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Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2012

# Mathematics

## Unit T6 Paper 2
## (With calculator)
## Higher Tier

**[GMT62]**

*GMT62*

**MONDAY 11 JUNE 3.00 pm–4.15 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 the question paper.
Complete in blue or black ink only. **Do not write in pencil or with a gel pen.**
Answer **all thirteen** questions.
Any working should be clearly shown in the spaces provided since 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 **questions 2 and 5**.
You should have a calculator, ruler, compasses and protractor.
The Formula Sheet is on page 2.

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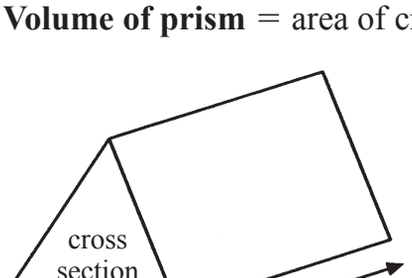
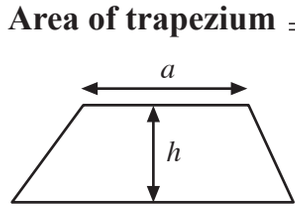
# Formula Sheet

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

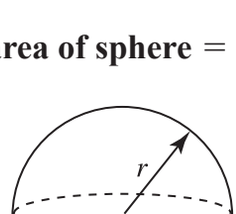



**Area of trapezium** = $\frac{1}{2}(a+b)h$



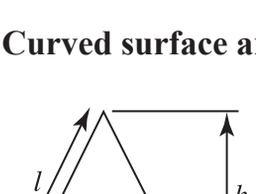

**Volume of sphere** = $\frac{4}{3}\pi r^3$

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




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

**Curved surface area of cone** = $\pi rl$

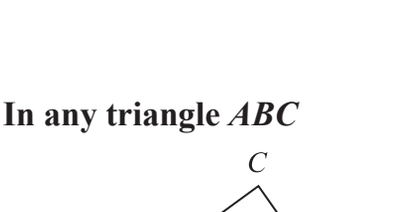



**Quadratic Equation**

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

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

**In any triangle *ABC***




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

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

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



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Answer **all** questions.

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

**1** 75 grams of flour and 135 millilitres of milk are needed to make 12 biscuits.

**(a)** How much flour is needed to make 30 biscuits?

Answer _____ grams [1]

**(b)** How many biscuits can be made with 175 grams of flour, provided there is enough milk?

Answer _____ biscuits [1]

**(c)** A number of biscuits are made using 300 grams of flour.

How much milk is needed?

Answer _____ millilitres [1]

| Total Question 1 | |
|---|---|
| | |



**[Turn over**

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**Quality of written communication will be assessed in this question.**

| Examiner Only | |
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| Marks | Remark |

**2** **(a)** Make $y$ the subject in the following equation and simplify the answer.

$$5x - 7 = 5 - y$$

Answer $y =$ _____ [2]

**(b)** Which of the statements below describes the number $3n + 1$, where $n$ represents any whole number? Explain your answer.

**"always even"** **"always odd"** **"could be even or odd"**

Answer _____

because _____

[2]

Total Question 2



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**3** In a game a square, triangle, hexagon or star will appear on the screen. Some probabilities of the shapes appearing are recorded in the table.

| **Shape** |  |  |  |  |
|---|---|---|---|---|
| **Probability** | 0.14 | 0.32 | | 0.08 |

**(a)** What is the probability of the hexagon appearing?

Answer _____ [2]

**(b)** If I play the game 60 times, how many times should I expect the triangle to appear?

Answer _____ [2]

| Examiner Only | |
|---|---|
| Marks | Remark |
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| Total Question 3 | |
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**[Turn over**

