Rewarding Learning

Centre Number

71

Candidate Number

General Certificate of Secondary Education
January 2014

Mathematics

Unit T6 Paper 1

(Non-calculator)

Higher Tier

[GMT61]

WEDNESDAY 15 JANUARY 9.15am–10.30am

MV18

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.
Complete in blue or black ink only.
Answer **all sixteen** 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 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 14 and 16**.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on pages 4 and 5.

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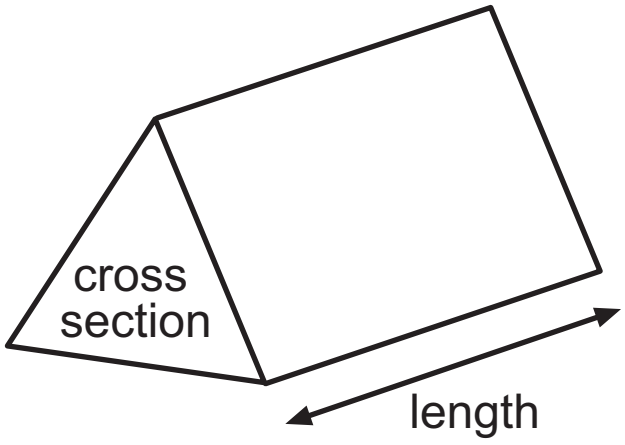
(Questions start on page 6)

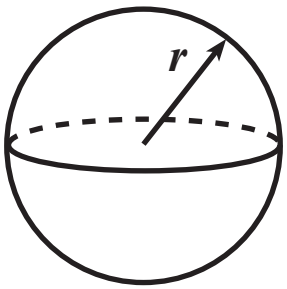
Formula Sheet

Volume of prism = area of cross section × length



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

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



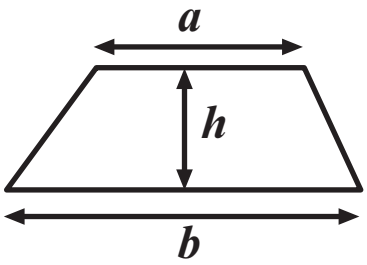
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

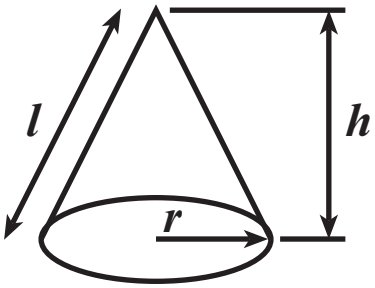
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

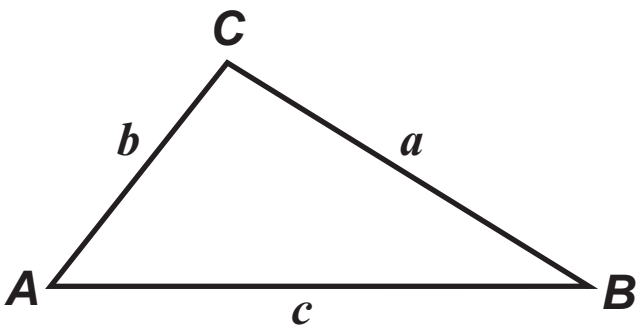


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



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 $= \frac{1}{2}ab \sin C$

1 In planning a school trip Mr Davison uses the following information.

For every 20 pupils you will need

16 bottles of milk
24 rounds of sandwiches
10 bars of chocolate

Complete the following for 50 pupils on a school trip.
[3 marks]

_____ bottles of milk

_____ rounds of sandwiches

_____ bars of chocolate

2 Estimate the value of

$$\frac{28.6 + 302.9}{116.1 - 115.5}$$ [2 marks]

