Rewarding Learning

GCSE Mathematics
Specimen Papers and Mark Schemes

For first teaching from September 2010

For first examination in Summer 2011
For first award in Summer 2012

Subject Code: 2210

mathematics

Foreword

The awarding bodies have prepared new specifications to comply with revised GCSE criteria. The specimen examination papers accompanying new specifications are provided to give centres guidance on the structure and character of the planned examinations in advance of the first examination. It is intended that the specimen papers and mark schemes contained in this booklet will help teachers and students to understand, as fully as possible, the markers' expectations of candidates' responses to the types of questions set at GCSE level. These specimen papers and mark schemes should be used in conjunction with CCEA's GCSE Mathematics specification.

GCSE Mathematics
Specimen Papers and Mark Schemes

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Subject Code 2210
QAN 500/7925/6

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Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Unit T1
(With calculator)
Foundation Tier

[CODE]

SPECIMEN EXAMINATION PAPER

TIME

1 hour 30 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 twenty five** 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 100.
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 6** and **23.**
You should have a calculator, ruler, compasses and a protractor.
The formula sheet is overleaf.

For Examiner's use only	
Question Number	**Marks**
1	
2	
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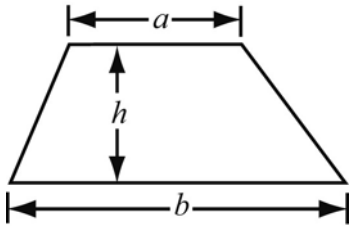
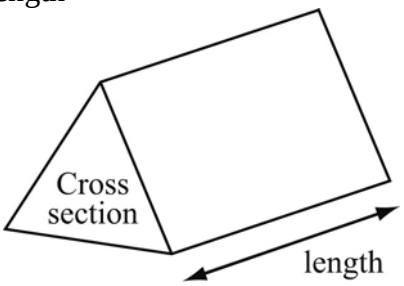
23	
24	
25	
Total Marks	

Foundation Tier Formulae Sheet

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



Volume of prism = area of cross section × length



Answer **all** questions

1 **(a)** Write 80% as a decimal

Answer _____ [1]

(b) Write 0.35 as a percentage

Answer _____ % [1]

(c) Write 48 million in figures

Answer_____ [1]

(d) 5729 people attended a football match.

Write the number 5729 to

(i) the nearest 10

Answer_____ [1]

(ii) the nearest 100

Answer_____ [1]

2 **(a)** Find the next 2 terms in the sequence and explain the rule you used:

6, 11, 16, 21, _____, _____

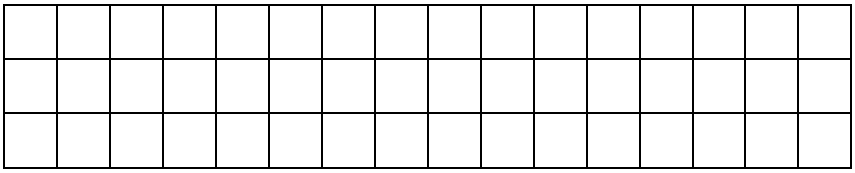
Rule _____ [3]

(b) Find the next term in the sequence

0.2, 0.4, 0.8, 1.6, _____ [1]

3 The diagram shows a tiled patio in the shape of a rectangle 3 by 16, covered with 48 square tiles.

Write down the length and width of 2 other possible rectangles which can be covered with 48 of these square tiles.



Answer_____ by_____ [1]

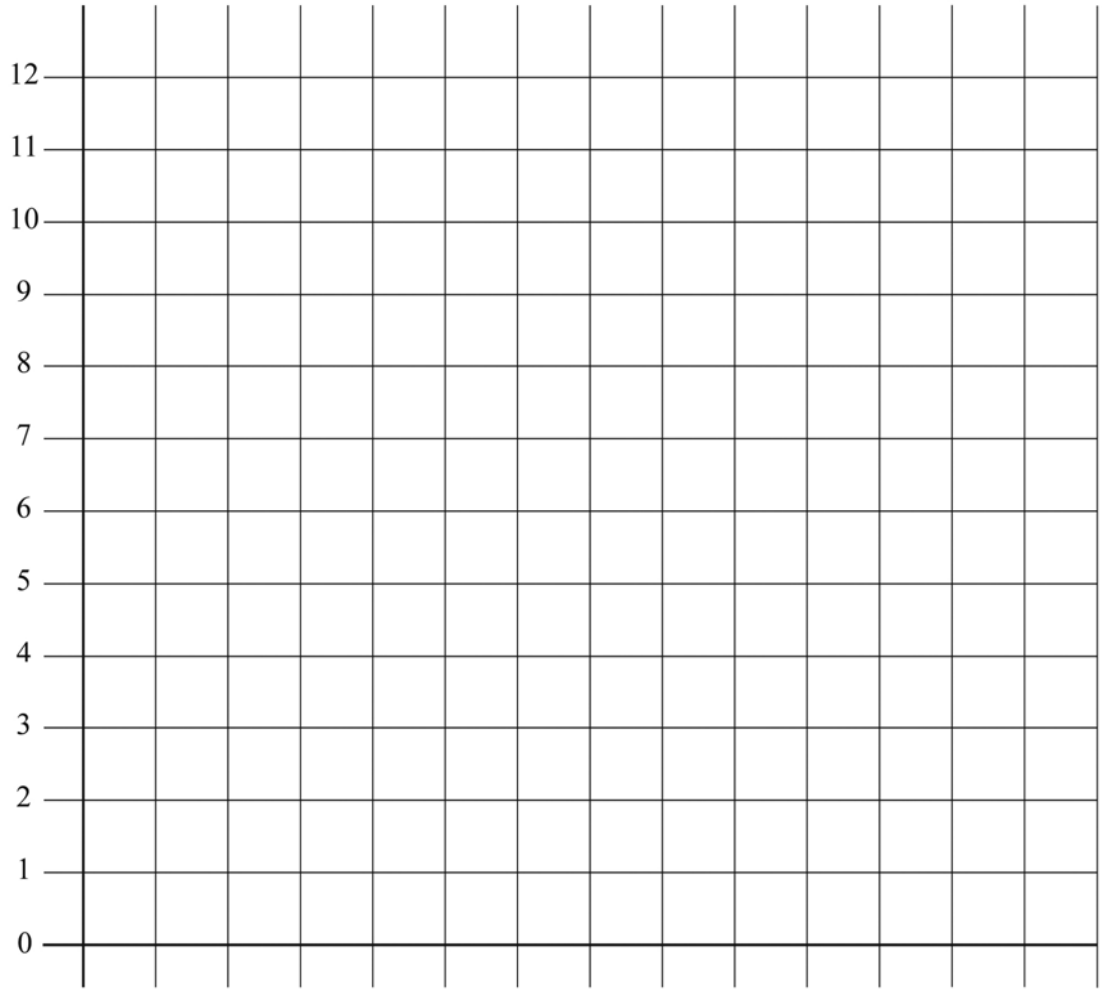
_____ by_____ [1]

4 Michael recorded the colours of cars in the school car park in a tally chart.

Colour	**Tally**	**Frequency**
Red	𝍸	4
Blue	||	2
Yellow	|||	
Black	𝍸 ||	
White	𝍸 𝍸	
Silver	𝍸	
Green	𝍸	

(a) Complete the frequency column. [1]

(b) On the grid opposite, draw a frequency diagram to show this information. [3]



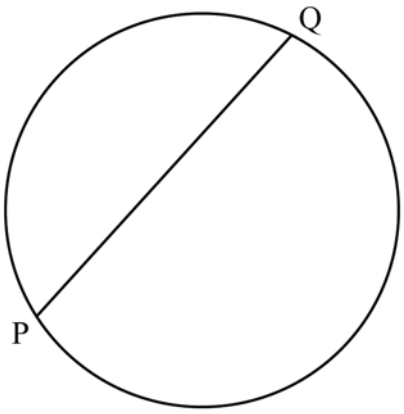
(c) What is the most popular colour of car in the car park?

Answer_____ [1]

(d) Using the frequency table, write down the fraction of the total cars which are yellow.

Answer_____ [1]

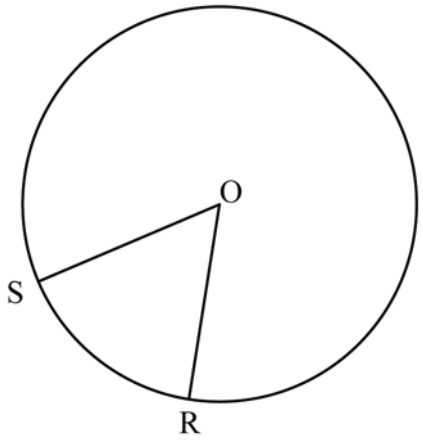
5 **(a)** **(i)** Shade the major segment in the circle below



[1]

(ii) PQ is called a _____ of the circle. [1]

(b) **(i)** Shade the minor sector in the circle below.



[1]

(ii) OS is called a _____ of the circle. [1]

6 The table below shows the percentage of pupils at a High School who obtained a grade C or better in GCSE Mathematics during the past five years.

Year	2004	2005	2006	2007	2008
% of pupils	75	78	82	84	90

(a) Which year showed the smallest improvement?

Answer_____ [1]

(b) **Your quality of written communication will be assessed in this question**

The school wants to show this information using a statistical diagram.
Which type of diagram would you use?

Answer_____ [1]

Give a reason for your answer.

_____

_____ [2]

7 Here is a list of numbers

25 27 32 35 8 21 9

(a) From the list write down those numbers which are

(i) multiples of 5

Answer_____ [1]

(ii) factors of 54

Answer_____ [1]

(b) From the list of numbers

(i) calculate the mean

Answer_____ [2]

(ii) find the median

Answer_____ [2]

8 In a mid season sale a clothing shop has 20% off all its items.

Clare bought a dress which originally cost £50 and a hat which originally cost £25

(a) How much did she save in the sale?

Answer £_____ [2]

(b) What was her total bill?

Answer £_____ [1]

9 Simplify

$5p - 2r - 3p + 5r$

Answer_____ [2]

10 **(a)** Jo bought 6 roses at 67p each. What change did she get from a £5 note?

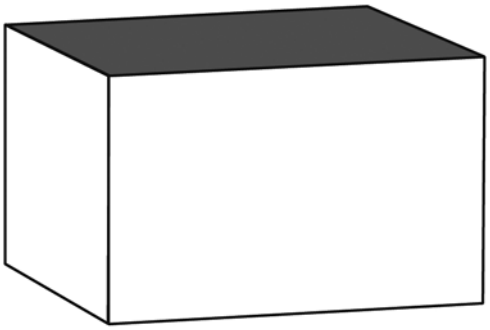
Answer £_____ [2]

(b) Five kilograms of potatoes and two kilograms of onions cost £4.10 in total.
The potatoes cost 62p per kilogram.
How much would it cost in total to buy one kilogram of potatoes and one kilogram of onions?

Answer £_____ [4]

11 The brick shown below is in the form of a cuboid, measuring 6.4 metres by 3.2 metres by 2.6 metres.

Calculate the volume of the brick.



Answer_____ [3]

12 Calculate

(a) the square root of 1.44

Answer_____ [1]

(b) the cube of 2.8

Answer_____ [1]

(c) $2.3^2 + \sqrt{1.69}$

Answer_____ [1]

(d) $\frac{3}{5}$ of 125

Answer_____ [2]

(e) $5.6^2 - 3.4$

Answer_____ [2]

13 The table below gives the maximum and minimum temperatures of six different cities in Europe in March.

City	**Minimum**	**Maximum**
Belfast	2° C	10° C
Dublin	–1° C	9° C
London	4° C	16° C
Edinburgh	0° C	11° C
Barcelona	10° C	19° C
Paris	8° C	20° C

(a) Which **minimum** temperature was the lowest?

Answer_____° C [1]

(b) In two of these cities the temperatures had increased from minimum to maximum by 12° C. Write down the names of these two cities.

Answer_____ and _____ [2]

(c) What is the difference in **minimum** temperature between Dublin and Paris?

Answer_____° C [1]

14 Results of a Year 12 Physics test

9	**2**	**5** **7**
8	**0**	**1** **6** **7** **8**
7	**2**	**5** **8** **9** **9** **9**
6	**7**	**8** **9**
5	**4**	**6**
4	**6**	

Key 5 ▌ 4 means 54%

(a) How many pupils sat the Physics test?

Answer_____ [1]

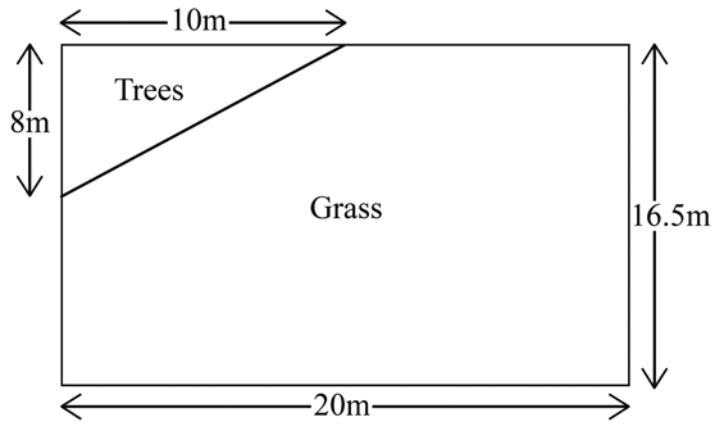
(b) What is the modal percentage mark?

Answer_____ % [1]

(c) What is the range of percentage marks?

Answer_____ % [1]

15



The diagram shows the plan for a rectangular garden.

Calculate

(a) the area of the garden

Answer_____m^2 [2]

(b) the area of the plot for the trees

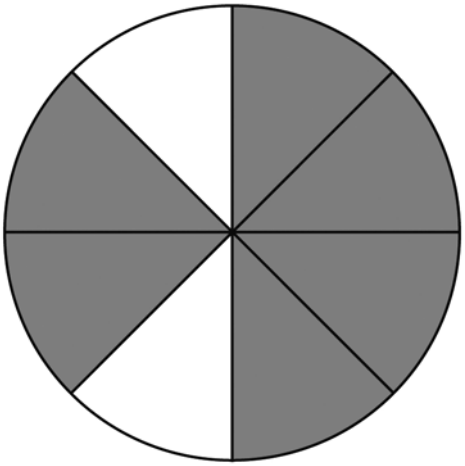
Answer_____m^2 [2]

A border needs to be dug around the perimeter of the garden.

(c) Calculate the perimeter of the garden.

Answer_____m [2]

16 The diagram shows a pizza which has been divided into 8 equal parts.



The shaded parts are eaten.

(a) Write down, as a fraction in its lowest terms, the fraction that is eaten.

Answer_____ [2]

(b) What percentage is left uneaten?

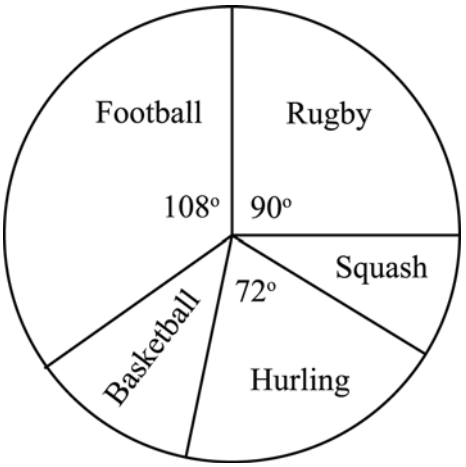
Answer_____ % [1]

17 Which fractions from the list given below are **not** equivalent to $\frac{2}{3}$?

$\frac{8}{12}, \frac{10}{15}, \frac{16}{28}, \frac{4}{6}, \frac{12}{16}$

Answer_____ [2]

18 In a survey 300 men were asked which sport they liked best. The pie-chart below shows the results.



(a) Measure the angle which represents Basketball.

Answer_____° [1]

(b) What fraction of men chose Rugby as their favourite sport?

Answer_____ [1]

(c) How many men chose Hurling as their favourite sport?

Answer_____ [2]

19 **(a)** Expand

$3(x + 1)$

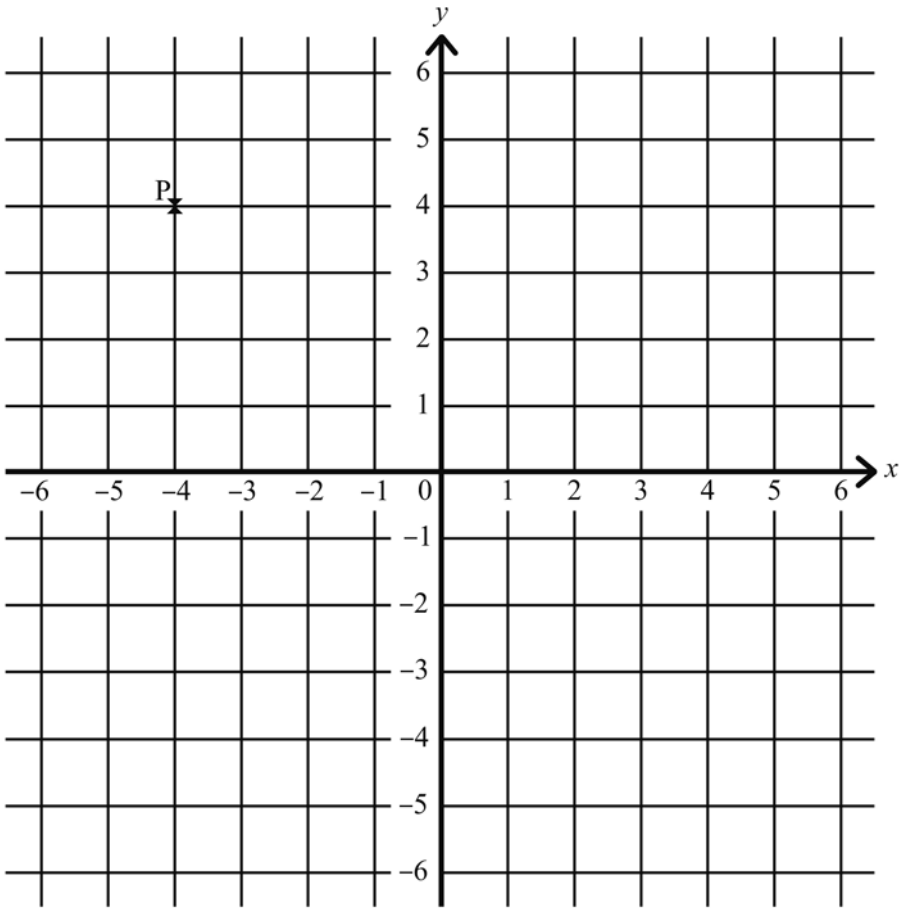
Answer_____ [2]

(b) Solve

$2y + 3 = 19$

Answer_____ [2]

20 In the diagram the point P (–4, 4) has been plotted.



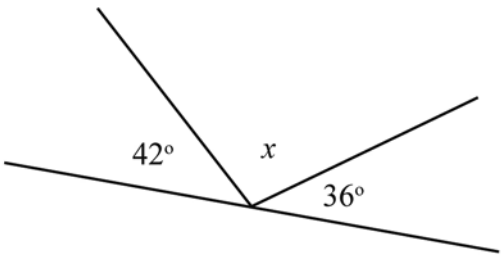
(a) Plot the following points on the diagram, labelling clearly

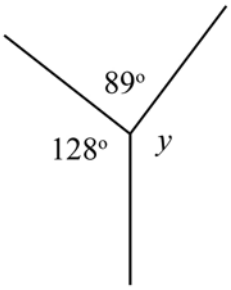
Q (–2, –3), R (5, –3) and S (3, 4) [3]

(b) Join up the points in order and name the quadrilateral formed.