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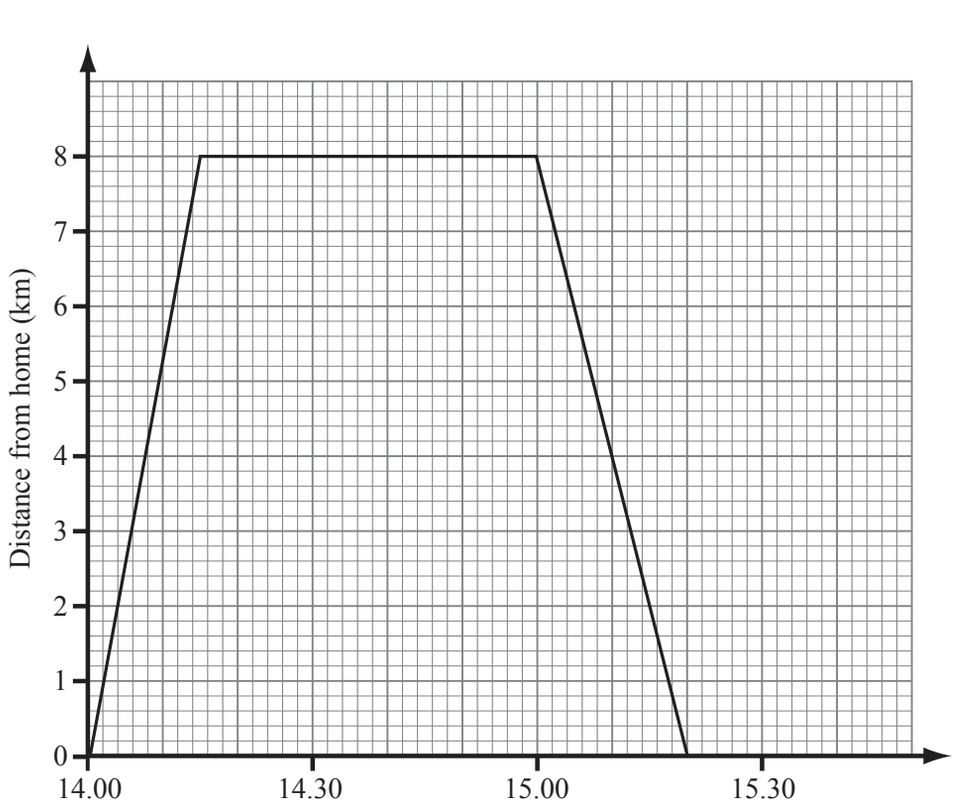
| Marks | Remark |

**4** Bob drove to the DIY store from his home. He bought some decorating materials and then returned home.

The distance–time graph below shows his journey.




**(a)** By looking at the graph, how can you tell that the average speed going to the store was greater than the average speed coming from the store?

Answer _____

_____ [1]

**(b)** Work out Bob's average speed on his journey to the store.

Give your answer in kilometres per hour.

Answer _____ km/h [2]



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**(c)** Bob's wife left home at 14.30 and drove to the same store to meet Bob.

She drove at an average speed of 24 km/h.

Draw a graph of her journey on the distance–time graph opposite. [1]

**(d)** How far from the store was Bob's wife at 14.42?

Answer _____ km [1]

| Examiner Only | |
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| Marks | Remark |
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| Total Question 4 | |
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**[Turn over**

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**Quality of written communication will be assessed in this question.**

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

**5** Jennifer knows the probability of getting a 2 when a fair dice is thrown is $\frac{1}{6}$

She also knows the probability of getting a prime number when a fair dice is thrown is $\frac{1}{2}$

She concludes then, that the probability of getting a 2 or a prime number on one throw of a fair dice is:

$$\frac{1}{6}+\frac{1}{2}=\frac{1}{6}+\frac{3}{6}=\frac{4}{6}=\frac{2}{3}$$

Is Jennifer correct in her conclusion? Explain your answer.