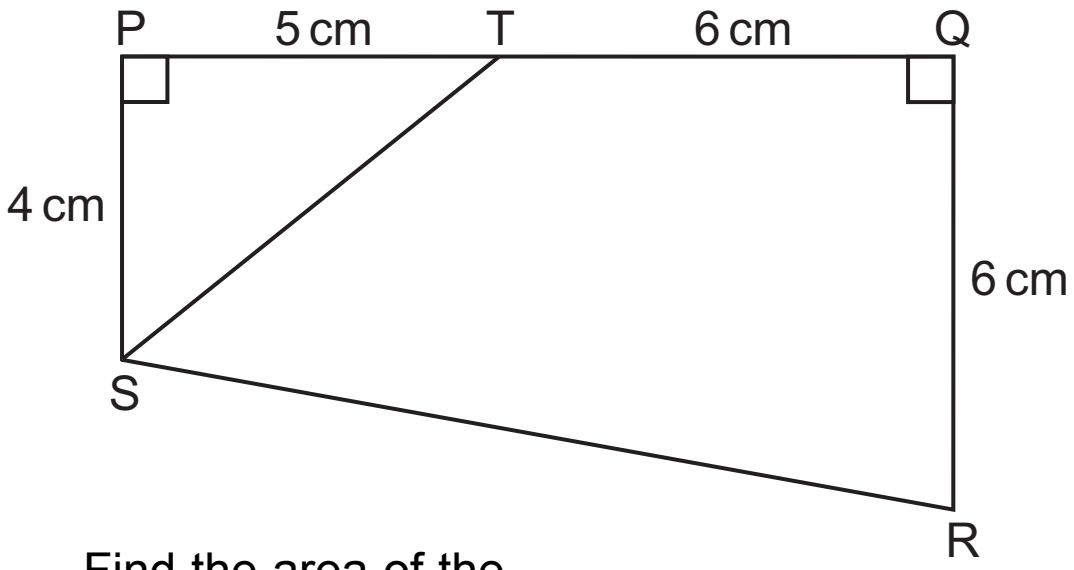
Show all your working.

Answer _____

3 PQRS is a trapezium. PS and QR are perpendicular to the line PQ.

PT = 5 cm, TQ = 6 cm, PS = 4 cm and QR = 6 cm.

Diagram not drawn accurately



Find the area of the

(a) trapezium PQRS, [2]

Answer _____ cm^2

(b) quadrilateral TQRS. [2]

Answer _____ cm^2

4 Work out the value of $\frac{R(3S+T)}{5}$ when

$R = -3$, $S = 4$, $T = -2$ [3 marks]

Answer _____

5 Which of the statements below describes the number $n^2 + 1$, where n represents any whole number? [2 marks]
Explain your answer.

