Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2018

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

MV18

[GMT62]

WEDNESDAY 10 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 on blank pages or tracing paper.
Complete in black ink only.
Answer **all thirteen** 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 at the end of each question 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 **7(c)**.
You should have a calculator, ruler, compasses and a protractor.
The Formula Sheet is on pages 4 and 5.

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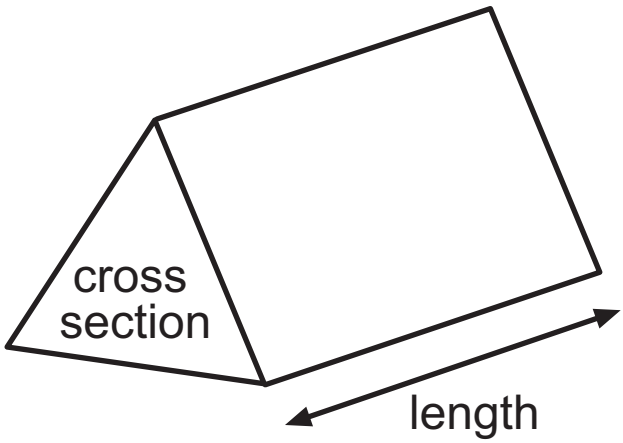
(Questions continue on page 6)

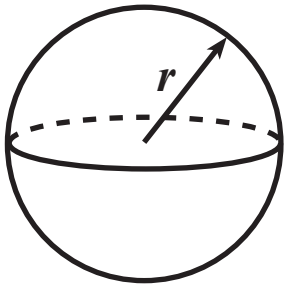
Formula Sheet

Volume of prism = area of cross section × length



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

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



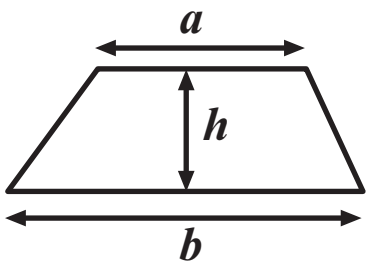
Quadratic Equation

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

where $a \neq 0$, are given by

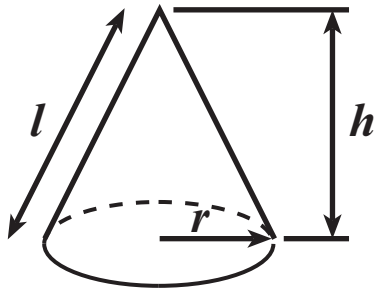
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