Answer _____ because _____

_____ [2]

| Total Question 5 | |
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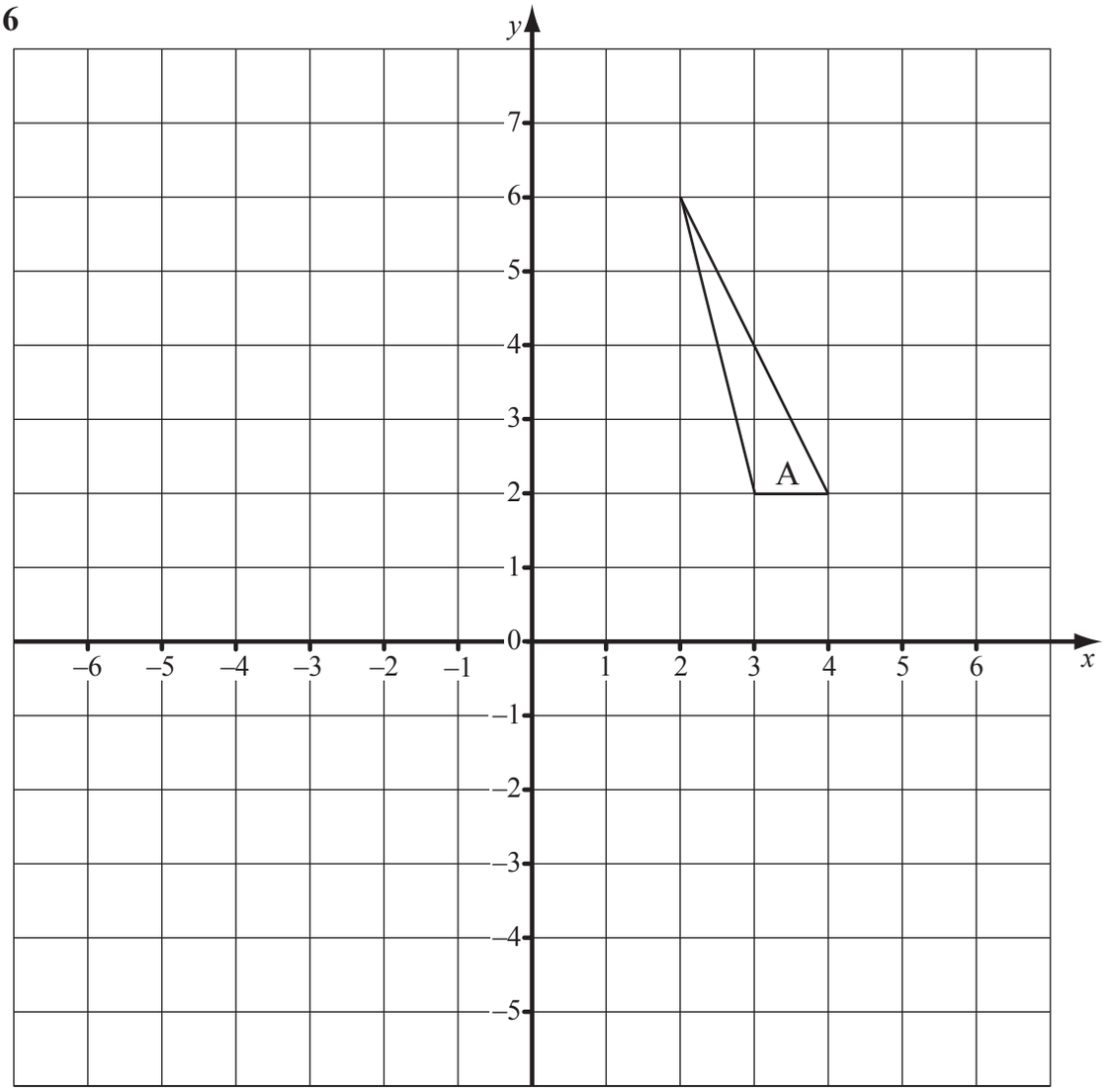
**6**




**(a)** Draw the image of triangle A after a translation $\begin{pmatrix} -6 \\ -2 \end{pmatrix}$. Label it B. [2]

**(b)** Draw the image of triangle A after a rotation of 90° clockwise about the point (−1, 0). Label it C. [2]

| Examiner Only | |
|---|---|
| Marks | Remark |
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| Total Question 6 | |

**[Turn over**



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**7** **(a)** Simplify:

**(i)** $a^4 \times a^4$

Answer _____ [1]

**(ii)** $\dfrac{b \times b^5}{b^2}$

Answer _____ [1]

**(iii)** $12c^5 \div 3c^7$

Answer _____ [1]

**(b)** Solve $8x < 6 + 3x$

Answer _____ [2]

| Examiner Only | |
|---|---|
| Marks | Remark |
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| Total Question 7 | |
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**8** Find the **total** surface area of a solid cylindrical rolling pin with radius 3 cm and length 40 cm.