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

Answer _____

because _____

_____

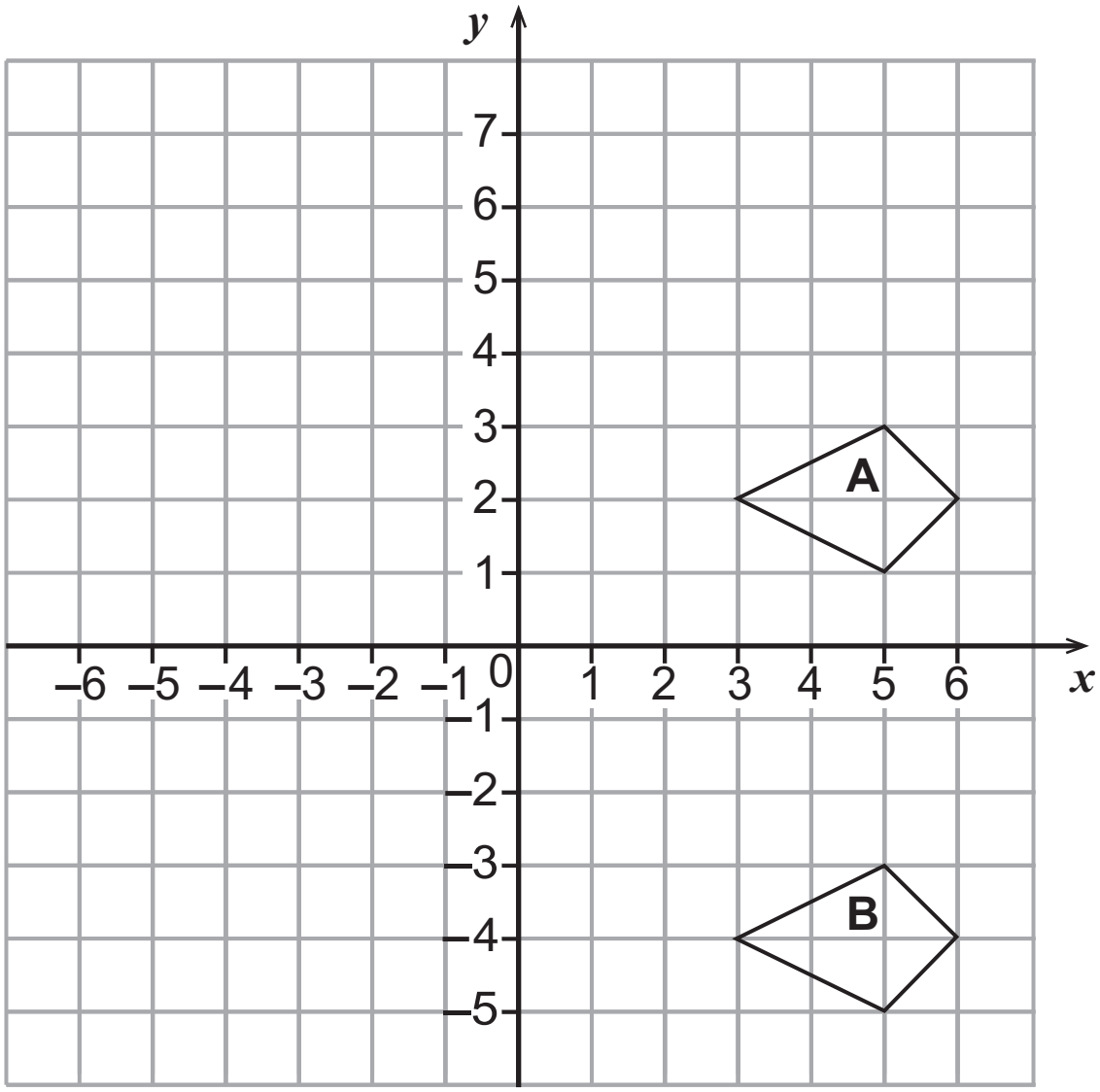
6 A box contains pens.
There are 8 black, 6 blue, 4 green and the rest are red.
The probability of taking a red pen from the box is $\frac{1}{10}$
How many red pens are in the box? [2 marks]

Answer _____

7 Find the reciprocal of 1.2 [2 marks]

Answer _____

8



(a) Describe fully a single transformation which maps shape **A** onto shape **B**. [2 marks]