Answer_____ [1]

21





(Diagram not drawn accurately)

Calculate

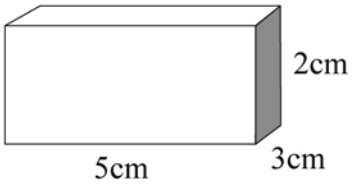
(a) x

$x =$ _____° [1]

(b) y

$y =$ _____° [1]

22 Draw the net of the matchbox tray (no lid) shown in the diagram, which has base 5cm by 3cm and height 2cm, on the square grid provided.



[3]

23 Your quality of written communication will be assessed in this question

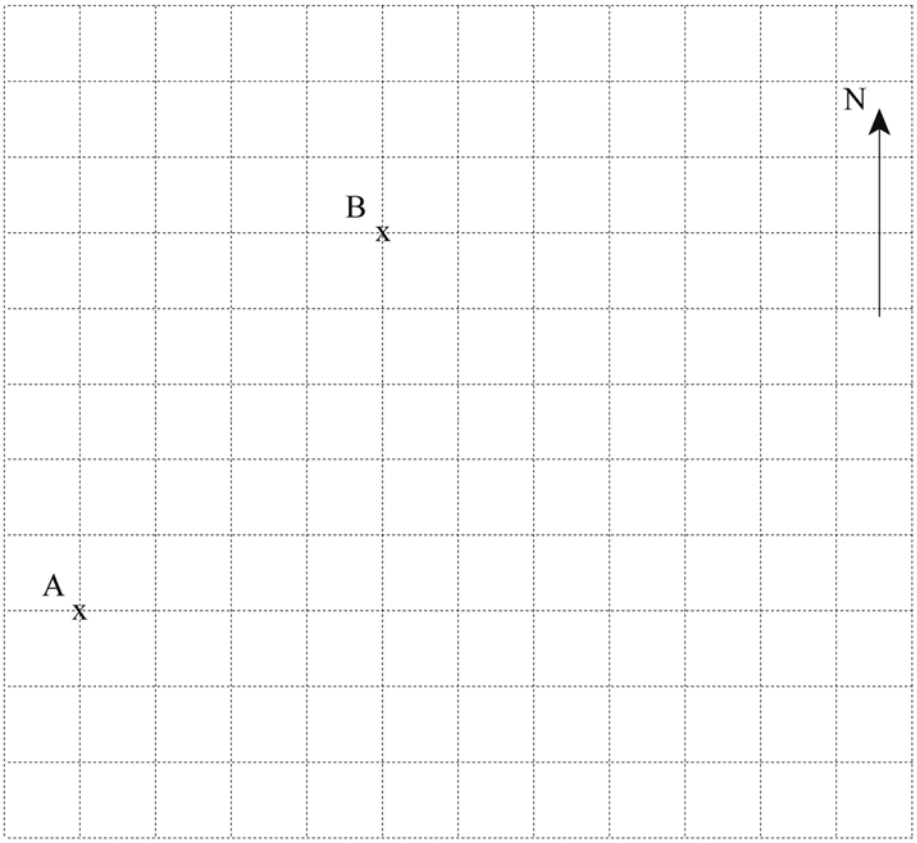
Fred has just won £900.
He has promised $\frac{1}{5}$ of it to his daughter, Kathy and $\frac{1}{4}$ of it to his son, James.

How much will he have left after he gives Kathy and James their shares?

Show clearly each step of your working out.

Answer £_____ [4]

24



The positions of two towns A and B are shown on the grid.

(a) A third town C is 3km east and 2km north of A.

Using a scale of 1cm = 0.5km, show the position of C. [2]

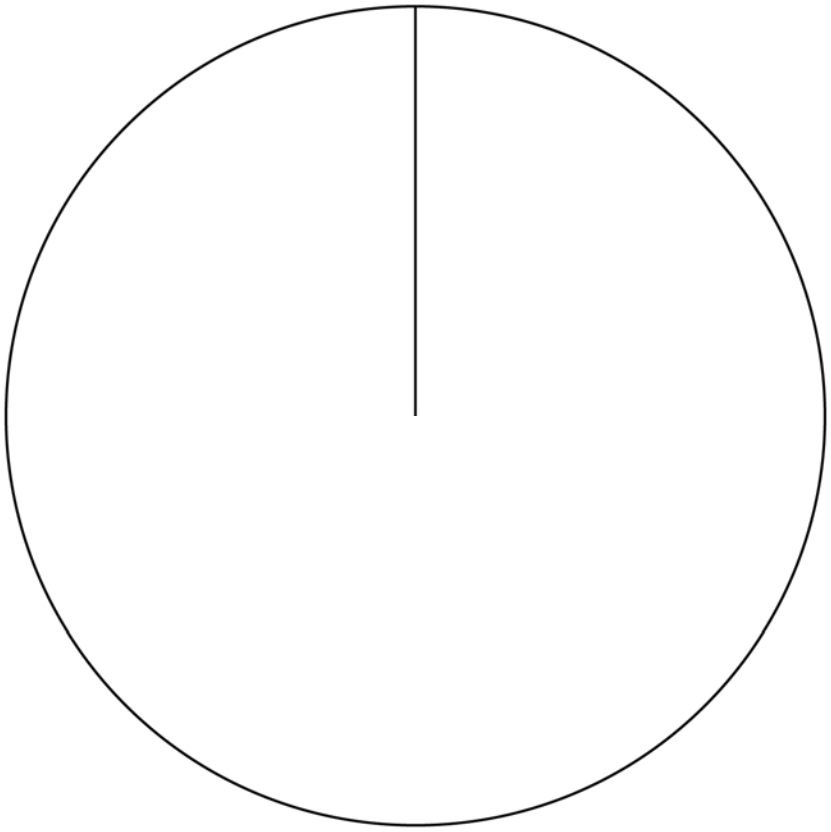
(b) How far is C from A?

Answer_____km [3]

25 The following information shows how Sinead spends her time on a Saturday.

Activity	Cleaning	Watching TV	Shopping	Using the Internet	Exercising	Sleeping
Number of hours	2	5	4	3	2	8

Draw a pie chart to illustrate this data.



[4]

THIS IS THE END OF THE QUESTION PAPER

Centre Number

71	

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General Certificate of Secondary Education
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Mathematics

Unit T2
(With calculator)
Foundation Tier

[CODE]

SPECIMEN EXAMINATION PAPER

For Examiner's use only	
Question Number	Marks
1	
2	
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19	
20	
21	
22	
23	
Total Marks	

TIME

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

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Answer **all twenty three** questions.
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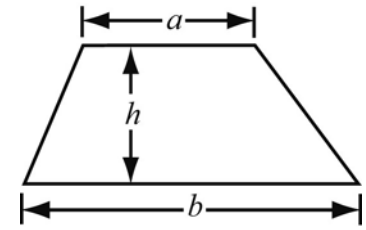
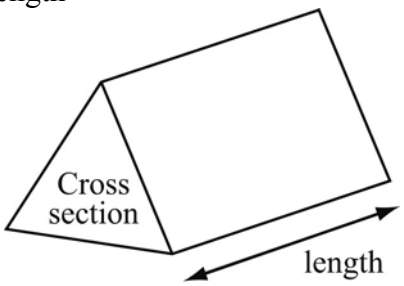
Foundation Tier Formulae Sheet

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



Volume of prism = area of cross section × length



Answer **all** questions

1 Five kilograms of potatoes and two kilograms of onions cost £4.10 in total.
The potatoes cost 62p per kilogram.

How much would it cost in total to buy one kilogram of potatoes and one kilogram of onions?

Answer £_____ [4]

2 **(a)** Simplify

$5p - 2r - 3p + 5r$

Answer_____ [2]

(b) Expand

$-2(2y - 3)$

Answer_____ [2]

3 Calculate

(a) the cube of 2.8

Answer_____ [1]

(b) $2.3^2 + \sqrt{1.69}$

Answer_____ [1]

(c) $5.6^2 \div 3.4$

Answer_____ [2]

4 **Results of a Year 12 Physics test**

9	**2**	**5**	**7**			
8	**0**	**1**	**6**	**7**	**8**	
7	**2**	**5**	**8**	**9**	**9**	**9**
6	**7**	**8**	**9**			
5	**4**	**6**				
4	**6**					

Key 5 ▌4 means 54%

(a) How many pupils sat the Physics test?

Answer_____ [1]

(b) What is the modal percentage mark?

Answer_____% [1]

(c) What is the range of percentage marks?

Answer_____% [1]

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

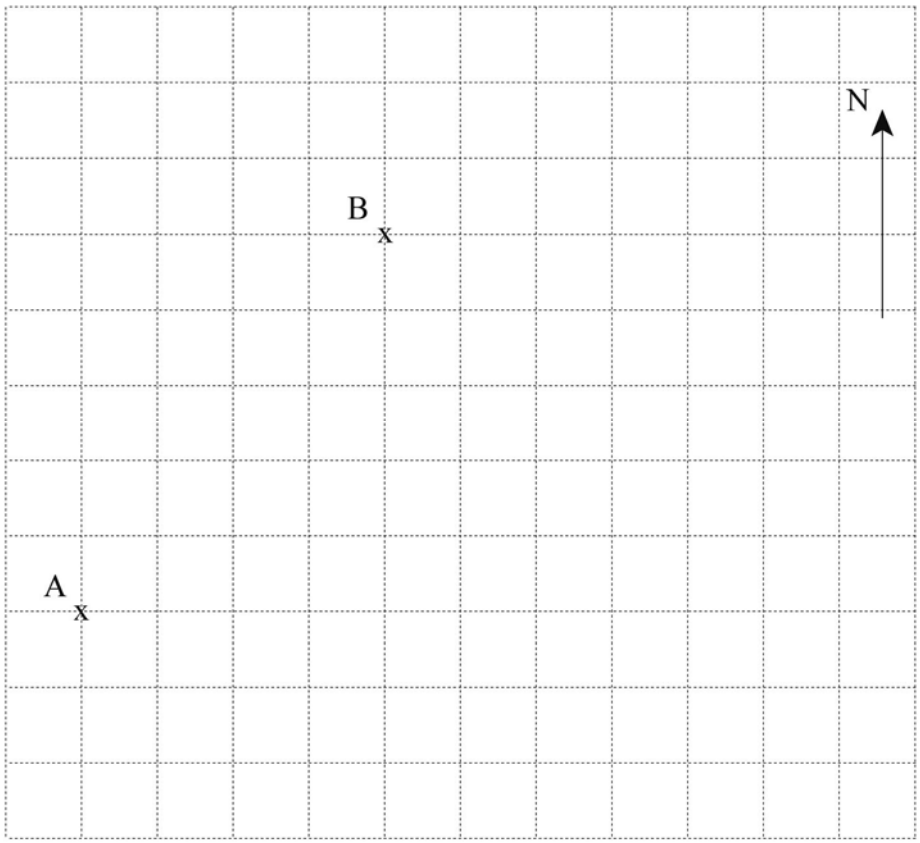
Fred has just won £900
He has promised $\frac{1}{5}$ of it to his daughter Kathy, and $\frac{1}{4}$ of it to his son James.

How much will he have left after he gives Kathy and James their shares?

Show clearly each step of your working out.

Answer £ _____ [4]

6



The positions of two towns A and B are shown on the grid.

(a) A third town C is on a bearing of 120° from B and at a distance of 2.5 km from B.

Using a scale of 1 cm = 0.5km, show the position of C.

[3]

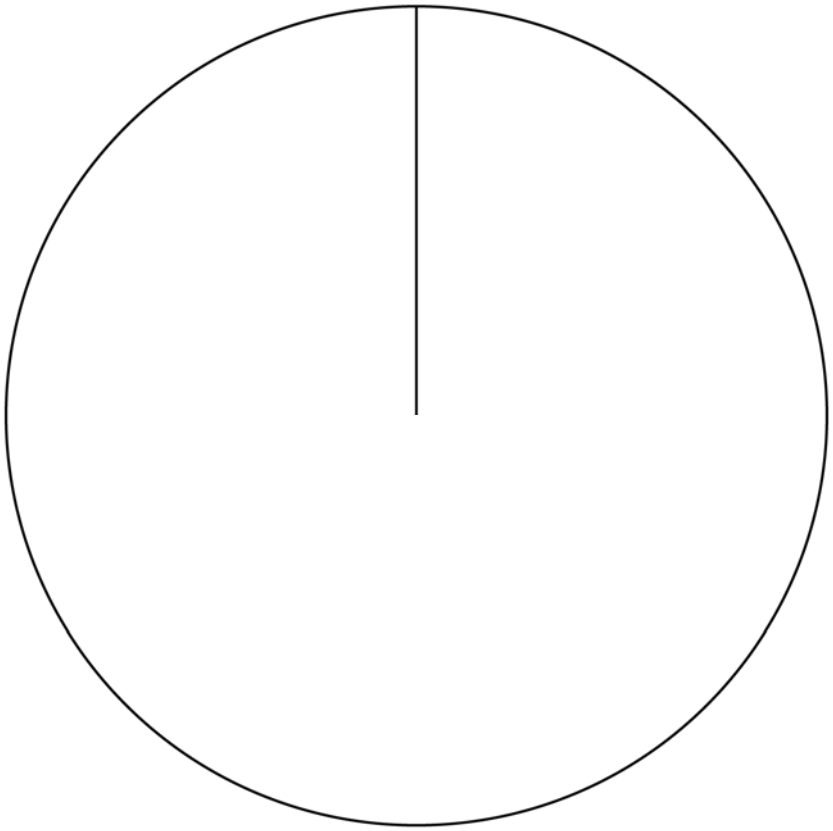
(b) How far is C from A?

Answer _____ km [2]

7 The following information shows how Sinead spends her time on a Saturday.

Activity	Cleaning	Watching TV	Shopping	Using the Internet	Exercising	Sleeping
Number of hours	2	5	4	3	2	8

Draw a pie chart to illustrate this data.



[4]

8 Solve

(a) $\frac{x}{4} = 15$

Answer $x =$ _____ [1]

(b) $6y - 2 = 13$

Answer $y =$ _____ [2]

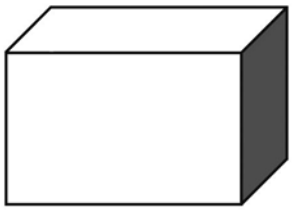
9 Write down the next two numbers in the sequence

11, 10, 8, 5, ____, _____

Answer_____, _____ [2]

10 In the diagram the volume of the cuboid is $48cm^3$. It holds exactly 48 sugar cubes each 1cm by 1cm by 1cm.

The length of the cuboid is 4cm and the breadth is 3cm.



(a) What is the height of the cuboid?

Answer_____ [3]

(b) Write down the dimensions of another cuboid that the 48 cubes could fit into exactly.

Answer_____cm by_____cm by_____cm [1]

11 **(a)** Find the value of $\frac{3.8 \times 6.2}{9.1 - 2.7}$ giving your answer correct to 1 decimal place.

Answer_____ [2]

(b) A plasma TV has a marked price of £790
In a sale its price is reduced by 15%

What is the sale price of the TV?

Answer £_____ [3]

(c) Mary's family drink 3 cartons of orange juice in 5 days.

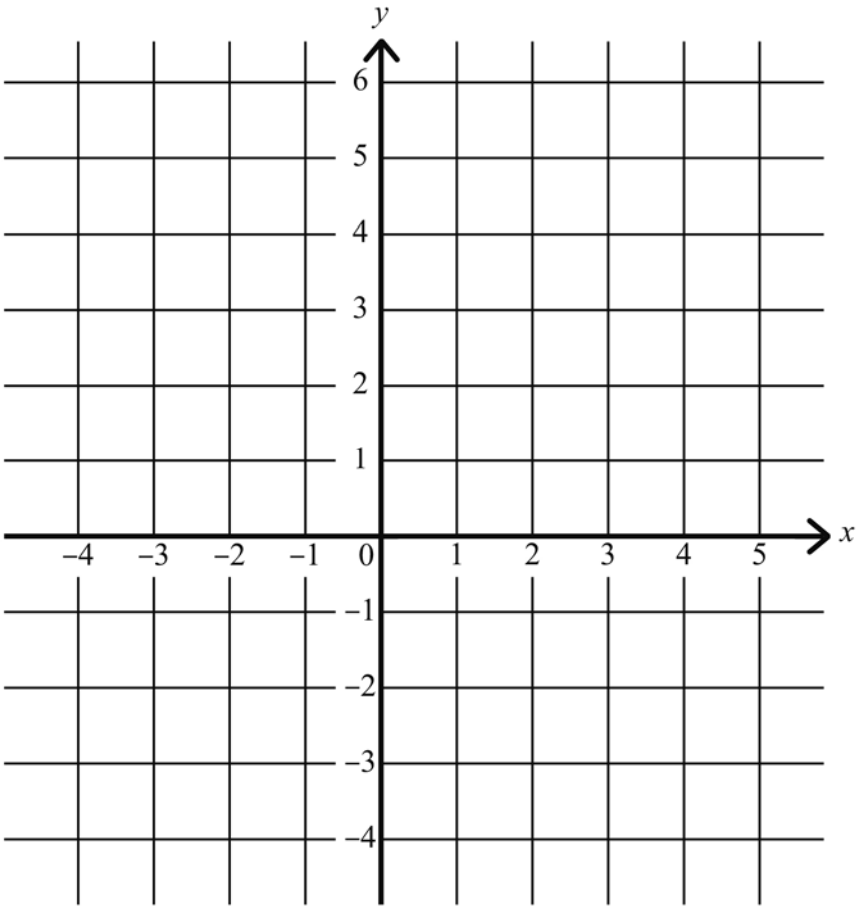
How many cartons would Mary need to buy to last a full week?

Answer _____cartons [3]

12 Write down an expression for the total cost of x bars of chocolate at 35p each and y bottles of water at 50p each.

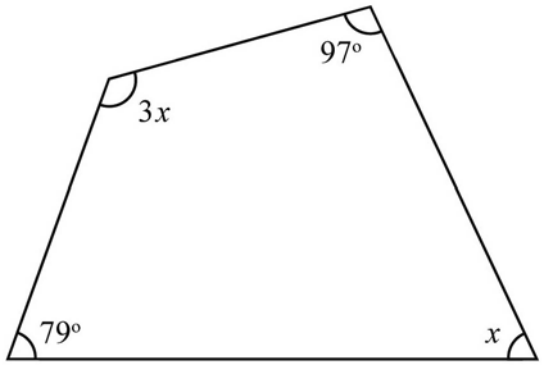
Answer_____ [2]

13 Draw the graph of $y = 4x - 3$ on the grid below.



[3]

14



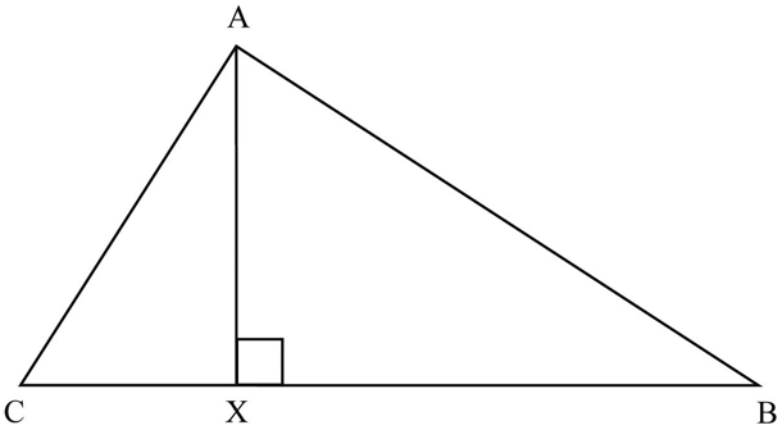
(Diagram not drawn accurately)

The quadrilateral shown has angles x, 79°, $3x$, and 97°

Work out the value of x

Answer $x =$ _____ ° [4]

15 **(a)**



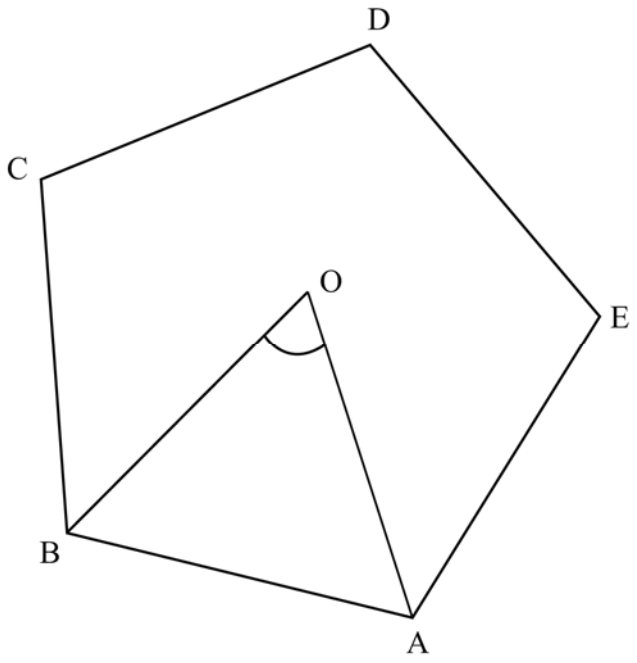
(Diagram not drawn accurately)

In the triangle ABC shown above BC = 8.5 cm and AX = 6.4 cm.