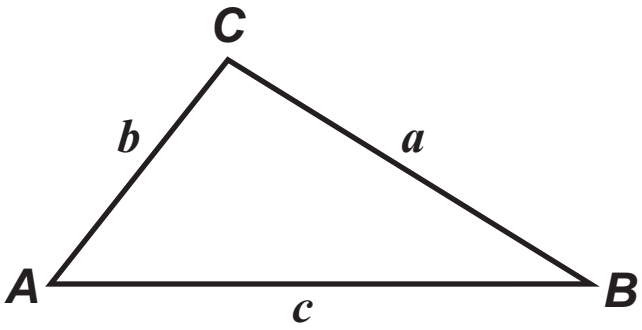


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



In any triangle *ABC*

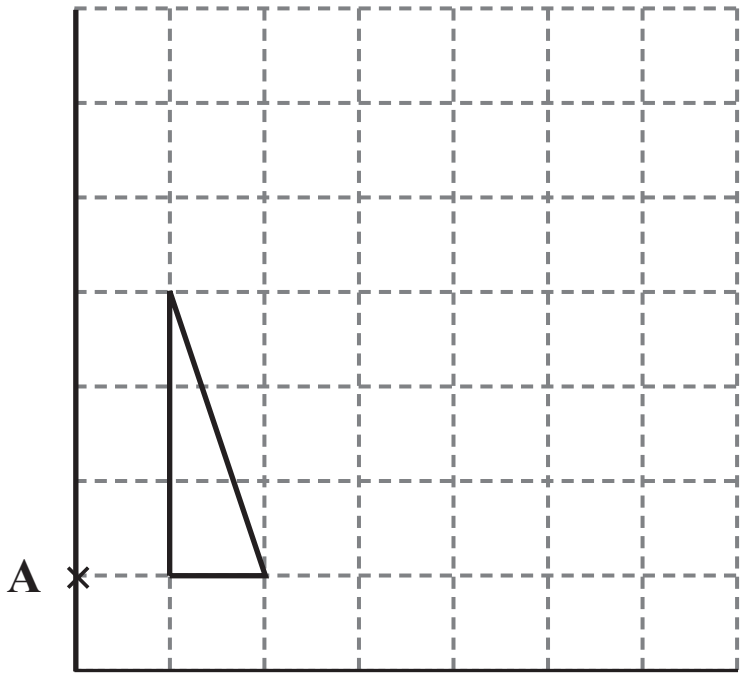


Sine Rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

1



Enlarge the triangle by scale factor 2, centre **A**. [3 marks]

2 Make R the subject of $T + 9 = 3 - R$ [2 marks]

Answer _____

3

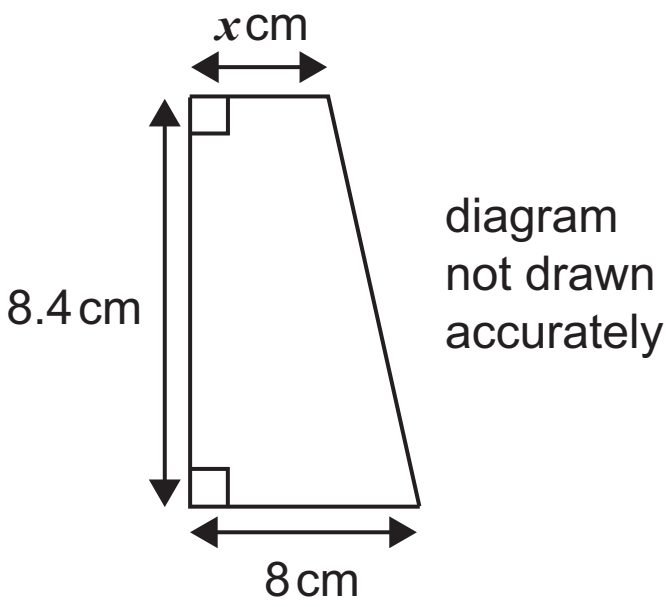


diagram
not drawn
accurately

The area of this trapezium is 50.4 cm^2

What is the value of x? [3 marks]

Answer _____

4 There are 4 colours of balls in a bag, red, green, blue and yellow.

A ball is taken at random from the bag.

Some of the probabilities are given in the table.

Colour	Red	Green	Blue	Yellow
Probability	0.15	0.3		0.2

(a) What is the probability of taking a blue ball? [2 marks]

Answer _____

(b) There are 160 balls in the bag.