**Give your answer to an appropriate degree of accuracy.**

Answer _____ $cm^2$ [4]

| Examiner Only | |
|---|---|
| Marks | Remark |
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| Total Question 8 | |

**[Turn over**



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**9** Each letter, $a$, $b$, $c$ and $d$, represents a length.

Complete the table below indicating whether the expressions could represent length, area, volume or none of these.

| $\frac{4a^2}{\sqrt{b^2+c^2}}$ | $\frac{\pi abc}{ab^2}$ | $2\pi b(c+d)$ |
|---|---|---|
| | | |

[3]

| Examiner Only | |
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| Marks | Remark |
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| Total Question 9 | |
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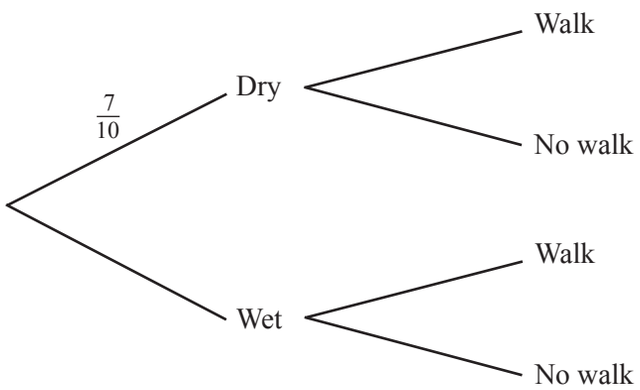
**10** In March the probability of a dry day is $\frac{7}{10}$

If it is dry, the probability that I go for a walk is $\frac{3}{5}$

If it is wet, the probability that I go for a walk is $\frac{1}{5}$

**(a)** Complete the tree diagram to show all the probabilities




[2]

**(b)** Calculate the probability that I go for a walk on a day in March.

Answer _____ [3]

| Examiner Only | |
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| Marks | Remark |
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| Total Question 10 | |

**[Turn over**



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**11** Simplify $\left(\frac{2x^2}{y}\right)^5$

Answer _____ [2]

| Examiner Only | |
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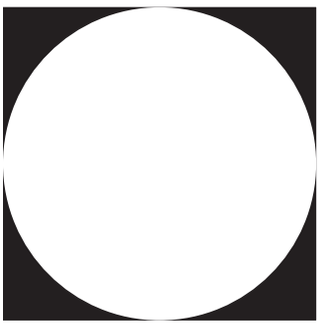
**12** In a game, a dart is dropped at random onto a square board which has a circle inscribed in it as shown.



Find the probability that the dart lands on the shaded area. Leave your answer in terms of $\pi$.

Answer _____ [4]

| Examiner Only | |
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| Marks | Remark |
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| Total Question 12 | |



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**13** The diagram below shows a sector of a circle of radius 10 cm. Part of this sector is shaded leaving unshaded a sector of a circle of radius $x$. The angle A is 80°.

The shaded area BCDE is twice the unshaded area ABE.

Calculate the radius $x$ of the small sector.

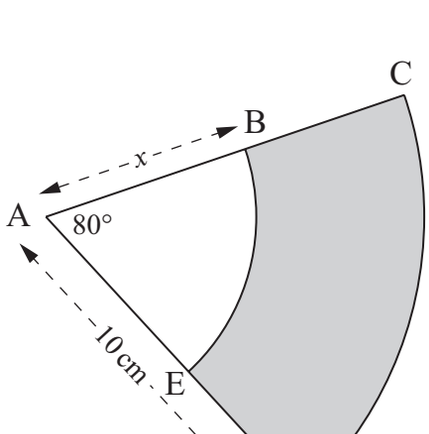


Diagram not drawn accurately

**Show your working.**

Answer $x$ = _____ cm [5]

| Examiner Only | |
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| Marks | Remark |
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| Total Question 13 | |

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| **Question Number** | **Marks** |
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| **Total Marks** | |

**Examiner Number**

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