Calculate the area of the triangle ABC.

Answer_____cm^2 [2]

(b)



(Diagram not drawn accurately)

ABCDE is a regular pentagon, with O as its centre.

Calculate the size of angle AOB.

Answer Angle AOB = _____° [2]

16 Find the area of a circle with a diameter of 3 metres.

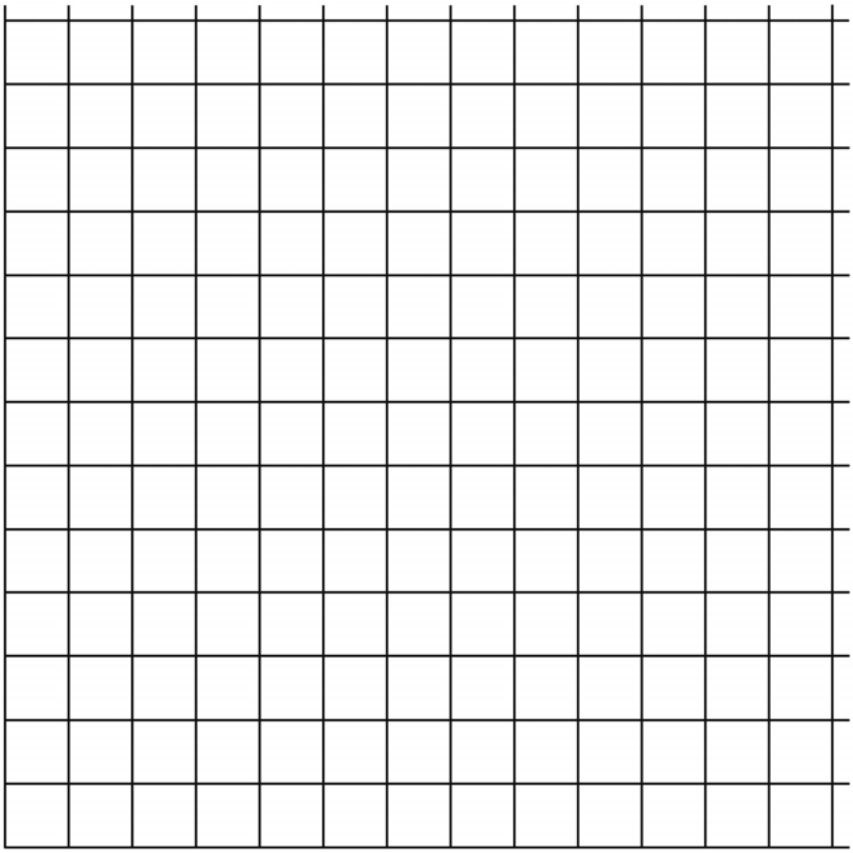
Take $\pi = 3.14$

Answer_____m^2 [2]

17 **(a)** The speeds, in miles per hour, of the cars passing the gates of a primary school during lunch hour are recorded in the table below.

Speed (mph)	0–5	6–10	11–15	16–20	21–25	26–30
No. of cars	2	5	34	61	29	4

Represent this information using a bar chart.



[3]

(b) Which is the modal class interval?

Answer_____ [1]

(c) Your quality of written communication will be assessed in this question

Katy wants to know how many times a month, on average, the people in her town go to the cinema. She asks 200 people in her school.

Explain why Katy's sample may not be representative of the people in her town.

_____

_____ [2]

18 **(a)** Write 72 as a product of prime factors

Answer_____ [2]

(b) Find the lowest common multiple (LCM) of 72 and 108

Answer_____ [2]

(c) Find the highest common factor (HCF) of 72 and 108

Answer_____ [2]

19 Susan puts £1700 in her bank account at 4.2% simple interest each year.

Calculate the total amount in her bank account after 3 years.

Answer £_____ [3]

20 **(a)** Expand and simplify

$4(2 - 3x) + 3(x + 4)$

Answer_____ [2]

(b) Expand

$x(x^2 - 6)$

Answer_____ [2]

(c) Solve for x

$7x + 18 = 2(x - 6)$

Answer x =_____ [3]

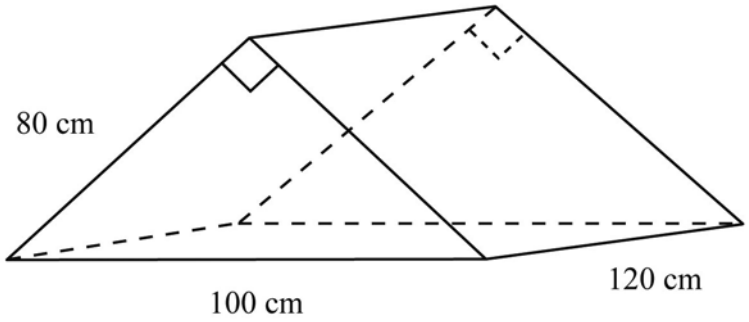
21 **(a)** A regular polygon has an exterior angle of 18°

Find the number of sides in the polygon.

Answer_____ [2]

(b) The diagram shows a play tent in the shape of a triangular prism.

Calculate the volume of the tent.



Answer_____cm^3 [6]

22 A teacher recorded the number of hours 50 students used the internet over a 7 day period. The information is shown in the table below.

Number of Hours	Number of Students
$0 \leq h < 3$	2
$3 \leq h < 6$	5
$6 \leq h < 9$	11
$9 \leq h < 12$	12
$12 \leq h < 15$	15
$15 \leq h < 20$	5

(a) Calculate an estimate for the mean number of hours.

Answer_____ [4]

(b) Write down the class interval which contains the median number of hours.

Answer_____ [1]

23 An ice-cream van recorded the sales of ice-cream and the temperatures over a period of a year. The results are shown in the table below.

Outside Temperature (°C)	Ice-cream Sales (Hundred £)
8	6
12	9.5
18	16
4	2
10	11
15	13.5
17	14

(a) On the graph paper opposite, draw a scatter graph for the data. [2]

(b) Describe any correlation from your graph.

_____

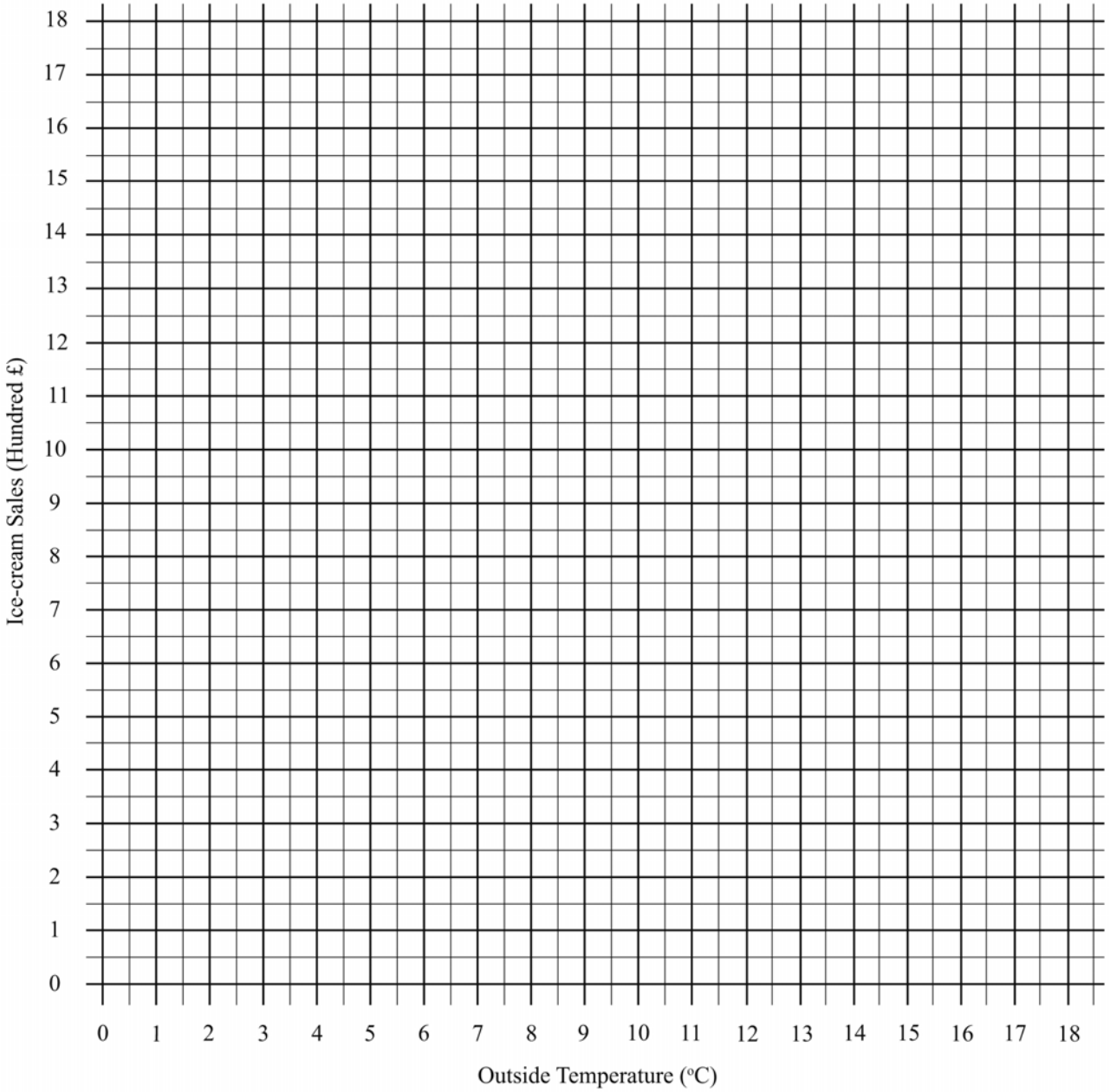
_____ [1]

(c) Draw a line of best fit on the scatter graph. [1]

(d) Explain what the line of best fit could be used for in this scatter graph.

_____

_____ [1]


Ice-cream Sales (Hundred £)
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Outside Temperature (°C)

THIS IS THE END OF THE QUESTION PAPER

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Unit T3
(With calculator)
Higher Tier

[CODE]

SPECIMEN EXAMINATION 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	
17	
18	
19	
Total Marks	

TIME

2 hours

INSTRUCTIONS TO CANDIDATES

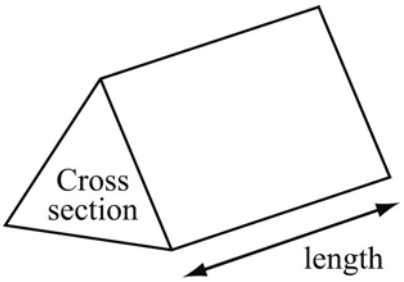
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in the question paper.
Answer **all nineteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

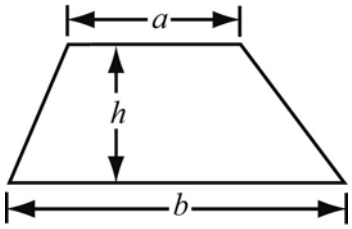
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 15** and **17**.
You should have a calculator, ruler, compasses and protractor.
The formula sheet is overleaf.

Higher Tier Formulae Sheet

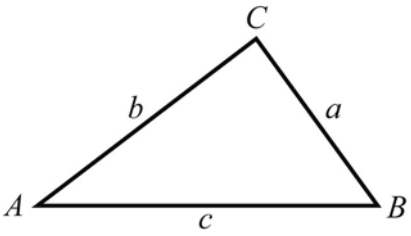
Volume of prism = area of cross section × length



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



In any triangle *ABC*



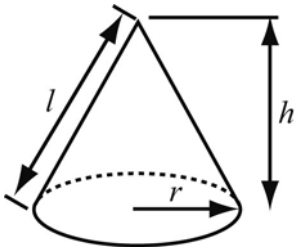
Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

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

Curved surface area of cone = πrl



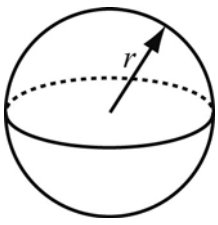
Quadratic Equation

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

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

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

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



Answer **all** questions

1 **(a)** Find the value of $\frac{3.8 \times 6.2}{9.1 - 2.7}$, giving your answer correct to 1 decimal place.

Answer _____ [2]

(b) A plasma TV has a marked price of £790
In a sale its price is reduced by 15%

What is the sale price of the TV?

Answer £ _____ [2]

(c) Mary's family drink 3 cartons of orange juice in 5 days.

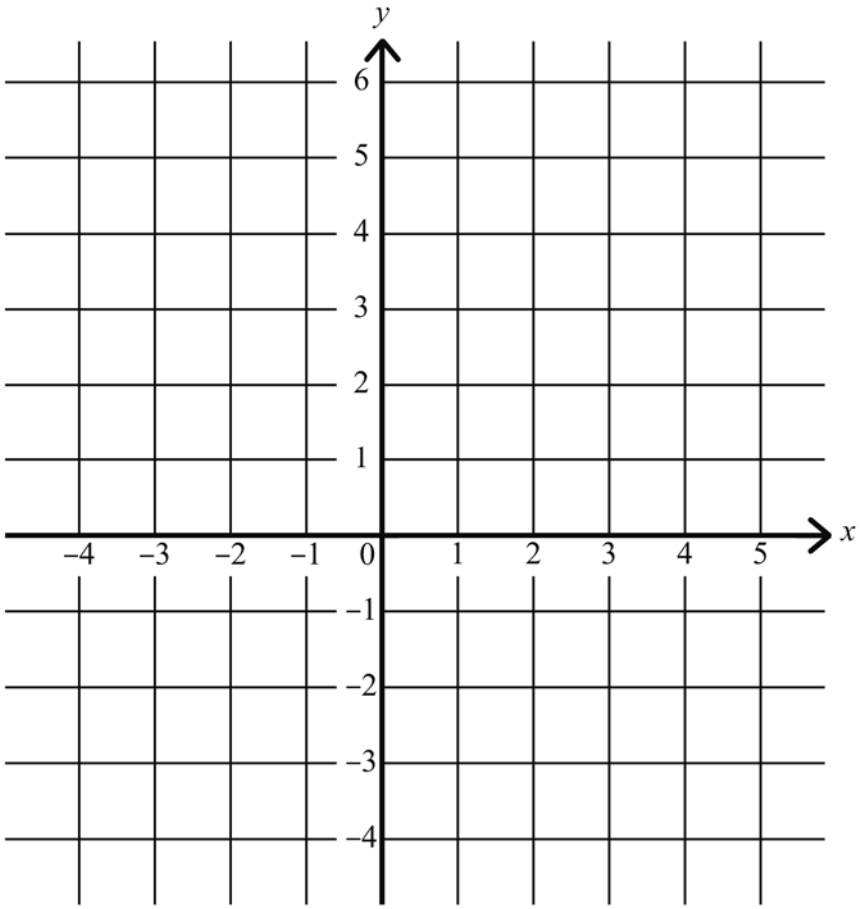
How many cartons would Mary need to buy to last a full week?

Answer _____ cartons [3]

2 Write down an expression for the total cost of x bars of chocolate at 35p each and y bottles of water at 50p each.

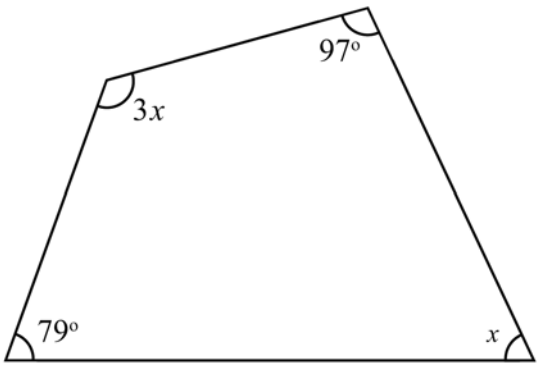
Answer _____ [2]

3 Draw the graph of $y = 4x - 3$ on the grid below.



[3]

4



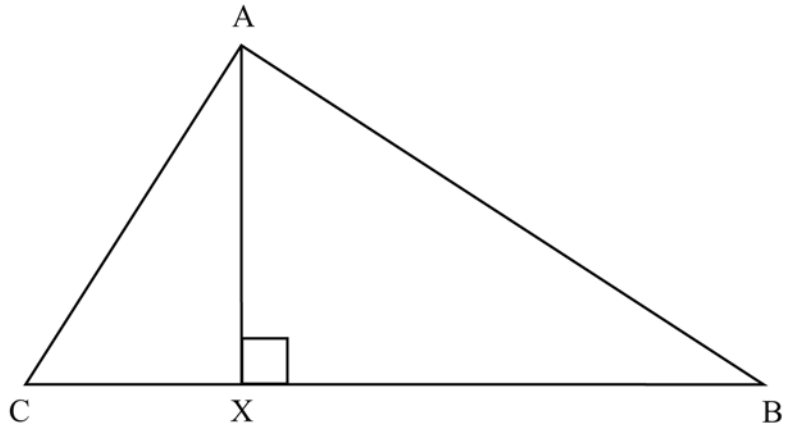
(Diagram not drawn accurately)

The quadrilateral shown has angles of x, 79°, $3x$ and 97°

Work out the value of x

Answer $x =$ _____ ° [4]

5 **(a)**



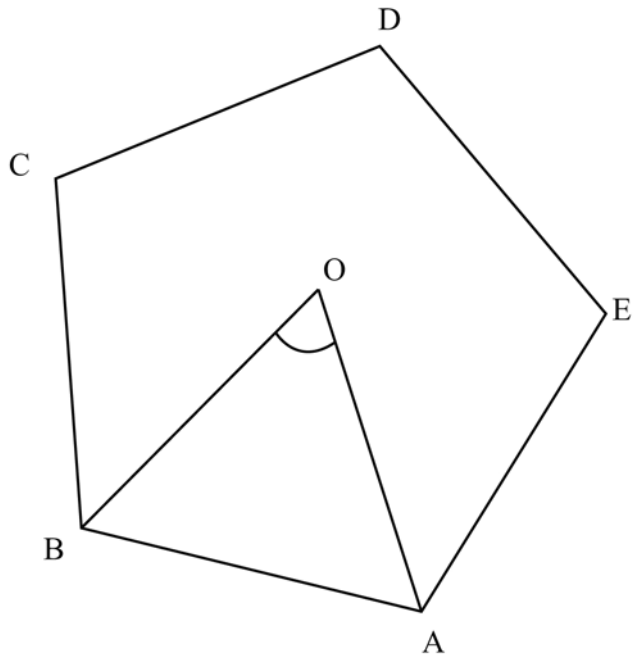
(Diagram not drawn accurately)

In the triangle ABC shown above, BC = 8.5 cm and AX = 6.4 cm.

