting a blue marble at random equal to $\frac{3}{5}$?

Answer _____ blue and _____ green [2]

9 Simplify $4x^3y^5 \times 3x^2y$

Answer _____ [2]

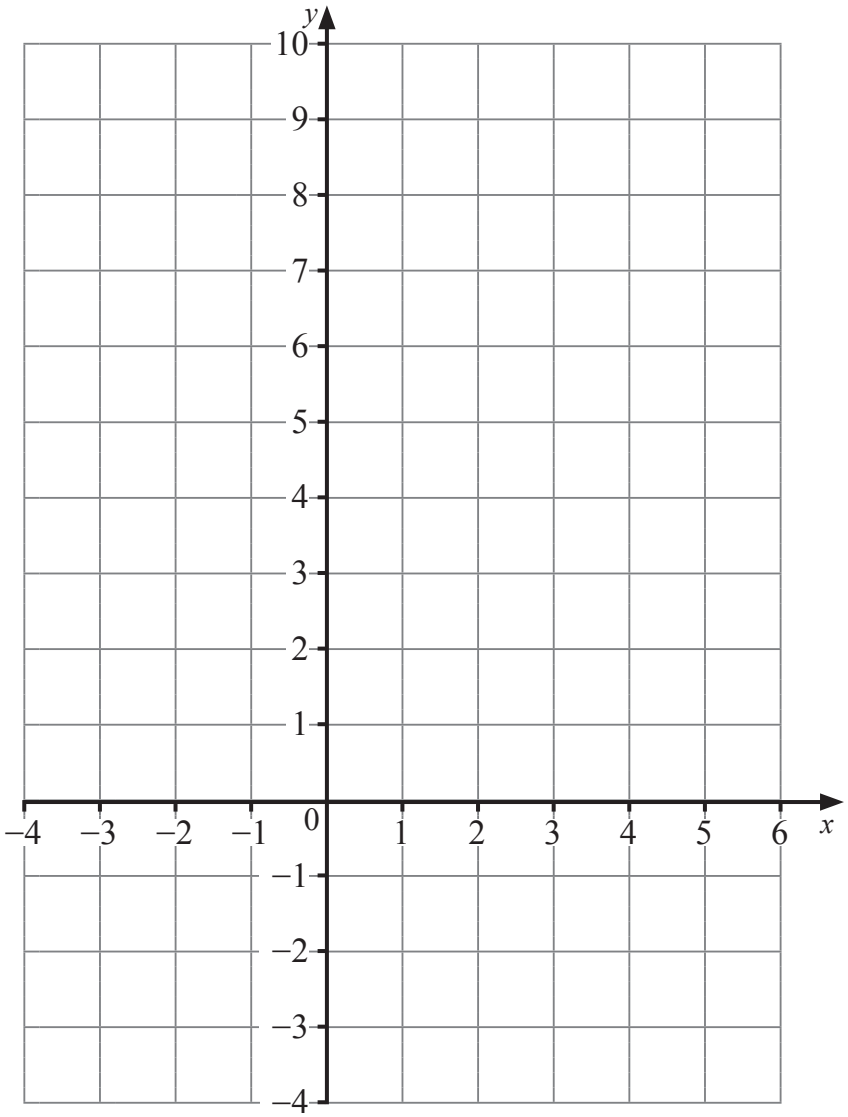
10 Part of the table for the graph of $y = x^2 - 2x - 1$ is shown below.

(a) Fill in the blanks in the table.

x	−2	−1	0	1	2	3	4
y	7			−2		2	7

[2]

(b) Use the values from the table to draw the graph of $y = x^2 - 2x - 1$ for $-2 \leqslant x \leqslant 4$



[2]

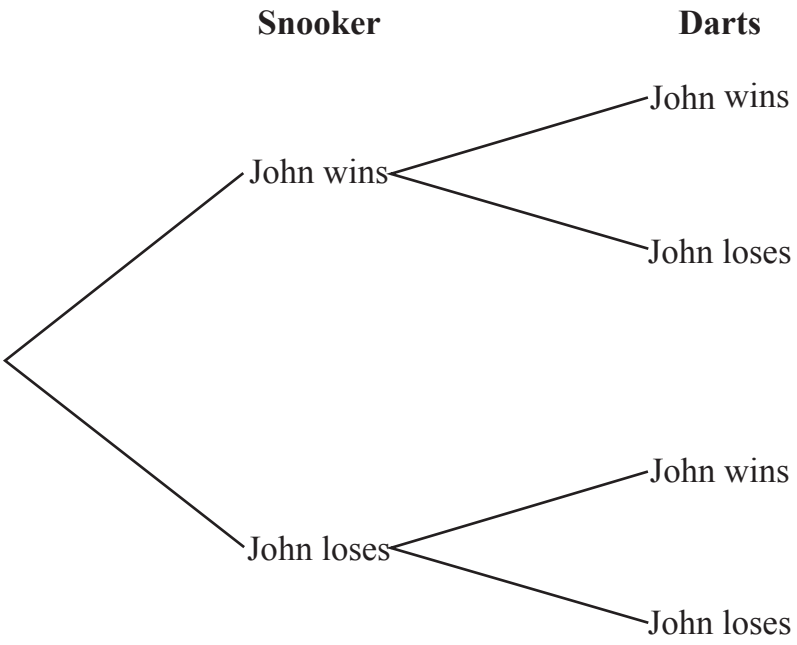
[Turn over

11 John is going to play one game of snooker and one game of darts.

He has a 30% chance of **winning** the game of snooker.