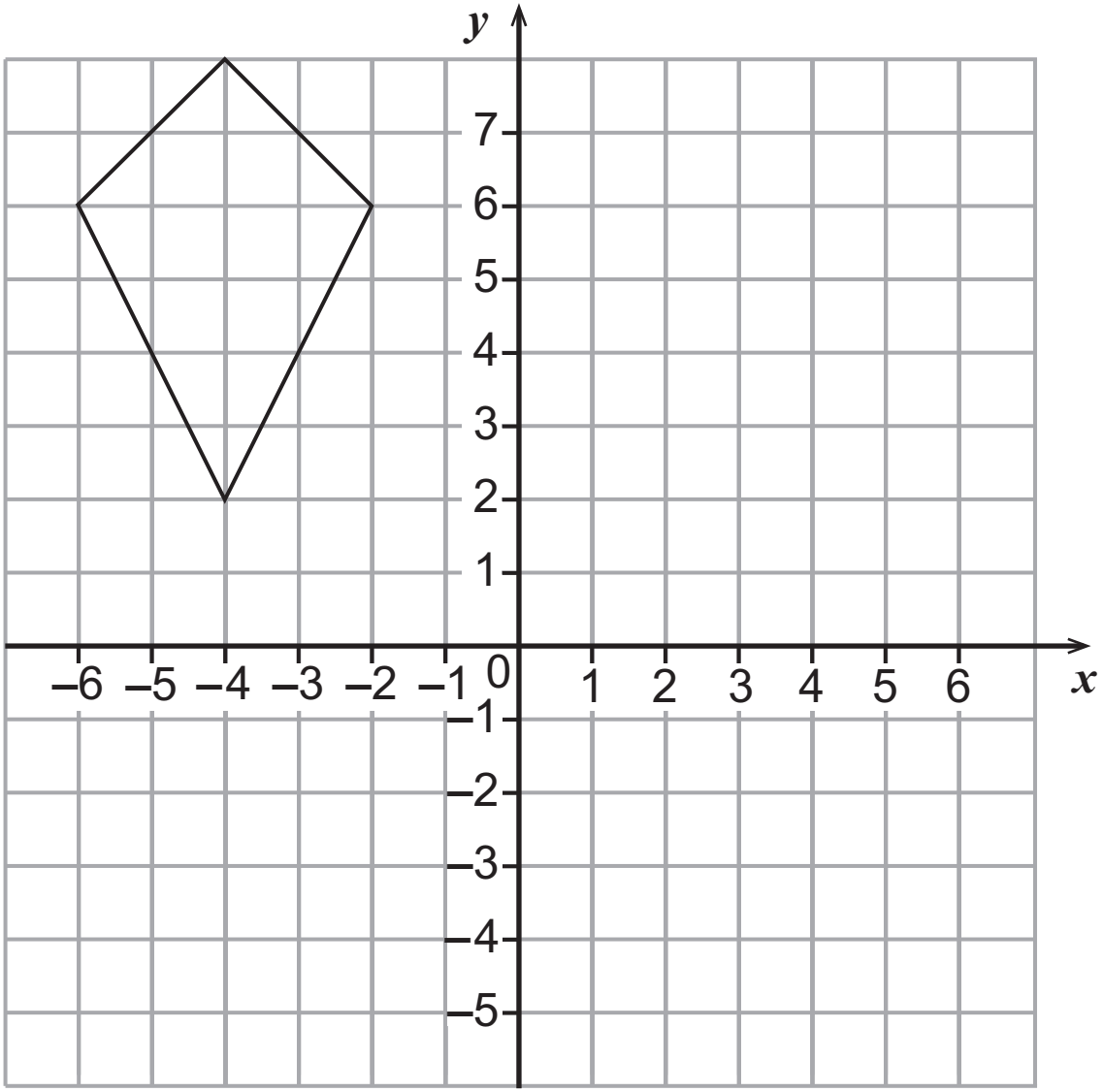
Answer _____

(b) Describe fully a different single transformation which maps shape **A** onto shape **B**. [2 marks]

Answer _____

(c) Draw the image of shape **A** after a rotation of 90° anti-clockwise about the point (**–**1, 0). [2 marks]