Calculate the area of the triangle ABC.

Answer _____cm^2 [2]

(b)



(Diagram not drawn accurately)

ABCDE is a regular pentagon, with O as its centre.

Calculate the size of the angle AOB.

Answer angle AOB = _____° [2]

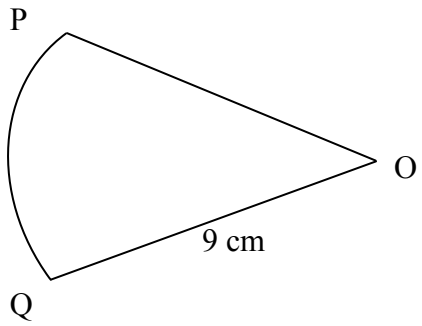
6 A line is measured as 3.21 metres to the nearest centimetre.

What is the minimum and maximum length of the line?

Answer: minimum = _____m [1]

maximum = _____m [1]

7



OPQ is a sector of the circle, centre O, with radius 9cm.

Angle POQ = 45°

(a) Work out the perimeter of the sector OPQ

Answer _____cm [3]

(b) Work out the area of the sector OPQ

Answer _____cm^2 [2]

8 A teacher recorded the scores in a Mental Maths test for her year 10 class.

19, 46, 27, 35, 11, 13, 22, 34, 18, 26, 32, 44, 34, 16

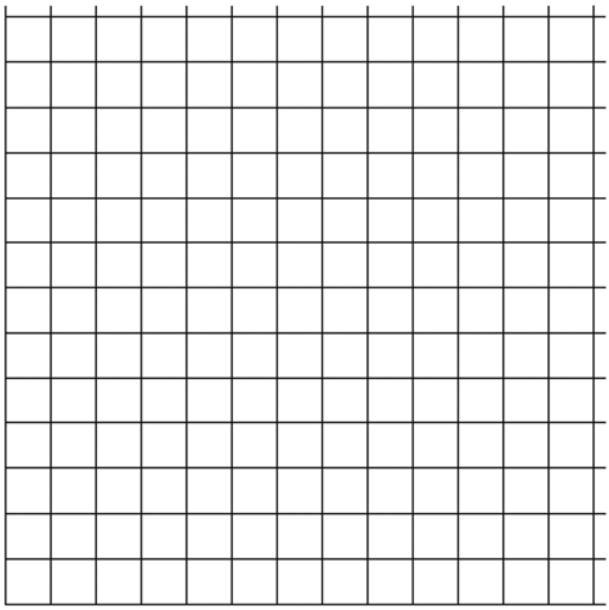
Construct a stem and leaf diagram to represent this information.

[3]

9 The speeds, in miles per hour, of the cars passing the gates of a primary school during lunch hour are recorded in the table below.

Speed (mph)	0–5	6–10	11–15	16–20	21–25	26–30
No. of cars	2	5	34	61	29	4

(a) On the grid below, represent this information using a statistical diagram.



[3]

(b) Which is the modal class interval?

Answer _____ [1]

10 **(a)** Write 72 as a product of prime factors.

Answer _____ [2]

(b) Find the lowest common multiple (LCM) of 72 and 108

Answer _____ [2]

(c) Find the highest common factor (HCF) of 72 and 108

Answer _____ [2]

11 Susan puts £1700 in her bank account at 4.2% simple interest each year.

Calculate the total amount in her bank account after 3 years.

Answer £_____ [3]

12 **(a)** Expand and simplify

$4(2 - 3x) + 3(x + 4)$

Answer _____ [2]

(b) Expand

$x(x^2 - 6)$

Answer _____ [2]

(c) Solve for x

$7x + 18 = 2(x - 6)$

Answer _____ [3]

13 **(a)** A regular polygon has an exterior angle of 18°

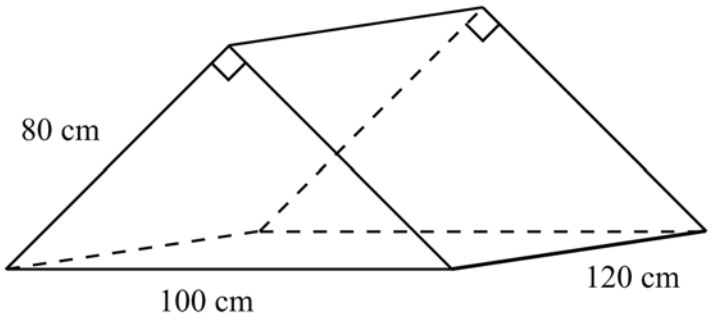
Find the number of sides in the polygon.

Answer _____ [2]

(b) The diagram shows a play tent in the shape of a triangular prism.

Calculate the volume of the tent.

Show all your working.



Answer _____ cm^3 [6]

14 A teacher recorded the number of hours 50 students used the Internet over a 7 day period. The information is recorded in the table below.

Number of Hours	Number of Students
$0 \leq h < 3$	2
$3 \leq h < 6$	5
$6 \leq h < 9$	11
$9 \leq h < 12$	12
$12 \leq h < 15$	15
$15 \leq h < 20$	5

(a) Calculate an estimate for the mean number of hours.

Answer _____ [4]

(b) Write down the class interval which contains the median number of hours.

Answer _____ [1]

15 An ice-cream van recorded the sales of ice-cream and the temperatures over a period of a year. The results are shown in the table below.

Outside Temperature (°C)	Ice-cream Sales (Hundred £)
8	6
12	9.5
18	16
4	2
10	11
15	13.5
17	14

(a) On the graph paper opposite, draw a scatter graph for the data. [2]

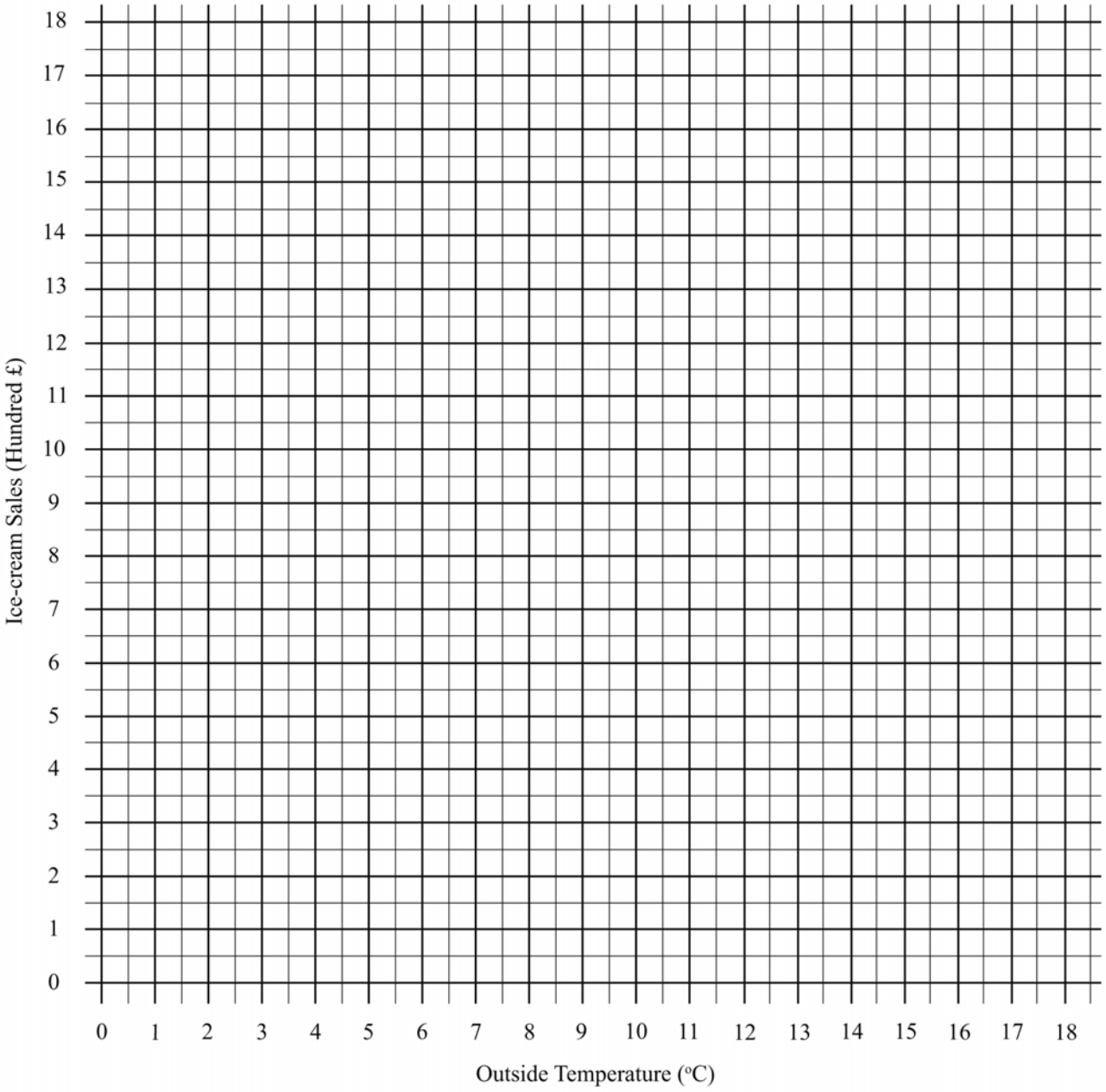
(b) **Your quality of written communication will be assessed in this question.**

Describe any correlation from the graph.

_____

_____ [2]

(c) Draw a line of best fit on the scatter graph. [1]


Ice-cream Sales (Hundred £)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Outside Temperature (°C)

16 **(a)** Jenny bought a new car for £12,500
Three years later she sold it for £7,600

Calculate the percentage loss in value.

Answer _____% [2]

(b) Each time a ball is dropped it rebounds to $\frac{3}{5}$ of its height.
A ball is dropped from a height of 3 metres.

How many times will it bounce before rebounding to a height of less than 0.5 metre?

Answer _____ times [2]

(c) A coat is priced at £117 in a sale.
This represents a saving of 35% on its original price.

What was the original price of the coat?

Answer £ _____ [3]

17 **(a)** (i) Factorise

$x^2 + x - 12$

Answer _____ [2]

(ii) Hence solve

$x^2 + x - 12 = 0$

Answer _____ [1]

Quality of written communication will be assessed in parts (b) and (c)

(b) Solve

$$\frac{x+3}{4} - \frac{2x-1}{3} = \frac{1}{4}$$

Show clearly each step of your working out.

Answer _____ [4]

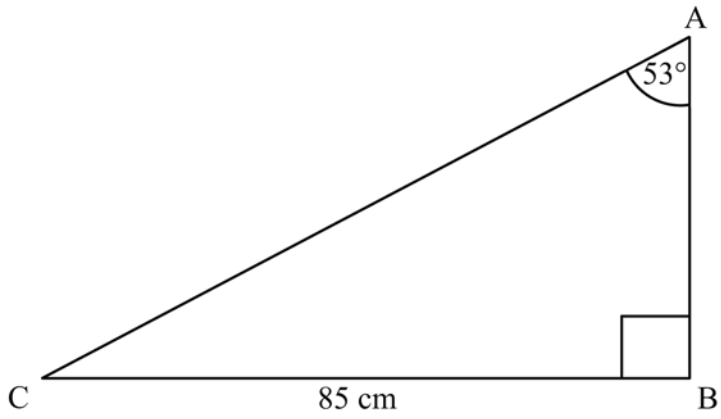
(c) Solve the simultaneous equations

$$2y - 5x = 18$$
$$3y + 2x = -11$$

Show clearly each step of your working out.

Answer $x =$ _____ $y =$ _____ [5]

18 **(a)** The diagram shows a ladder, AC, leaning against the wall of a house.



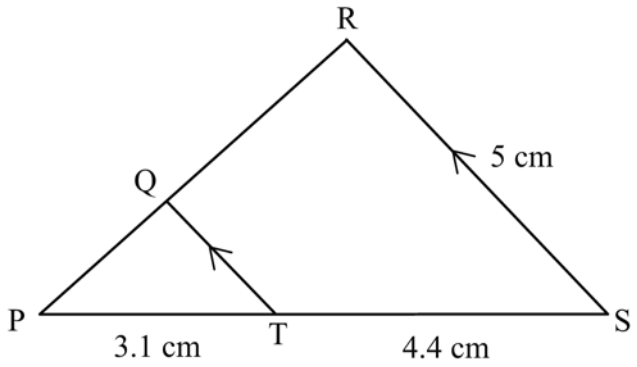
(Diagram not drawn to scale)

In the triangle ABC, angle ABC = 90°, angle CAB = 53° and CB = 85 cm.

How high up the wall does the ladder reach?

Answer AB = _____ cm [3]

(b)



(Diagram not drawn accurately)

In the diagram above TQ is parallel to SR. Triangles PQT and PRS are similar.
PT = 3.1 cm, TS = 4.4 cm. RS = 5 cm

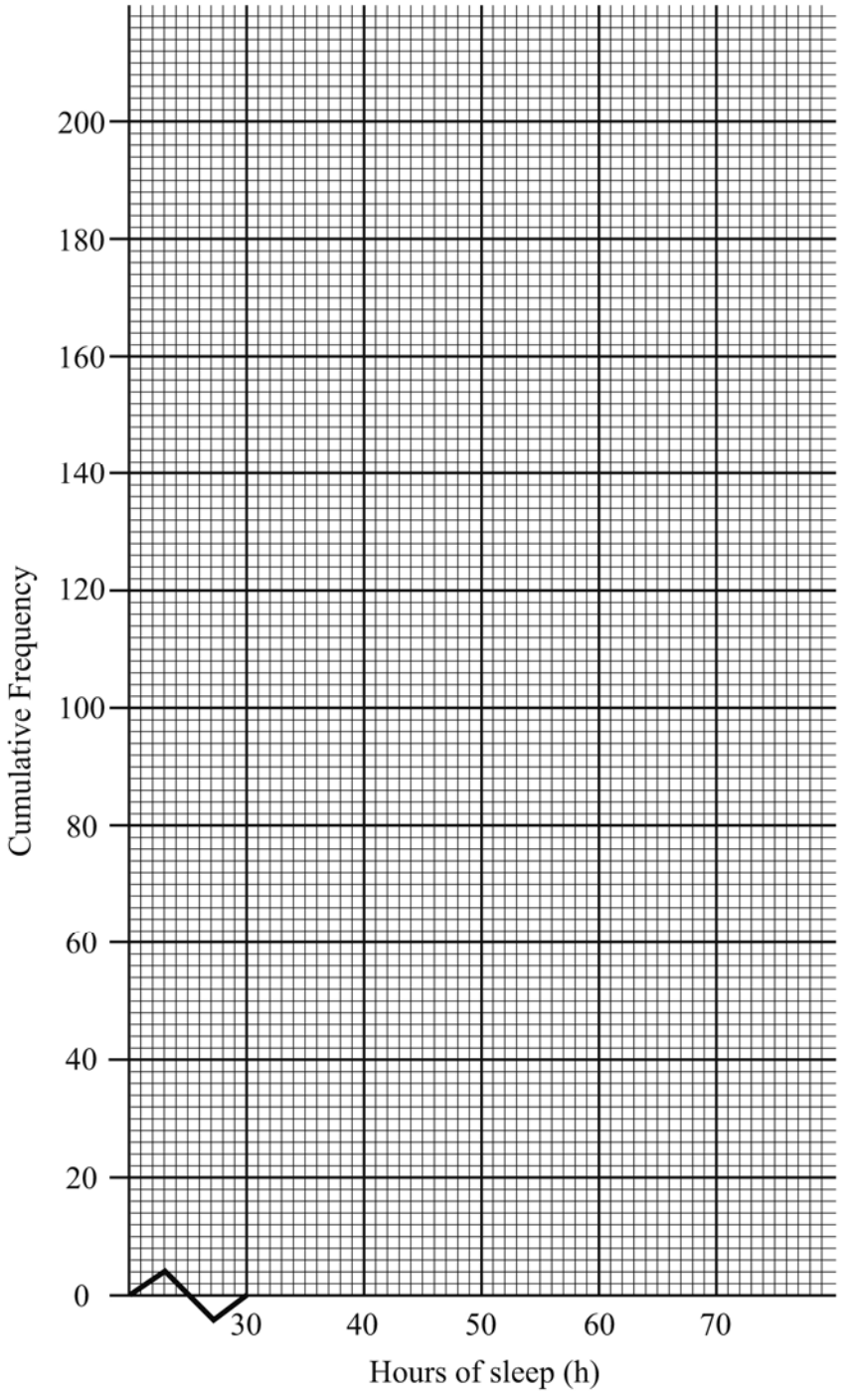
Find the length of QT, giving your answer correct to 3 significant figures.

Answer QT = _____ cm [3]

19 In a survey, 200 people under the age of 25 were asked how many hours of sleep they had during the past week. The results of the survey are shown in the table below.

Hours of sleep (h)	$h \leq 35$	$35 < h \leq 40$	$40 < h \leq 45$	$45 < h \leq 50$	$50 < h \leq 55$	$55 < h \leq 60$	$60 < h \leq 65$	$65 < h \leq 70$
Frequency	0	7	10	16	69	64	29	5
Cumulative Frequency								

(a) Use the data to complete the cumulative frequency table and then draw the cumulative frequency graph on the grid below. [4]



(b) Use your graph to find

(i) the median

Answer _____hours [1]

(ii) the interquartile range

Answer _____hours [2]

THIS IS THE END OF THE QUESTION PAPER

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Mathematics

Unit T4
(With calculator)
Higher Tier

[CODE]

SPECIMEN EXAMINATION 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	
17	
18	
19	
Total Marks	

TIME

2 hours

INSTRUCTIONS TO CANDIDATES

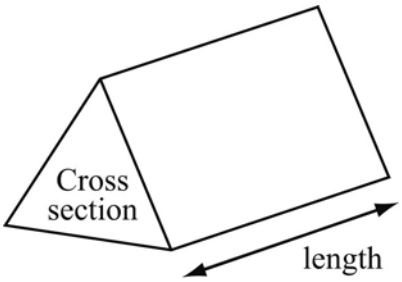
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in the question paper.
Answer **all nineteen** questions.
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.
You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

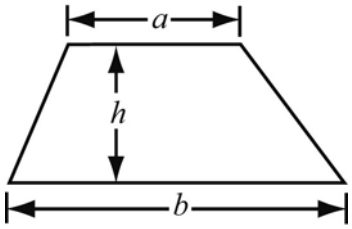
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional elements will be assessed in this paper.
Quality of written communication will be assessed in **question 2.**
You should have a calculator, ruler, compasses and protractor.
The formula sheet is overleaf.

Higher Tier Formulae Sheet

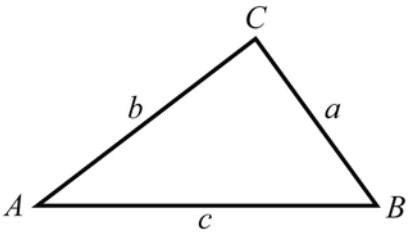
Volume of prism = area of cross section × length



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



In any triangle *ABC*



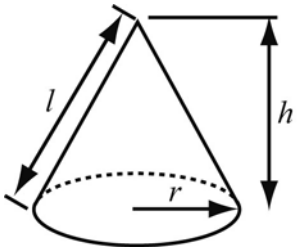
Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

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

Curved surface area of cone = πrl



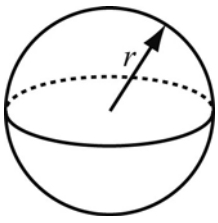
Quadratic Equation

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

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

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

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



Answer **all** questions

1 **(a)** Each time a ball is dropped it rebounds to $\frac{3}{5}$ of its height.
A ball is dropped from a height of 3 metres.