He has a 60% chance of **losing** the game of darts.

(a) Complete the probability tree diagram below.



[3]

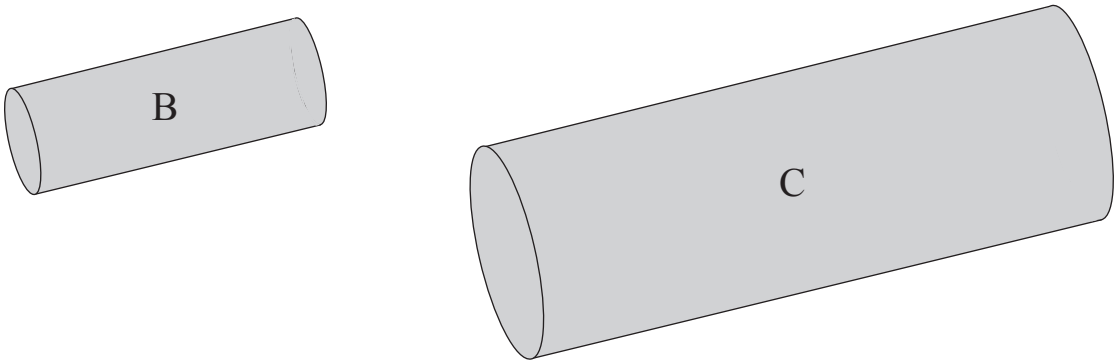
(b) Work out the probability that John wins just one of the games that he plays.

Answer _____ [2]

12 Solve the inequality $5x + 4 \leqslant 7x - 5$

Answer _____ [2]

13



B and C are two mathematically similar cylinders.

The area of the cross section of B is $14\pi\,\text{cm}^2$

The area of the cross section of C is $56\pi\,\text{cm}^2$

B has a volume of $580\,\text{cm}^3$

Work out the volume of C.

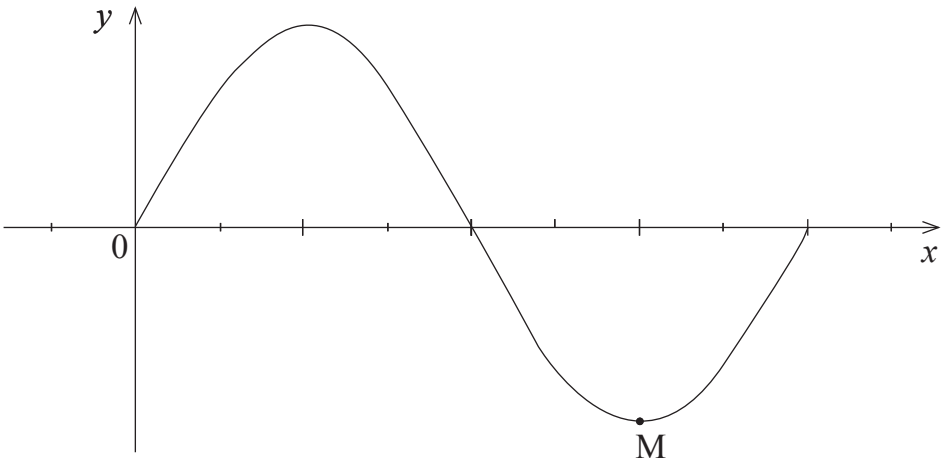
Answer _____ cm^3 [3]

[Turn over

14 Make n the subject of the formula $H = \dfrac{5 - 2n}{6 + n}$

Answer _____ [4]

15 The diagram below shows a sketch of the graph of $y = \sin x$



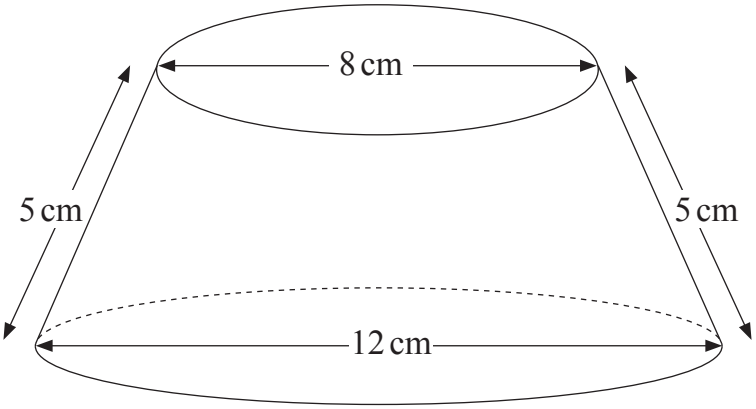
(a) Write down the coordinates of the point M.

Answer _____ [1]

(b) Draw a sketch of the graph of $y = \cos x$. Do this on the diagram above. [1]

16 The frustum of the cone shown below has slant height 5 cm.

The diameter of the base is 12 cm and the diameter of the top is 8 cm.



Work out the volume of the frustum shown.

Answer _____ cm^3 [5]

THIS IS THE END OF THE QUESTION PAPER

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For Examiner's use only	
Question Number	**Marks**
1	
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Examiner Number