9 Enlarge the shape by scale factor $\frac{1}{2}$ using the centre (0, 0).
[2 marks]



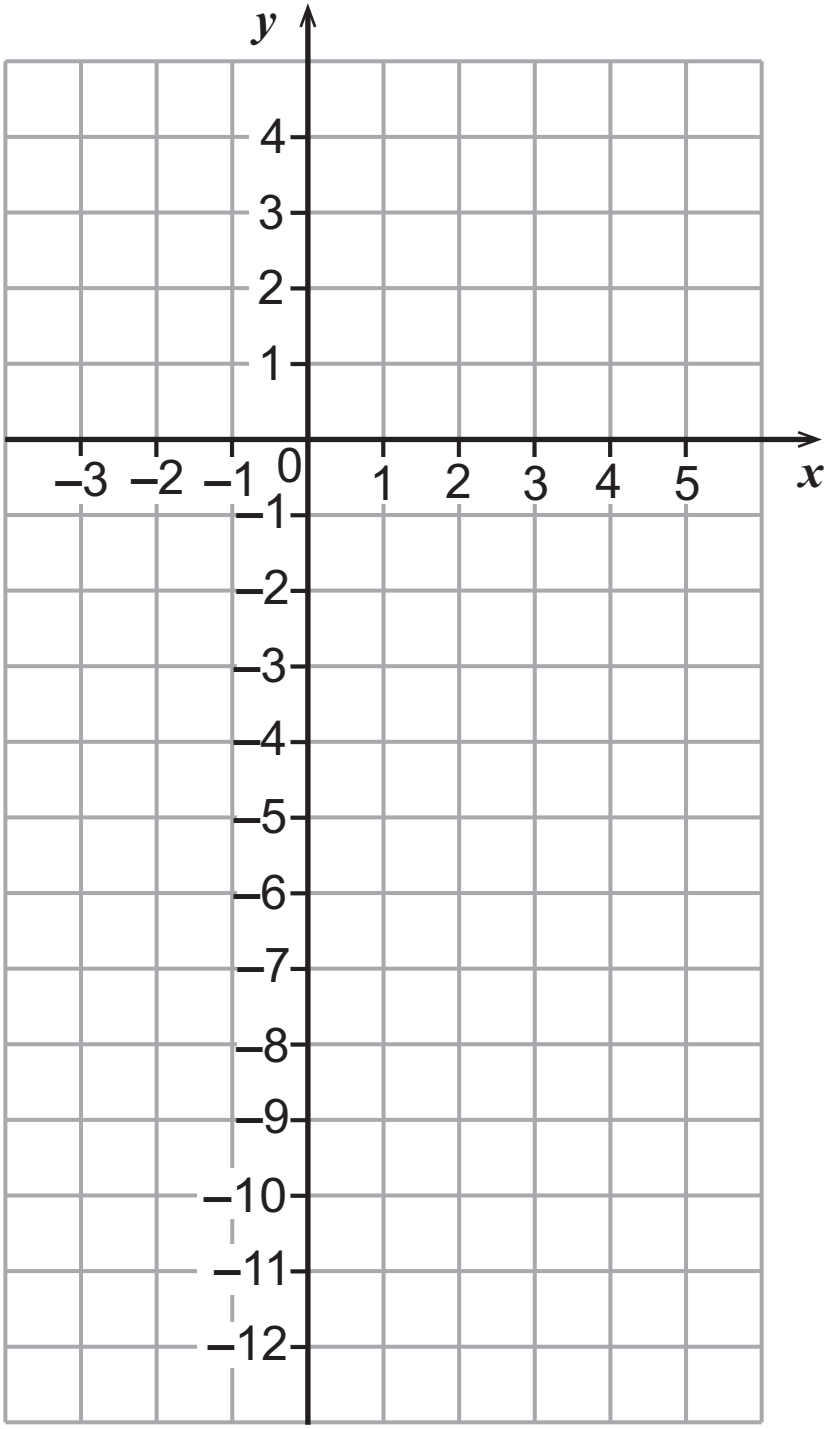
10 Find the value of $(3.46 \times 10^{-3}) \times (2.5 \times 10^{-6})$, giving your answer in standard form. [2 marks]

Answer _____

11 **(a)** Complete the table of values for $y = 3x - x^2 - 1$ [2 marks]

x	–2	–1	0	1	2	3	4
y		–5	–1	1	1		–5

(b) On the grid below, draw the graph of $y = 3x - x^2 - 1$ between $x = -2$ and $x = 4$ [2 marks]



(c) Use your graph to work out the values of x for which $y = -3$ [2 marks]

Answer $x =$ _____

12 Simplify $(5y^3)^2$ [2 marks]

Answer _____

13 A wooden spear of length 130 cm is made from a cylinder and a cone. The cylinder has radius 3 cm and length 120 cm.
Calculate the volume of the spear, giving your answer in terms of π. [5 marks]

Answer _____ cm^3

Quality of written communication will be assessed in this question.

14 Martha has a bag of fruit sweets. There are 5 red, 4 green and 3 yellow sweets.

(a) Martha says, "I hate green sweets. If I take a green sweet, I am going to put it back in the bag and try again."