How many times will it bounce before rebounding to a height of less than 0.5 metre?

Answer _____ times [2]

(b) A coat is priced at £117 in a sale. This represents a saving of 35% on its original price.

What was the original price of the coat?

Answer £ _____ [3]

2 **(a)** **(i)** Factorise $x^2 + x - 12$

Answer _____ [2]

(ii) Hence solve $x^2 + x - 12 = 0$

Answer x = _____ [1]

Quality of written communication will be assessed in parts (b) and (c).

(b) Solve

$$\frac{x+3}{4} - \frac{2x-1}{3} = \frac{1}{4}$$

Show clearly each step of your working out.

Answer x = _____ [4]

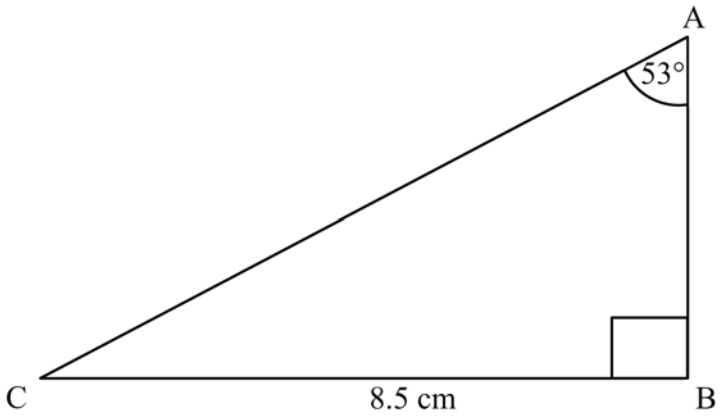
(c) Solve the equations

$$2y - 5x = 18$$
and $$3y + 2x = -11$$

Show clearly each step of your working out.

Answer x = _____ y = _____ [5]

3 The diagram shows a ladder, AC, leaning against the wall of a house.



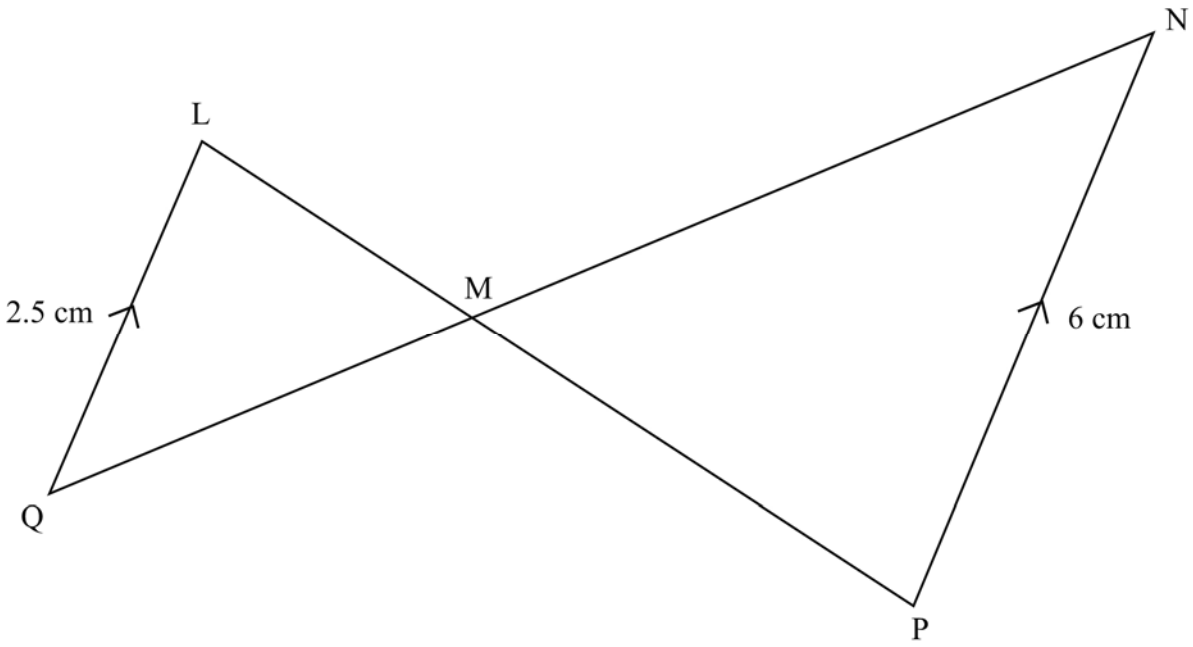
(Diagram not drawn accurately)

In the triangle ABC, angle ABC = 90°, angle CAB = 53° and CB = 8.5 cm.

How high up the wall does the ladder reach?

Answer AB = _____ cm [2]

4



(Diagram not drawn accurately)

In the diagram above, QL is parallel to PN. The triangles LMQ and MNP are similar.

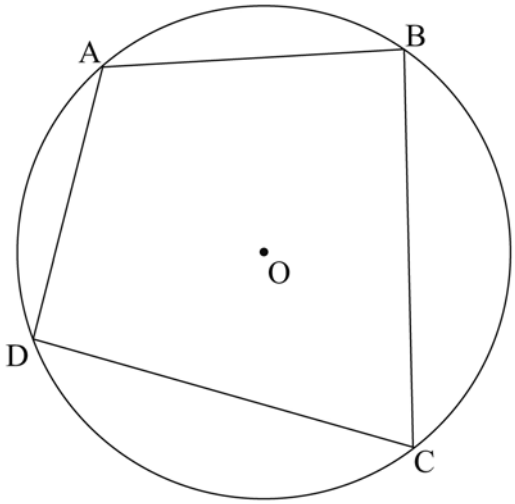
QL = 2.5 cm, PN = 6 cm and LP = 10.2 cm.

Find the lengths of LM and MP.

Answer LM = _____ cm

MP = _____ cm [4]

5



ABCD is a cyclic quadrilateral in the circle with centre O.

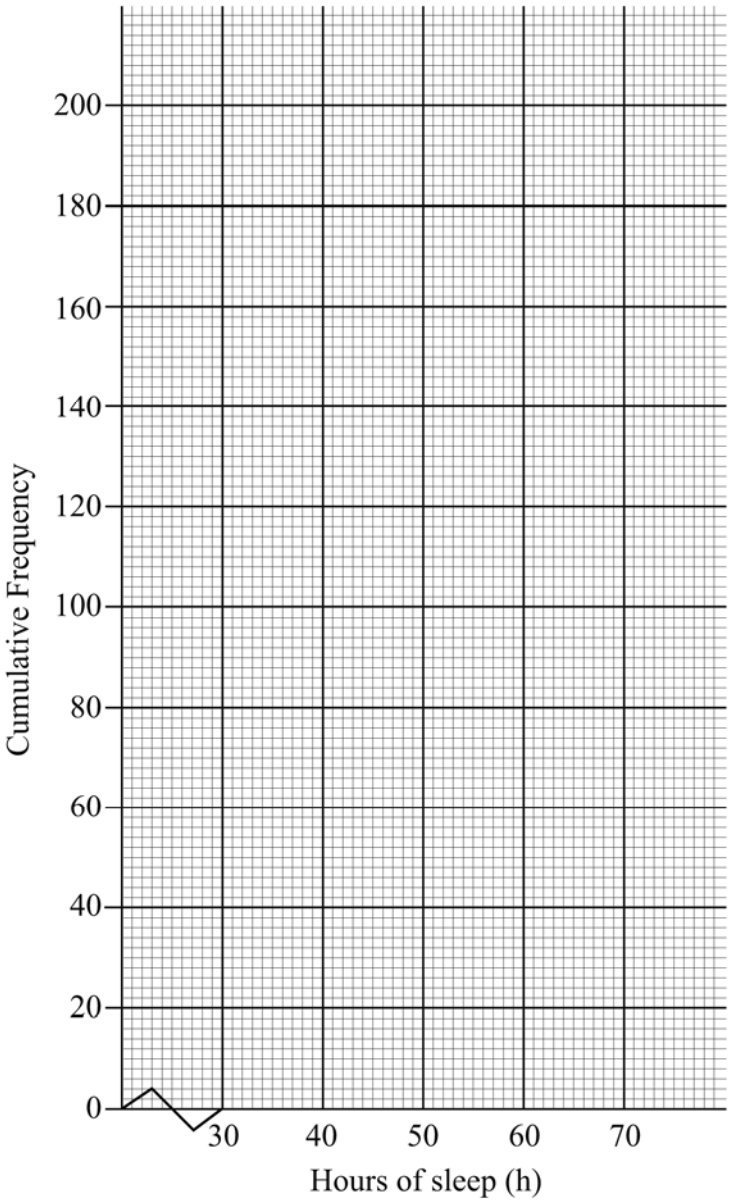
Prove that the opposite angles in a cyclic quadrilateral add up to 180°

[3]

6 In a survey, 200 people under the age of 25 were asked how many hours of sleep they had during the past week. The results of the survey are shown in the table below.

Hours of sleep (h)	$h \leq 35$	$35 < h \leq 40$	$40 < h \leq 45$	$45 < h \leq 50$	$50 < h \leq 55$	$55 < h \leq 60$	$60 < h \leq 65$	$65 < h \leq 70$
Frequency	0	7	10	16	69	64	29	5
Cumulative Frequency								

(a) Use the data in the table to construct a cumulative table and then draw the cumulative frequency graph on the grid opposite. [4]



(b) Use your graph to estimate:

(i) the median

Answer _____ [1]

(ii) the interquartile range

Answer _____ [2]

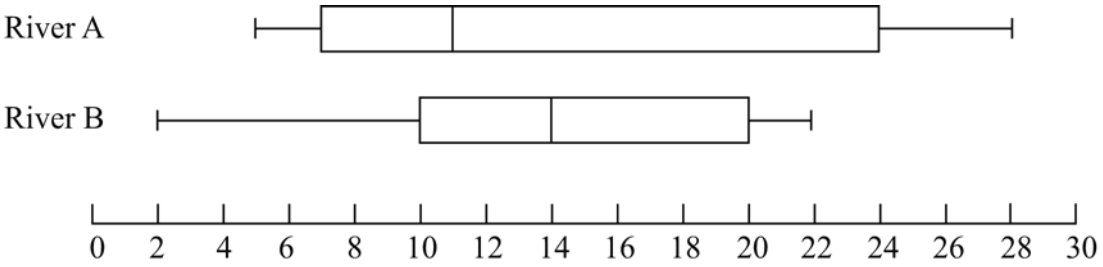
(c) A similar survey of people over the age of 55 found that they had a median of 55 hours of sleep and an interquartile range of 11 hours.

Use this information to comment on the sleeping habits of people aged over 55 compared with those of people aged under 25.

_____

_____ [1]

7 The box and whisker diagrams below show the distributions of the lengths of fish found in two rivers in Co. Tyrone.



(a) In which river are the lengths of the fish on average longer?

Explain your answer.

Answer _____ Reason _____

_____

_____ [1]

(b) In which river are the lengths of the fish more variable?

Explain your answer.

Answer _____ Reason _____

_____

_____ [1]

8 Find the **exact** value of:

(a) $64^{\frac{3}{2}} \times 9^{-1}$

Answer _____ [2]

(b) $\dfrac{3^{-3}}{5^{0} \times 16^{0.25}}$

Answer _____ [3]

(c) $216^{-\frac{2}{3}}$

Answer _____ [2]

9 **(a)** Expand and simplify

$(2x + y)(3x - 2y)$

Answer _____ [3]

(b) Simplify

$$\frac{x^2 - 9}{2x^2 + 5x - 3}$$

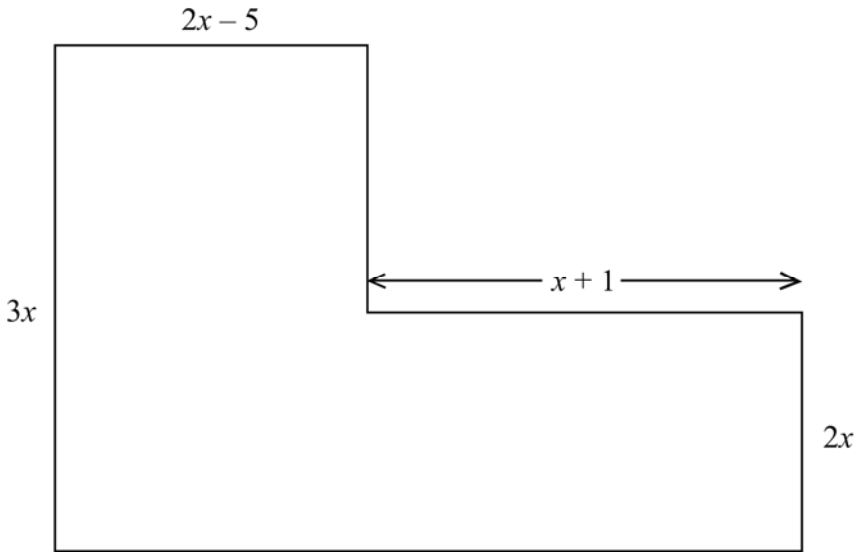
Answer _____ [3]

10 The equation of the straight line which passes through the point (0, –1) and which is perpendicular to the line $y = 4x + 3$ can be written in the form $ax + by + c = 0$, where a, b and c are all integers.

Find the values of a, b and c.

Answer a = _____, b = _____, c = _____ [3]

11



(Diagram not drawn to scale)

In the shape above, all the corners are right angles and all measurements are in cm. The total area of the shape is 35 cm^2.

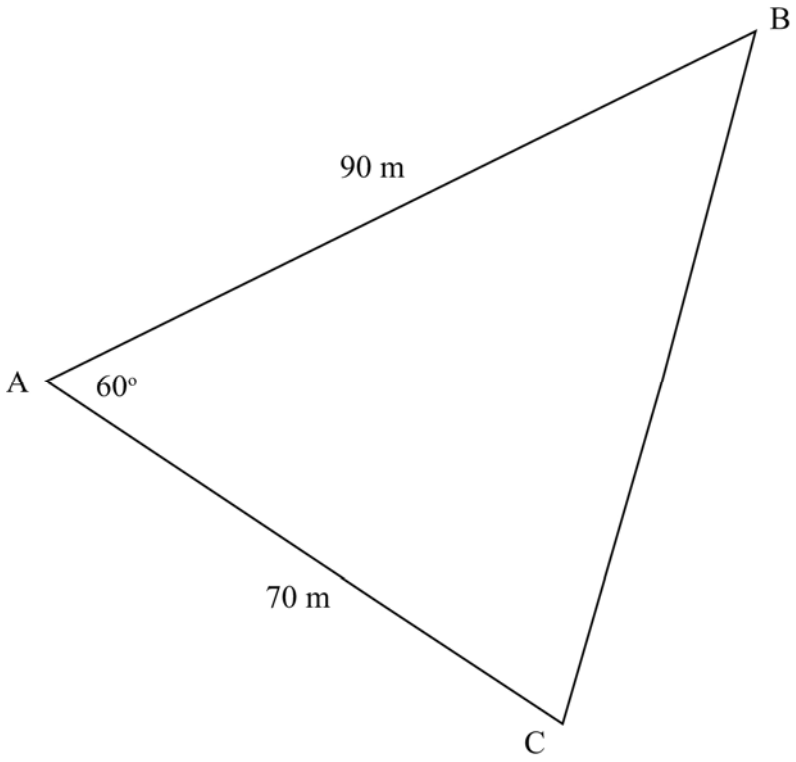
(a) Show that $8x^2 – 13x – 35 = 0$

[2]

(b) Solve $8x^2 – 13x – 35 = 0$, giving your answer correct to 3 significant figures.

Answer _____ [3]

12 The diagram shows a triangular building plot.



(Diagram not drawn to scale)

In the triangle AB = 90 m, AC = 70 m and angle BAC = 60°

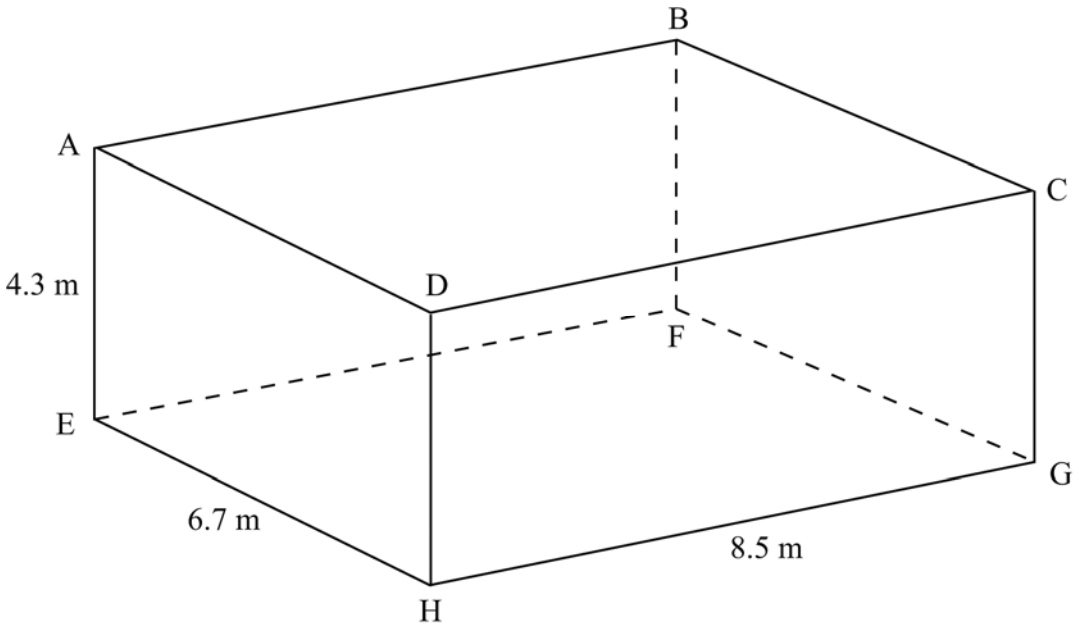
(a) Calculate the length of BC.

Answer _____ m [2]

(b) Calculate the area of triangle ABC.

Answer _____ [3]

13



(Diagram not drawn to scale)

The open box above is a cuboid with dimensions 8.5 m by 6.7 m by 4.3 m.

(a) Calculate the length AG.

Answer _____ m [2]

(b) Calculate the angle between AG and the base EFGH.

Answer _____ ° [3]

14 Which of these three equations has a rational solution?

A: $0.4x^2 = 4$ B: $4 - x^2 = 1$ C: $\frac{2}{3}x^3 = 18$

Explain your answer

Answer _____ Reason_____

_____

_____ [2]

15 **(a)** Factorise fully

$12ax^2 + 14axy - 6ay^2$

Answer _____ [3]

(b) Given that $x^2 - 14x + p \equiv (x + q)^2$,
find the values of p and q.