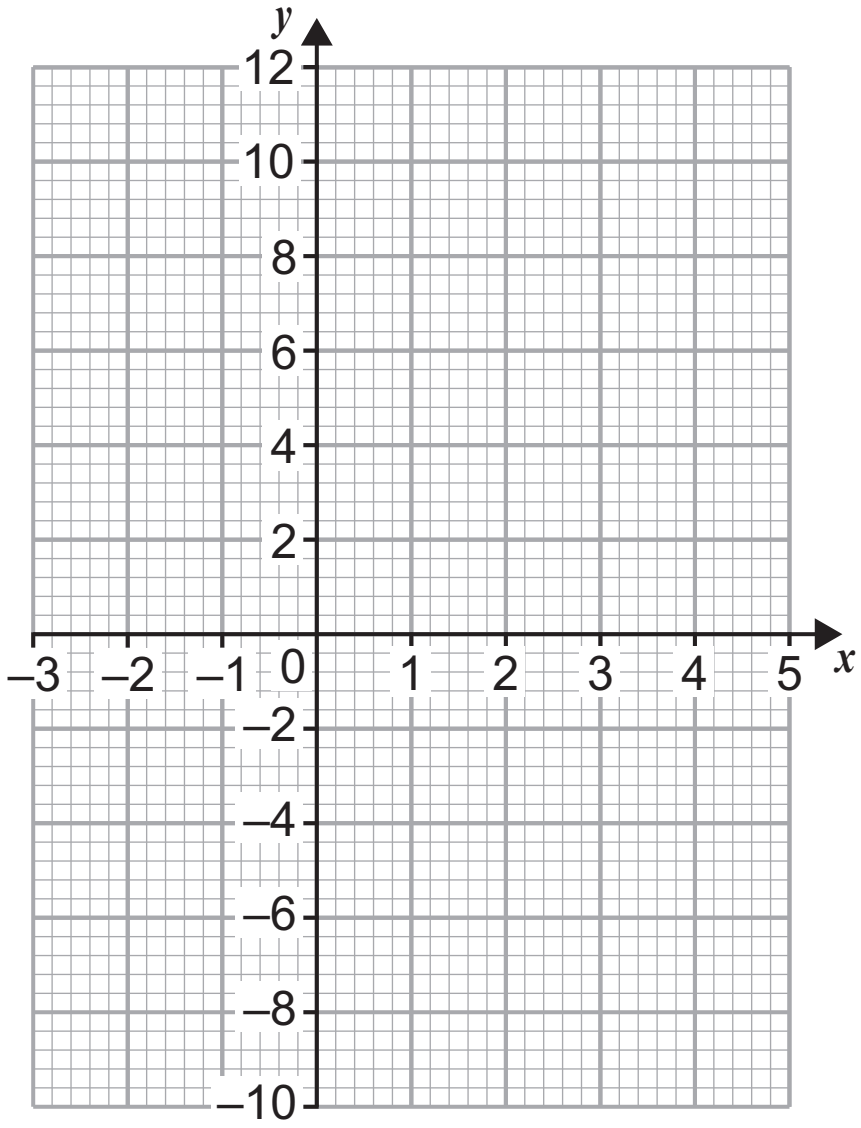
How many green balls are in the bag? [2 marks]

Answer _____

5 **(a)** Complete the table of values for $y = 2x^2 - 4x - 6$ [1 mark]

x	–2	–1	0	1	2	3
y		0	–6	–8	–6	0

(b) Hence draw the graph of $y = 2x^2 - 4x - 6$ on the grid below. [2 marks]



6 The prize money for a race is £255 000

The top 3 finishers in the race share the prize money in the ratio 10 : 5 : 2

How much do they each get? [3 marks]

Answer 1st Prize **£** _____ 2nd Prize **£** _____

3rd Prize **£** _____

7 Shea throws a dice 200 times.

He records the number of times he gets a 5 after 40, 80, 120, 160 and 200 throws.

He then calculates the relative frequency.

Number of throws	40	80	120	160	200
Number of 5s	13	26		40	46
Relative frequency	0.325	0.325	0.3	0.25	

(a) Calculate the missing values in the table. [2 marks]

(b) What is the best estimate of the probability of getting a 5 on this dice? [1 mark]

Answer _____

Quality of written communication will be assessed in this question.

(c) Do you think the dice is biased? Explain your answer clearly. [1 mark]

Answer _____ because _____

_____

8 A bus travels 42 km in 1 hour 25 minutes.

It then travels 180 km in 2 hours 50 minutes.

Find the average speed of the bus for the whole journey.
[4 marks]

Show your working and give your answer to a suitable degree of accuracy.

Answer _____ km/h

9 The height and diameter of a cylinder are equal.

The curved surface area of the cylinder is 254.5 cm^2

Calculate the height of the cylinder, **showing your work**.
[4 marks]