What is the probability that Martha takes two green sweets in succession? [2 marks]

Answer _____

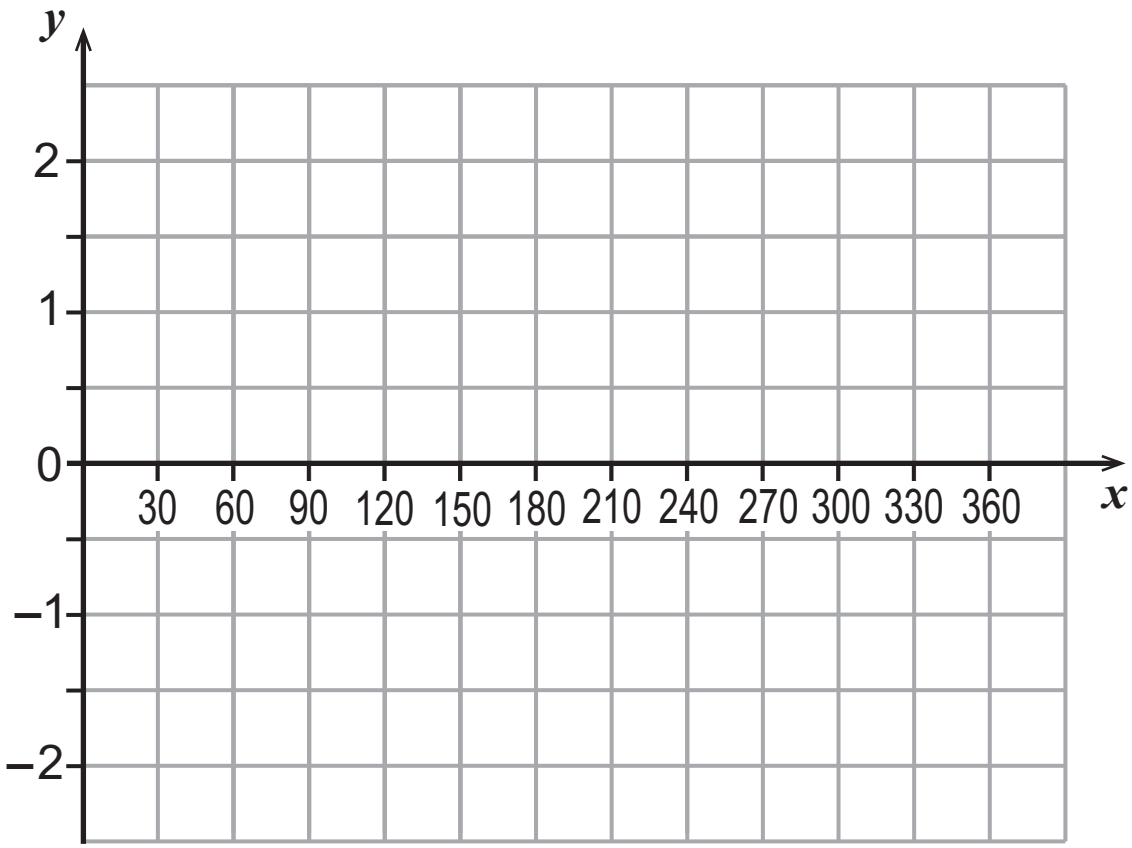
(b) If Martha had said, "I hate green sweets. If I take a green sweet, I am going to throw it out and try again," would the probability of taking two green sweets in succession increase or decrease? [2 marks]
Justify your answer.

Answer _____

because _____

_____

15 (a) Sketch the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$ on the axes below. [1 mark]



(b) Use your graph from part **(a)** to solve the equation $\cos x = -0.75$ [2 marks]

Answer $x =$ _____

Quality of written communication will be assessed in this question.

16 Emer says she has worked out that $3 - \sqrt{5}$ is a square root of $14 - 6\sqrt{5}$

Showing all your work clearly prove that Emer is correct. [2 marks]

THIS IS THE END OF THE QUESTION PAPER

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
Total Marks	

Examiner Number