Answer p = _____, q = _____ [3]

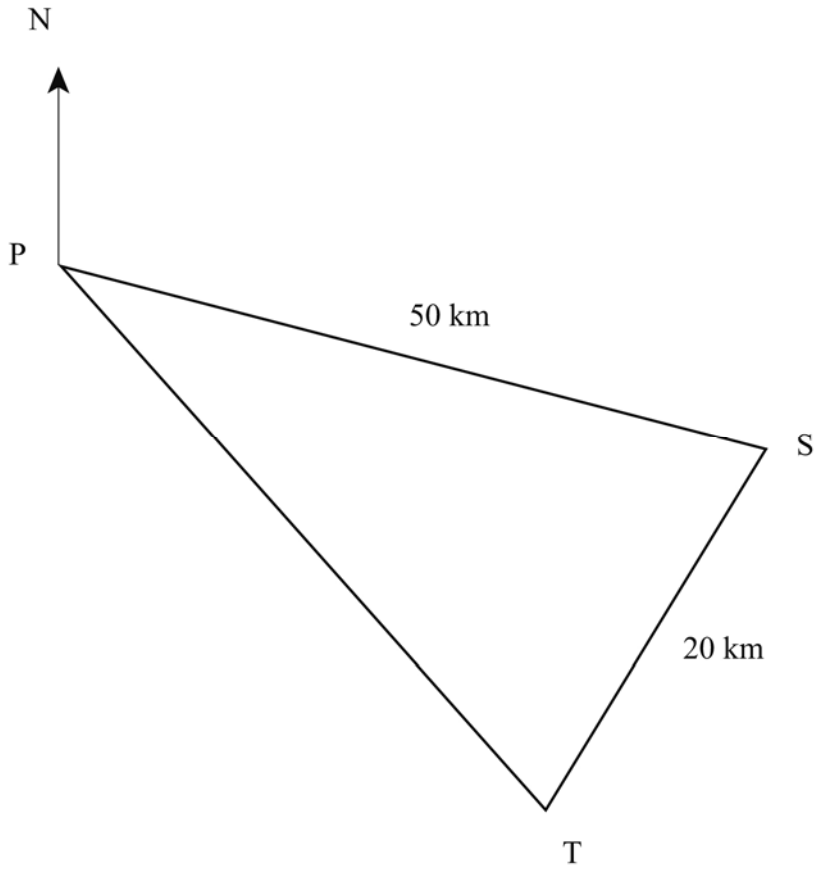
16 Solve $\frac{2x}{x-2} - \frac{4}{x+1} = 5$

A solution by trial and improvement will not be accepted.

Show clearly each step of your working out.

Answer x = _____ [7]

17



The diagram represents the position of two ships, S and T, one hour after leaving a port P.
S travelled on a bearing of 130° and is 50 km from P.
T travelled on a bearing of 153° and is 20 km from S.

(a) What is the bearing of S from T?

Answer _____ ° [2]

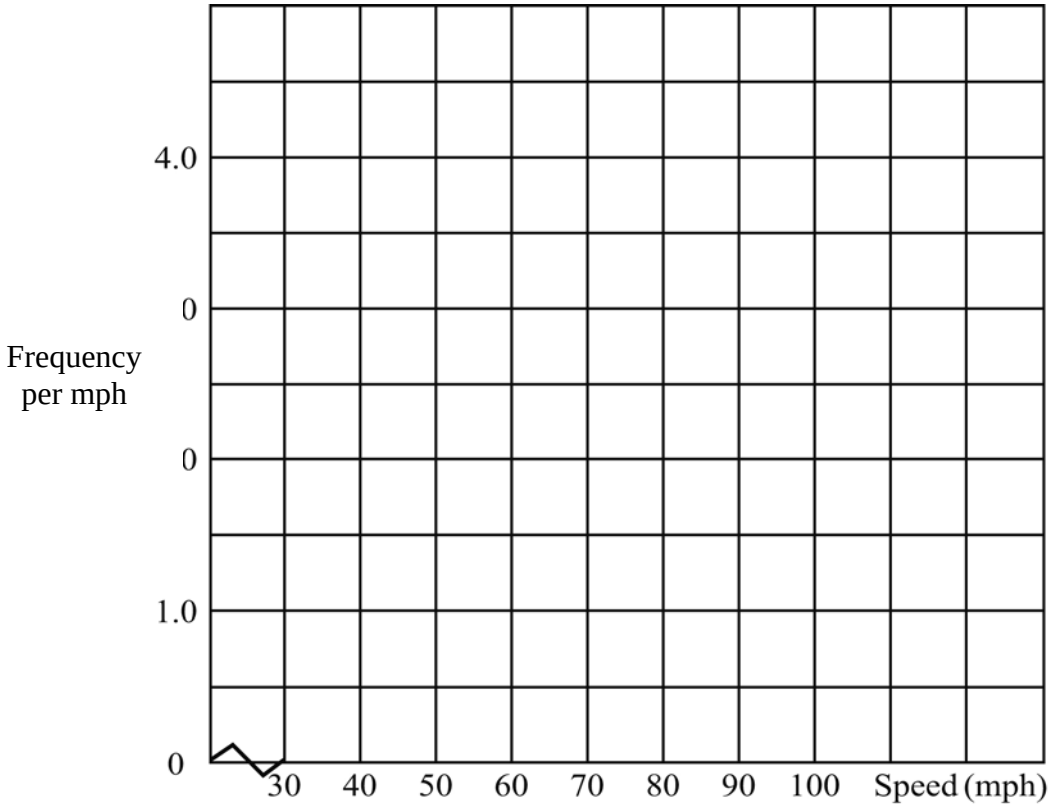
(b) Calculate how far T is from P.

Answer _____ km [2]

18 A police radar checked the speeds of cars travelling along a section of a dual-carriageway.
The results for 100 cars are shown in the table below.

Speed, S (mph)	$30 \leq S < 45$	$45 \leq S < 60$	$60 \leq S < 70$	$70 \leq S < 80$	$80 \leq S < 100$
Frequency	9	12	18	37	24

(a) Draw a histogram on the grid below to show this information. [3]



(b) The speed limit on this part of the dual-carriageway is 88 mph.

Estimate the number of cars that were over the speed limit.

Answer _____ cars [2]

(c) Estimate the median speed of the 100 cars.

Answer _____ mph [2]

19 The table below shows information about the 800 pupils at a High School.

Year Group	No. of Boys	No. of Girls
8	110	88
9	95	84
10	80	76
11	73	75
12	64	55

The editor of the school magazine wishes to carry out a survey of pupils' views about the school canteen.
He is going to do this by taking a sample of 50 pupils to answer the survey.

(a) One option is to go to the school library and select 50 pupils at random from there.

Explain why this might not produce a fair sample.

Answer

_____

_____ [1]

If the sample is to be fair, the editor decides that a stratified sample would be best.

(b) Work out the number of boys who should be in the stratified sample.

Answer _____ boys [2]

(c) How many year 8 girls should be in the stratified sample?

Answer _____ year 8 girls [2]

(d) The editor says that, according to the data in the table, there should be exactly twice as many year 8 boys in the stratified sample as year 12 girls.

Is the editor correct?

You must show working to justify your answer.

Answer _____ because _____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T5 Paper 1
(non calculator)
Foundation Tier

[CODE]

SPECIMEN EXAMINATION PAPER

TIME

1 hour

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.
Answer **all twelve** 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.

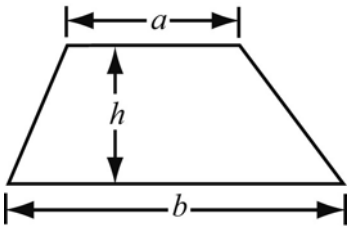
INFORMATION FOR CANDIDATES

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 8** and **10**.
You should have a ruler, compasses and protractor.
The formula sheet is overleaf.

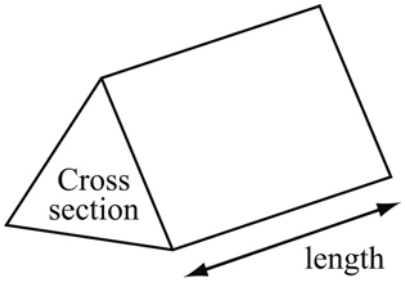
For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

Foundation Tier Formulae Sheet

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



Volume of prism = area of cross section × length



Answer **all** questions

1 **(a)** 5386 people attended a concert

Write

(i) 5386 correct to the nearest 10

Answer _____ [1]

(ii) 5386 correct to the nearest 100

Answer _____ [1]

(b) Estimate

(i) 96×7.3

Answer _____ [2]

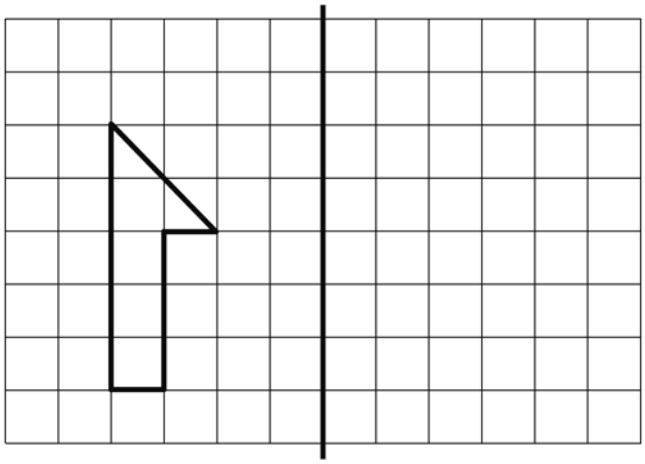
(ii) $810 \div 4.1$

Answer _____ [2]

(iii) $\sqrt{90}$

Answer _____ [1]

2 Draw the reflection of the shape below in the mirror line.



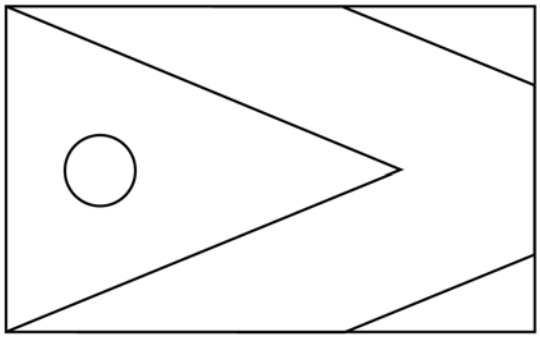
[2]

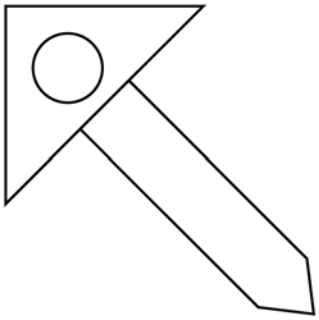
3 A book costs £3.99

How many of these books could I buy with £30?

Answer _____ [2]

4 Draw a line of symmetry on each of the following shapes.





[2]

5 Calculate

(a) $5 + 3 \times 9$

Answer _____ [1]

(b) $18 - 6 \div 2$

Answer _____ [1]

6 $R = 2S + 3T$

Find R when S = 11 and T = 5

Answer _____ [2]

7 A letter is selected at random from the word

E X A M I N A T I O N

Write down the probability that the letter selected is

(a) the letter A

Answer _____ [1]

(b) a vowel

Answer _____ [1]

(c) **not** in the word EXAM

Answer _____ [2]

8 **Your quality of written communication will be assessed in this question.**

Give four properties of a square.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

9 Laura has a box of sweets which contain nut sweets and toffee sweets.

The ratio of nut sweets to toffee sweets is 3:4

(a) There are 12 nut sweets in the box.

How many toffee sweets are there?

Answer _____ [2]

(b) Laura eats 2 nut sweets.

What fraction of the remaining sweets are nuts?

Answer _____ [2]

10 **(a)** A survey of 1000 people found that the probability of being left-handed is 0.15

What is the probability of being right-handed?

Answer _____ [1]

(b) The table below shows the results of a survey taken in a class of Year 12 pupils.

	Boys	**Girls**
Left-handed	2	1
Right-handed	13	12

A pupil is chosen at random from the class.

What is the probability that the pupil is left-handed?

Answer_____ [2]

(c) **Your quality of written communication will be assessed in this question.**

Which of the two surveys, in (a) or (b), is likely to be the more accurate?

Give a reason for your answer.

Answer _____ Reason_____

_____

_____ [3]

11 **(a)** Write down the reciprocal of 4

Answer _____ [1]

(b) Work out

$(12) \div (-4)$

Answer _____ [1]

(c) David said, "When you subtract any number from an even number you always get an even number." His teacher replied. "That's not correct, David."

Give an example to show why David's statement was incorrect.

Answer _____

_____ [2]

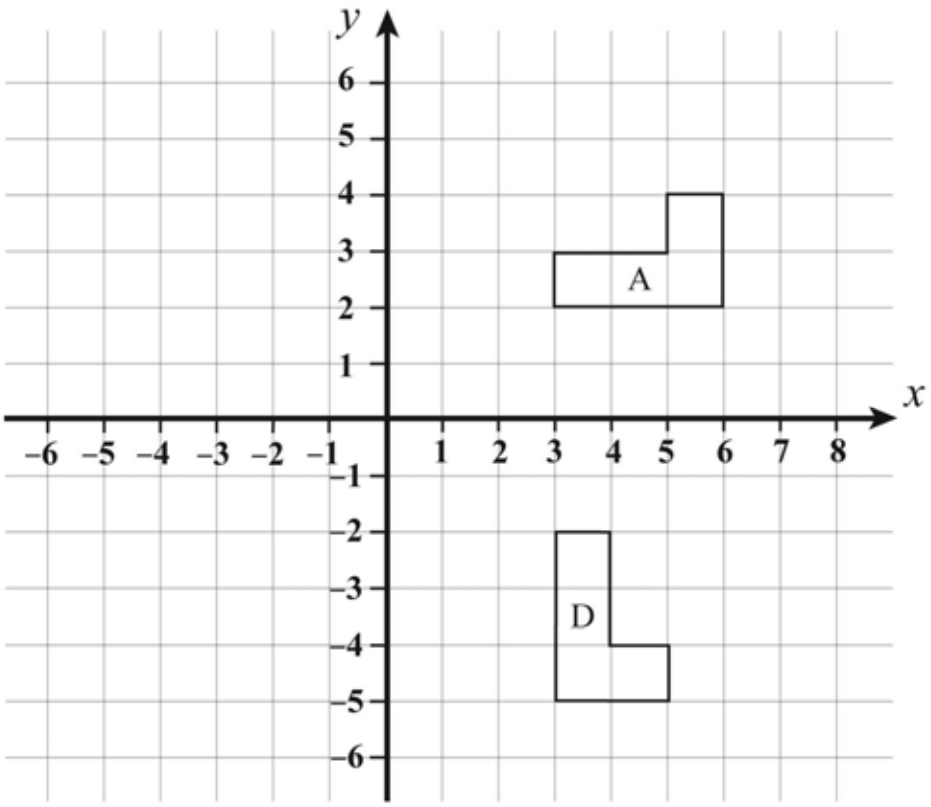
(d) Write down the **two** numbers which are the square roots of 49

Answer _____ [1]

(e) Write down the meaning of $0.\dot{5}\dot{7}$

Answer _____ [1]

12



(a) Draw the image of the shape A after a reflection in the line $x = 2$ Label it B. [2]

(b) Draw the image of the shape A after a translation $\begin{pmatrix} -7 \\ -3 \end{pmatrix}$ and label it C. [2]

(c) Describe fully the single transformation which maps the shape A onto the shape D.

Answer_____ [3]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T5 Paper 2
(With calculator)
Foundation Tier

[CODE]

SPECIMEN EXAMINATION PAPER

TIME

1 hour

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.
Answer **all twelve** questions.
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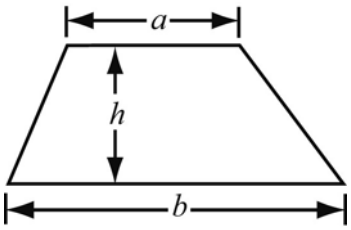
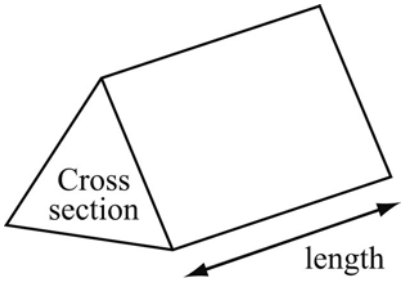
For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

Foundation Tier Formulae Sheet

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

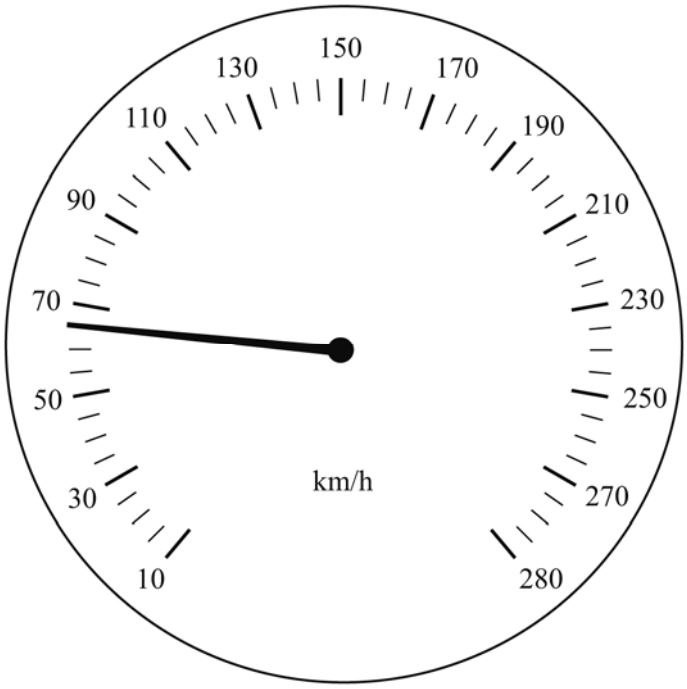


Volume of prism = area of cross section × length



Answer **all** questions

1



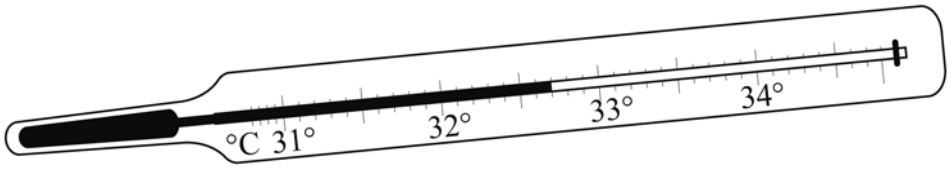
(a) The speedometer above indicates the speed in km/h.

At what speed is the vehicle travelling?

Answer _____km/hr [1]

(b) On the speedometer above draw an arrow to show a speed of 138 km/h. [1]

(c) Write down the temperature shown on the garden thermometer below.



Answer _____^{o}C [1]

2 Trudy buys a length of ribbon to make 24 badges each 5.6 cm long.

What length of ribbon should she buy?

Answer _____cm [2]

3 Gavin is a plumber. When called out to a job, he calculates the cost for the job using the formula:

Cost = £25 + rate per hour × number of hours

(a) If Gavin works for 3 hours and charges £18 per hour, what will the total cost be?

Answer £ _____ [2]

(b) Gavin charges £20 per hour and costs a job at £165

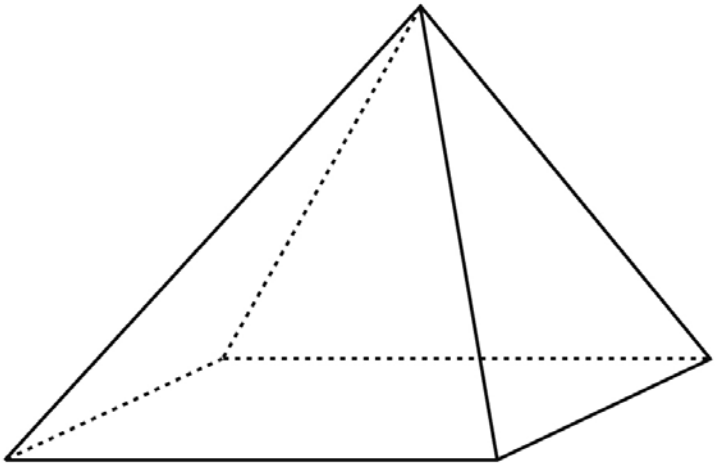
How long does he expect it will take him?

Answer _____hrs [3]

(c) What is his callout fee?

Answer £ _____ [1]

4 This diagram shows a square based pyramid.



(a) How many edges does the pyramid have?

Answer _____ [1]

(b) How many faces does the pyramid have?