Answer _____

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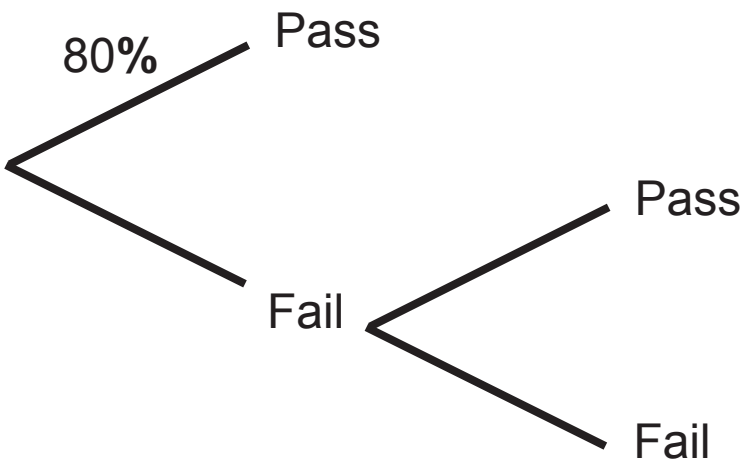
(Questions continue overleaf)

10 The probability of a student passing a piano exam on the first attempt is 80%

The probability of a student passing a piano exam on the second attempt is 90%

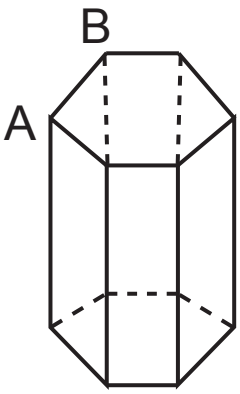
(a) Complete the tree diagram. [2 marks]

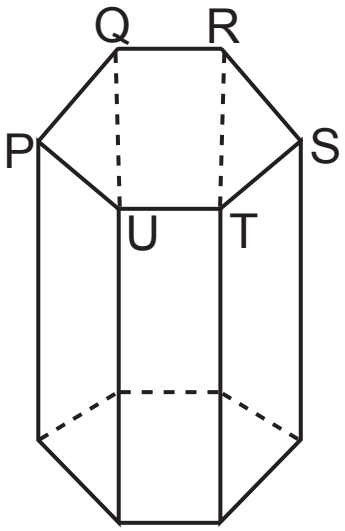


(b) Calculate the probability that a student will take no more than two attempts to pass a piano exam. [3 marks]

Answer _____

11 A child plays with building blocks in the shape of regular hexagonal prisms which are mathematically similar as illustrated below.





The ratio of the lengths of the sides of the two blocks is 4:5

AB = 3 cm.

(a) Calculate the perimeter of PQRSTU. [3 marks]

Answer _____ cm

The volume of the smaller block is 48 cm^3

(b) Calculate the volume of the larger block. [2 marks]

Answer _____ cm^3

12 Make x the subject of $4(x + 5) = x(7 - 3x)$ [4 marks]

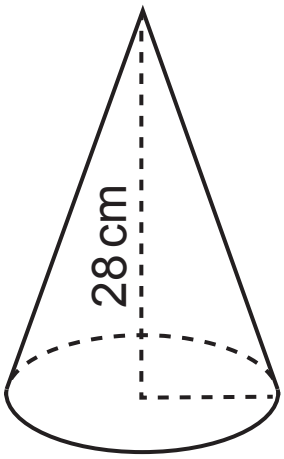
Answer _____

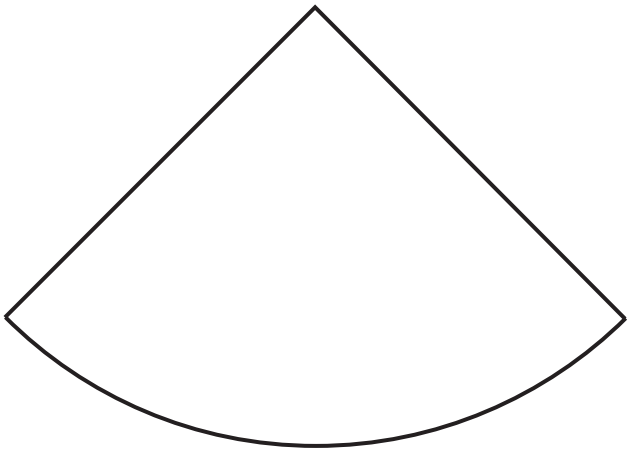
13 A cone with a perpendicular height of 28 cm has a volume of 2400 cm^3

The net of the cone is a sector of a circle.

Calculate the perimeter of the sector of the circle. [6 marks]

You must show all your working.





Answer _____ cm

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
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Total Marks	

Examiner Number