Answer _____ [1]

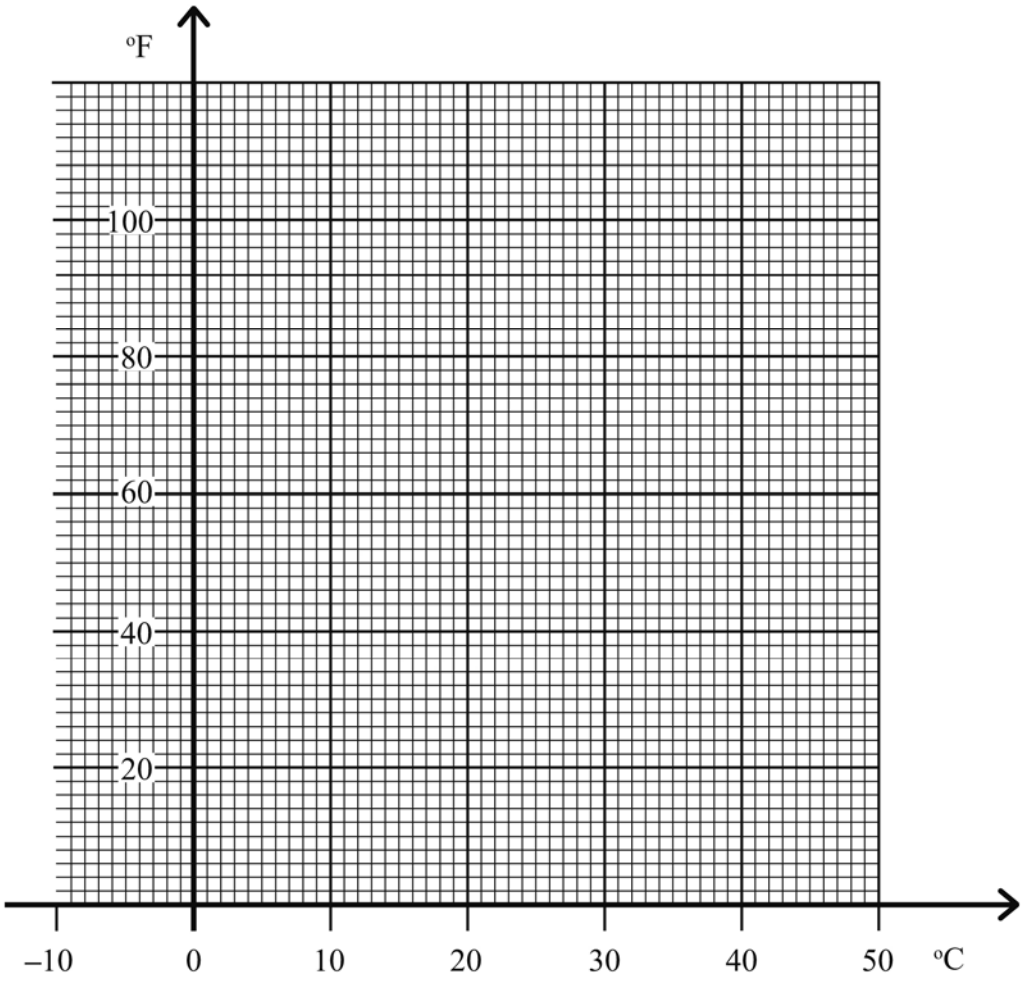
(c) How many congruent faces does the pyramid have?

Answer _____ [1]

5

°C	–5	0	5	10	15	20	25	30	35	40
°F	23	32	41	50	59	68	77	86	95	104

(a) Use the values in the table above to draw the conversion graph from °C to °F.



[3]

(b) Use the graph to convert 45°F to °C.

Answer _____ °C [1]

(c) Use the graph to convert 32°C to °F.

Answer _____ °F [1]

6 **(a)** Ciaran's soup recipe requires 2 litres of stock. His measuring jug is marked in pints.

Would 3 pints be enough?

Explain your answer.

_____

_____

_____ [2]

(b) Amanda's new baby weighs 4 kilograms. Granny wants to know the weight in pounds.

What is the baby's approximate weight in pounds?

Answer _____ pounds [2]

(c) Paul cycled 20 miles to his friend's house.

Approximately how many kilometres is this?

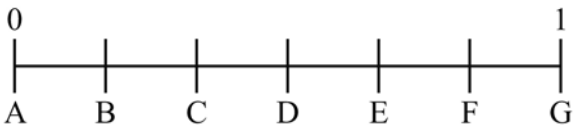
Answer _____ km [2]

(d) Paul left home at 11.40 and arrived at his friend's house at 13.35

Work out the time taken for his journey?

Answer _____ [2]

7



A fair dice, marked 1, 2, 3, 4, 5, 6 is thrown.

Choose the letter on the probability scale which best matches

(a) the probability of a score of 3

Answer _____ [1]

(b) the probability of a score of less than 3

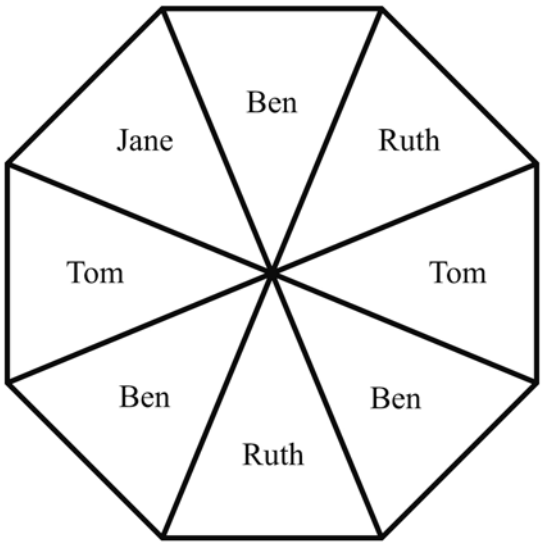
Answer _____ [1]

(c) the probability of a score of less than 8

Answer _____ [1]

8 The spinner below is a regular octagon.

It can land on any name.



(a) Which name is the spinner most likely to land on?

Answer _____ [1]

The spinner is spun 400 times.

(b) How many times would you expect the spinner to land on Ruth or Tom?

Answer_____ [2]

9 **(a)** The exchange rate is £1 = €1.12

Kate pays €14.50 for a meal

How much does this cost in pounds?

Answer £_____ [2]

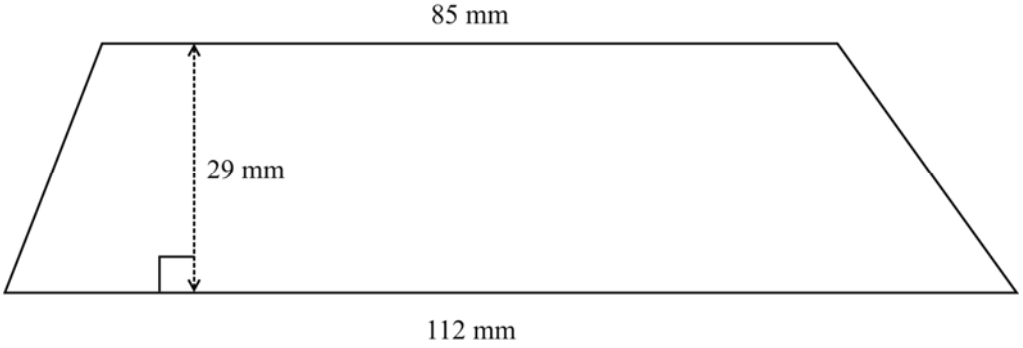
(b) Jason invests £3500 in an Individual Savings Account (ISA) for 3 years at 6% p.a.

How much simple interest does he earn?

Answer _____ [3]

(c) The diagram shows a piece of glass needed to repair a stained glass window.

Calculate the area of the glass.

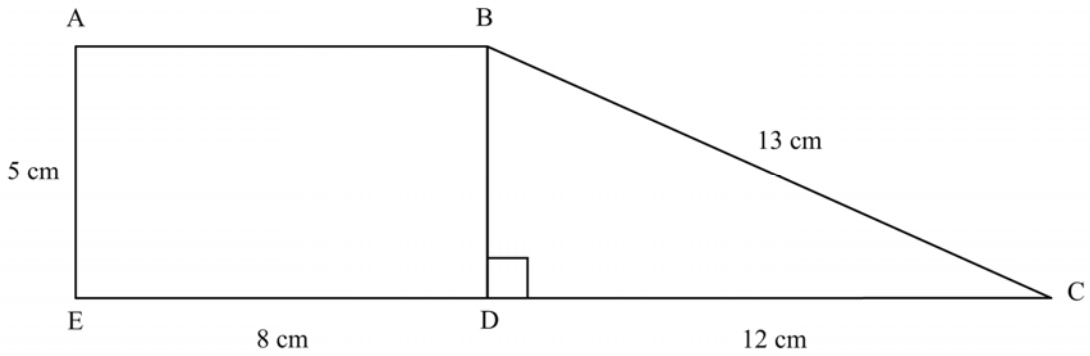


(Diagram not drawn accurately)

Give your answer to an appropriate degree of accuracy.

Answer _____ mm^2 [3]

10



(Diagram not drawn accurately)

ABDE is a rectangle and BCD is a right-angled triangle.

Calculate

(a) the perimeter of ABCDE

Answer _____cm [1]

(b) the area of ABCDE

Answer _____cm^2 [3]

11 Simplify

(a) $a^4 \times a^3$

Answer _____ [1]

(b) $\frac{b^2}{b^5}$

Answer _____ [1]

12 Solve the inequality, $-4 < 3n + 1 \leq 10$, where n is an integer.

Answer _____ [3]

THIS IS THE END OF THE QUESTION PAPER

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Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T6 Paper 1
(Non Calculator)
Higher Tier

[CODE]

SPECIMEN EXAMINATION PAPER

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.
Answer **all fifteen** questions.
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Question Number	**Marks**
1	
2	
3	
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7	
8	
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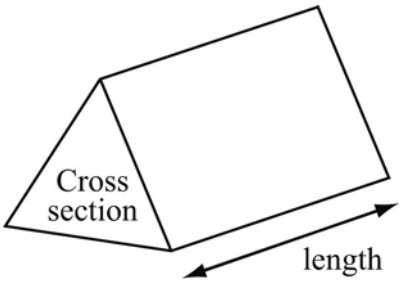
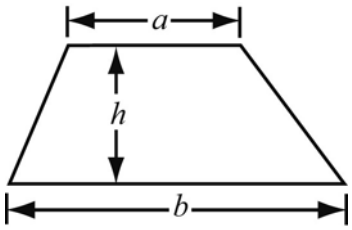
10	
11	
12	
13	
14	
15	
Total Marks	

Higher Tier Formulae Sheet

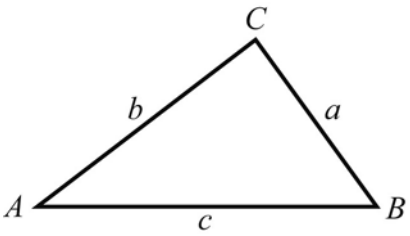
Volume of prism = area of cross section × length



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



In any triangle *ABC*



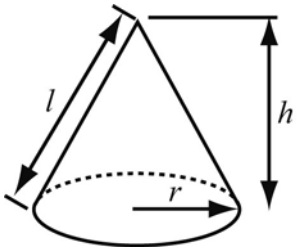
Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

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

Curved surface area of cone = πrl



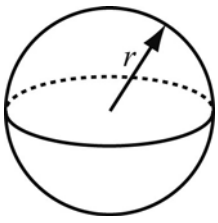
Quadratic Equation

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

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

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

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



Answer **all** questions

1 Laura has a box of sweets which contain nut sweets and toffee sweets.
The ratio of nut sweets to toffee sweets is 3:4
There are 12 nut sweets in the box.

How many toffee sweets are there?

Answer _____ [2]

2 The probability that Barry uses his mobile phone is shown below.

Reason	Photographs	Texting	Phone Calls	Other
Probability	$\frac{1}{4}$	$\frac{2}{5}$		$\frac{3}{10}$

What is the probability that Barry uses his mobile phone for phone calls?

Answer _____ [2]

3 **(a)** Solve $-6 \leq 4n < 20$ for **integer** values of n

Answer _____ [3]

(b) Illustrate the solution on the number line below.

[1]

4 **(a)** The instructions for cooking frozen salmon in an oven were:
'Cook at 400°F for 30 minutes.'
The formula to change °F to °C is:

$$C = (F - 32) \times \frac{5}{9}$$

Change 400°F to °C, giving your answer to an appropriate degree of accuracy.

Answer _____ °C [3]

(b) Rearrange $T - 14 = 10 - R$ to make R the subject.

Answer R = _____ [2]

5 **(a)** The table below shows the results of Survey 1 taken in a class of Year 12 pupils.

	Boys	**Girls**
Left-handed	2	1
Right-handed	13	12

A pupil is chosen at random from the class.

What is the probability that the pupil is left-handed?

Answer_____ [2]

(b) Survey 2 was taken from a group of 1000 people.

Which of the two surveys is likely to be the more accurate?

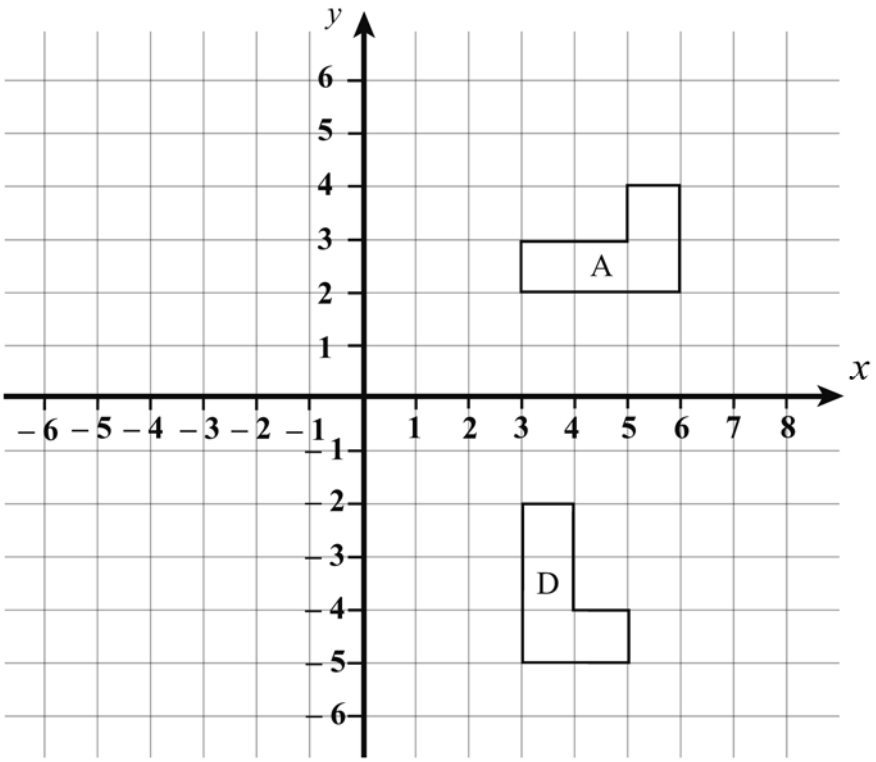
Answer Survey _____ [1]

Give a reason for your answer.

_____

_____ [1]

6



(a) Draw the image of the shape A after a reflection in the line $x = 2$. Label it B. [2]

(b) Describe fully the **single** transformation which maps the shape A onto the shape D.

Answer

_____ [3]

7 Simplify

(a) $\dfrac{a^4 \times a}{a^8}$

Answer _____ [1]

(b) $(b^4)^3$

Answer _____ [1]

8 Given that $45 \times 132 = 5940$ work out:

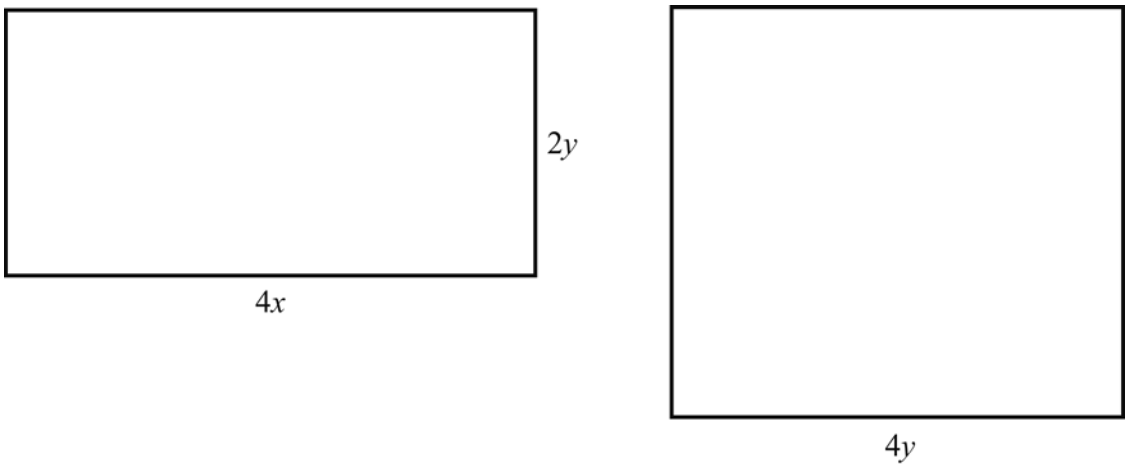
(a) 4.5×132000

Answer _____ [1]

(b) $\dfrac{594000}{13.2}$

Answer _____ [1]

9 The perimeters of the rectangle and square below are equal.

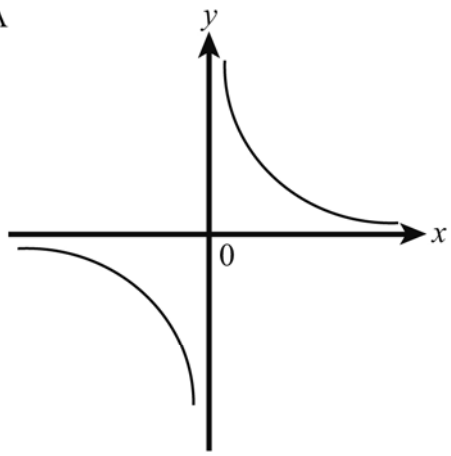


Find an expression for y in terms of x.

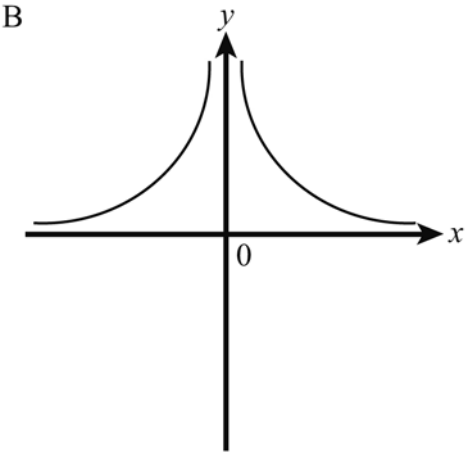
Answer y = _____ [4]

10 Look at the graphs below

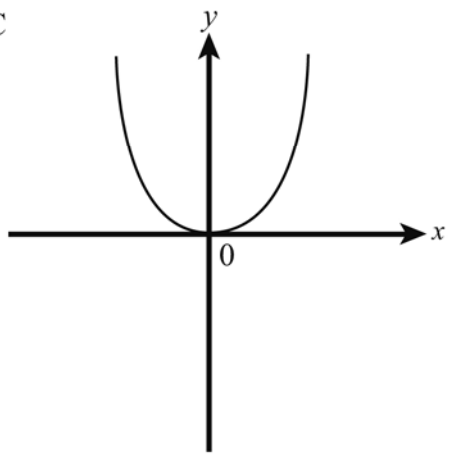
A



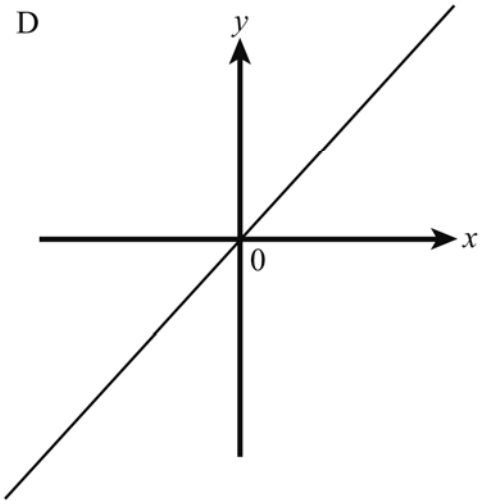
B



C



D

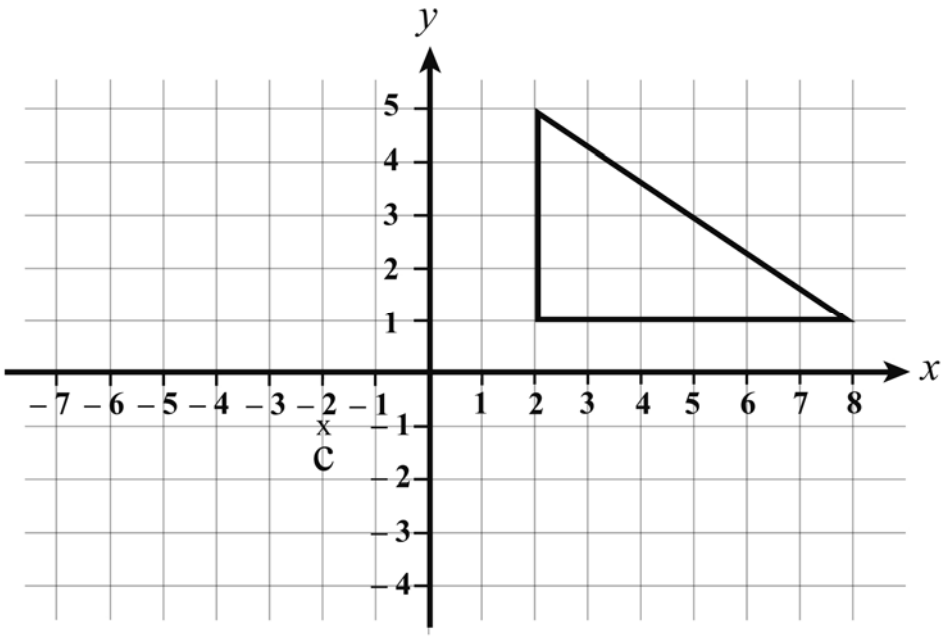


Match each of these statements to one of the graphs.

STATEMENT 1 '*y* varies as the square of *x*' Answer 1: Graph_____ [1]

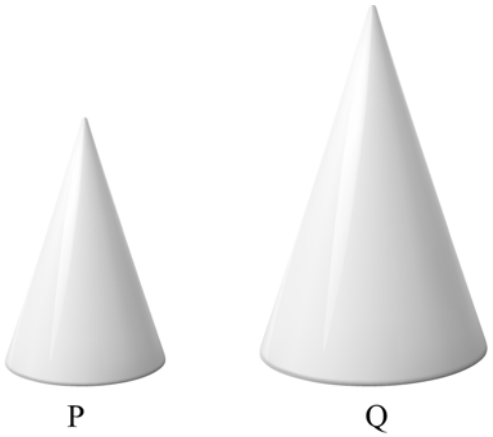
STATEMENT 2 '*y* varies as the reciprocal of *x*' Answer 2: Graph_____ [1]

11 **(a)** Enlarge the triangle on the grid by scale factor – ½ and centre C.



[2]

(b)



Two cones are similar. The radius of Q is twice the radius of P.
The volume of P is 60 cm^3.

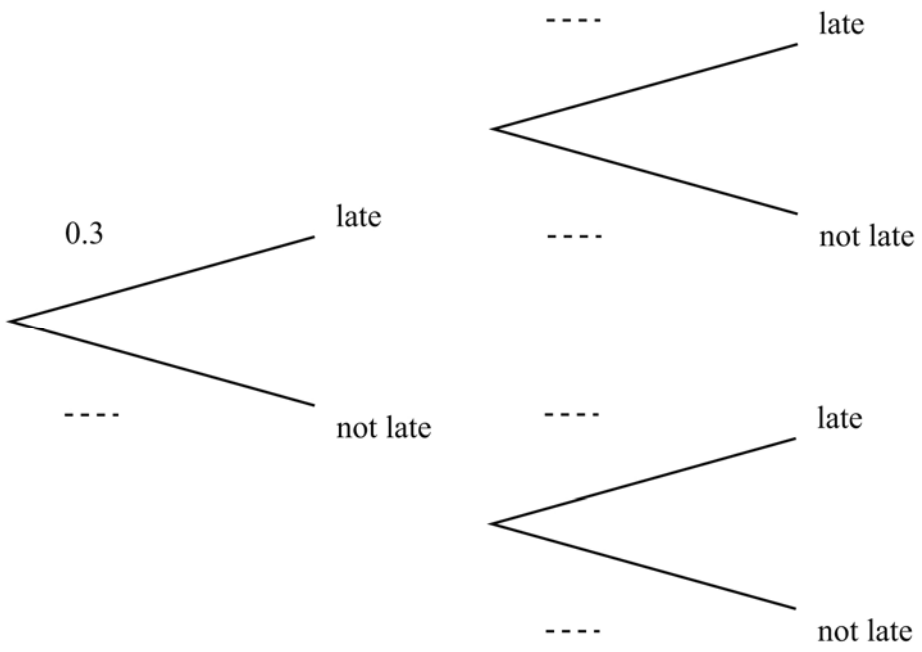
What is the volume of Q?

Answer _____ cm^3 [2]

12 Catherine travels to work by train on two days.

The probability that the train is late on any day is 0.3

(a) Complete the tree diagram to show the probabilities of the possible outcomes for the two days.



[2]

(b) What is the probability that the train will be late on at least one of the two days?

Answer_____ [3]

13 **(a)** Express the recurring decimal 0.27272727… as a fraction.

Write your answer in its simplest form.

Answer_____ [2]

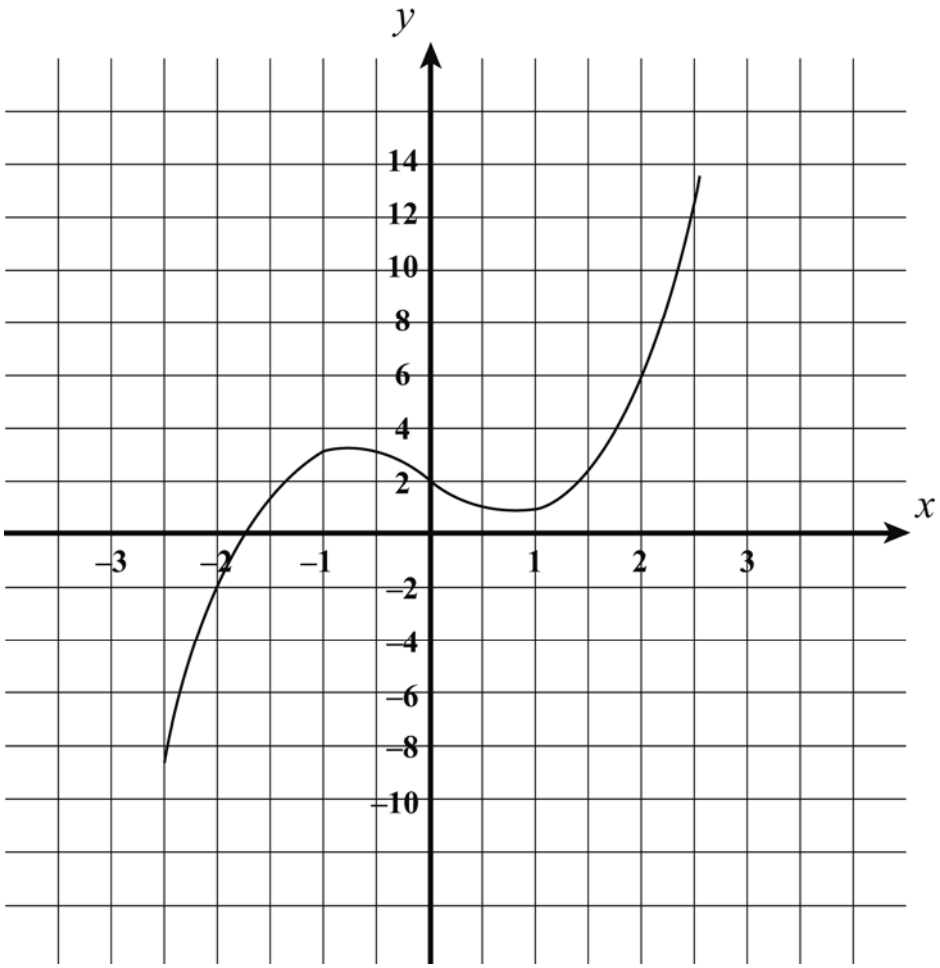
(b) Evaluate $64^{\frac{2}{3}}$

Answer_____ [2]

14 Write $(5 - \sqrt{3})^2$ in the form $a + b\sqrt{3}$

Answer_____ [2]

15 Part of the graph of $y = x^3 - 2x + 2$ is shown below



Draw an appropriate straight line on the graph above and use it to solve the equation $x^3 - 4x - 1 = 0$

Answer $x =$ _____ [3]

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Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Mathematics

Unit T6 Paper 2
(With calculator)
Higher Tier

[CODE]

SPECIMEN EXAMINATION PAPER

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.
Answer **all eleven** 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

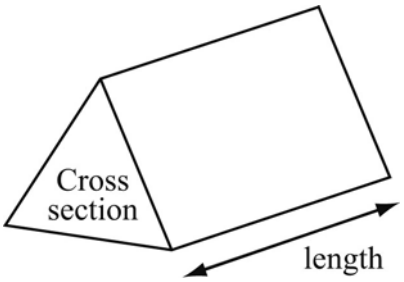
The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Functional Elements will be assessed in this paper.
Quality of written communication will be assessed in **questions 9** and **10.**
You should have a calculator, ruler, compasses and protractor.
The formula sheet is overleaf.

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

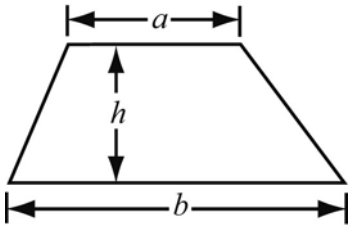
Total Marks	

Higher Tier Formulae Sheet

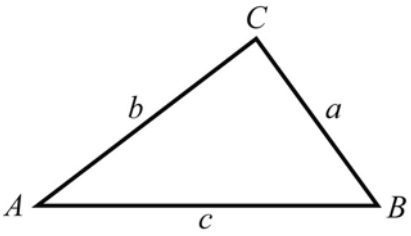
Volume of prism = area of cross section × length



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



In any triangle *ABC*



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

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

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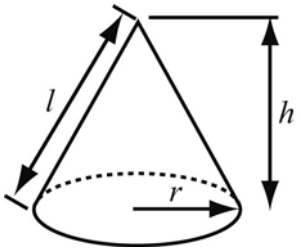

Quadratic Equation

The solutions of $ax^2+bx+c=0$
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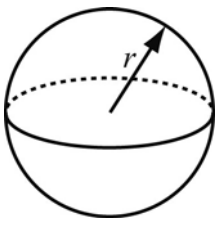
Volume of sphere = $\frac{4}{3}\pi r^3$

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



Answer **all** questions

1 250 grams of a breakfast cereal contains 105 grams of sugar.

What percentage of this cereal is sugar?

Answer _____ % [2]

2 **(a)** Expand

$5\,(2y - 3)$

Answer _____ [1]

(b) Factorise

$x^2 + 3x$

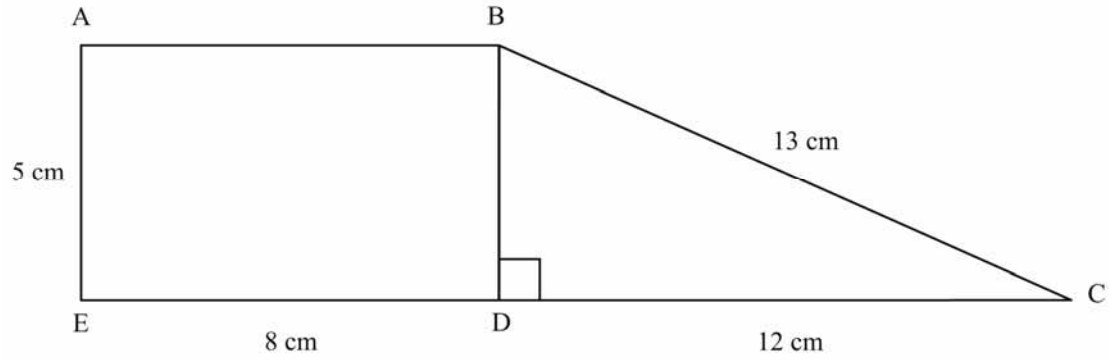
Answer _____ [1]

(c) Emma downloads n CDs, each taking 5 minutes.
She then downloads 8 DVDs, each taking n minutes

Find the total time she takes.
Give your answer in its simplest form.

Answer _____ [2]

3



ABDE is a rectangle and BCD is a right-angled triangle.

Calculate

(a) the perimeter of ABCDE

Answer _____ cm [2]

(b) the area of ABCDE

Answer _____ cm^2 [3]

4 Philip is in charge of the local youth football team. He has a budget of £300 available to spend on transport and football tops. The transport costs £84
Each football top costs £27.80

He buys *n* sports tops.

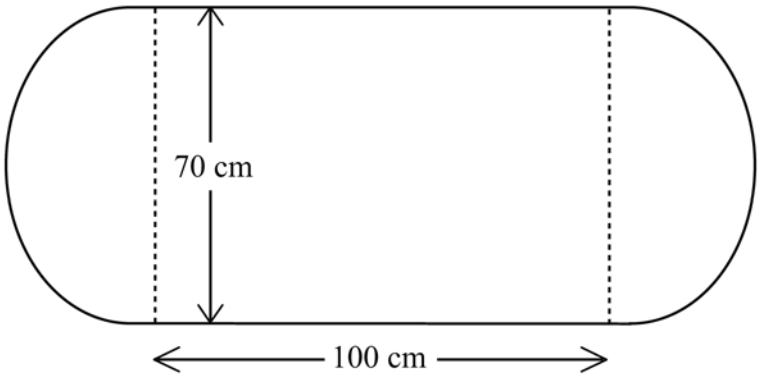
(a) Form an inequality in *n*

Answer _____ [2]

(b) Solve your inequality to find the greatest number of football tops he can buy.

Answer _____ football tops [3]

5



(Diagram not drawn accurately)

The running track shown is formed by two opposite sides of a rectangle and a semi-circle at each end. The rectangle measures 100m by 70m

Calculate

(a) the perimeter of the running track.

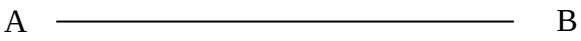
Answer _____ m [3]

(b) the total area enclosed by the running track.

Answer _____ m^2 [3]

6 The line AB below is 6 cm long.

Shade the locus of all points that are:
less than or equal to 4 cm from A **and** closer to B than A



[3]

7 The area of the earth covered by sea is approximately 362 000 000 km^2

(a) Write 362 000 000 in standard form.

Answer _____ [1]

The surface area of the Earth can be found using the formula $A = 4\pi r^2$
Where r = radius of the Earth = 6.28×10^3 km

(b) Calculate the surface area of the Earth.

Give your answer in standard form in terms of π, to 3 significant figures.

Answer _____km^2 [3]

(c) Calculate the percentage of the Earth's surface which is covered by sea.

Give your answer correct to 3 significant figures.

Answer _____ [2]

8 A formula to find the variable G is $G = aH - b$
A formula to find the variable a is $a = v(H + 1)$

Find a formula to find v in terms of a, b and G

Answer v = _____ [4]

9 The table below shows information about the shoe sizes of 25 pupils in a class.

Shoe size	Number of pupils
7	6
8	7
9	12

(a) Two pupils are chosen at random.

What is the probability that they both have the same shoe size?

Answer _____ [3]

(b) Your quality of written communication will be assessed in this question.

Exactly 3 of these 25 pupils wear glasses.
Conor says: If you choose one of the 25 pupils at random, the probability that this pupil will have either a shoe size of 7 or wears glasses is $\frac{6}{26} + \frac{3}{26} = \frac{9}{26}$

Is Conor correct?

Answer _____

Explain your answer

_____

_____

_____ [2]

10 Rosalyn wants to test the following hypothesis:

"The local leisure centre is mainly used by women aged 30–39."

Rosalyn uses the following data capture form to collect her data.

Do you use the local leisure centre? Yes ☐ No ☐

How old are you? 15–25 ☐ 25–35 ☐ 35–45 ☐

How often do you use the leisure centre?

☐

What do you use the leisure centre for?

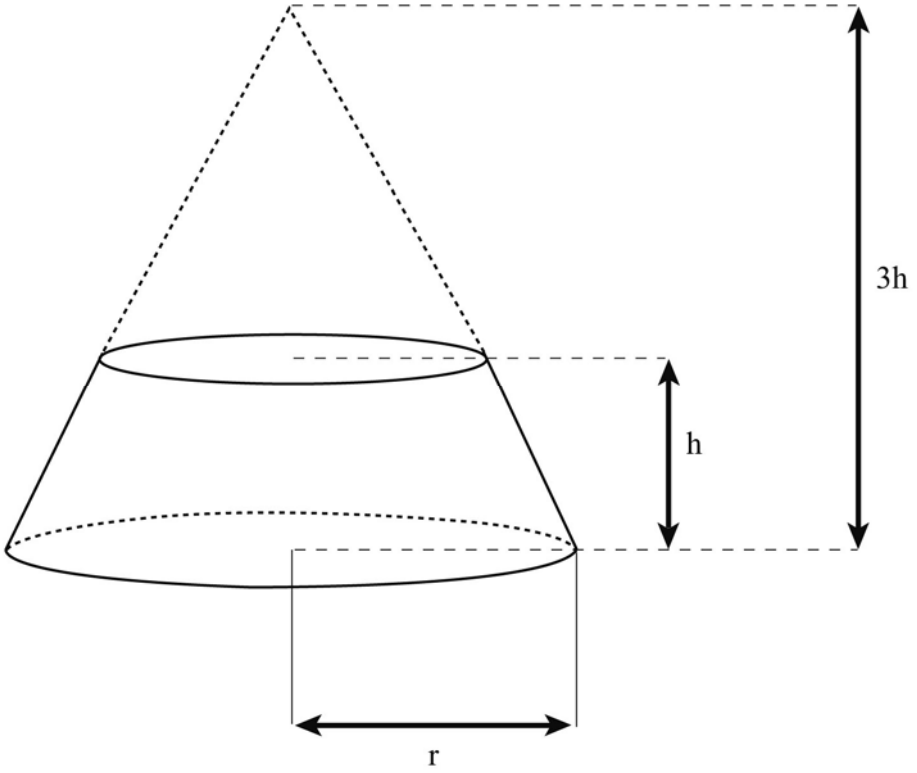
Swimming ☐ Yoga ☐ Step Class ☐ Aerobics ☐

Discuss whether Rosalyn's data capture form is appropriate or not and suggest your own changes.

Your quality of written communication will be assessed in this question.

[6]

11 Work out an expression for the volume of the frustrum of the cone shown below.
Give your answer in terms of π, r and h.



Answer _____ [4]

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MARK SCHEMES DIVIDER PAPER FRONT

MARK SCHEMES DIVIDER PAPER BACK

General Certificate of Secondary Education

Mathematics

GENERAL MARKING INSTRUCTIONS

GCSE MATHEMATICS

Introduction
The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **A** and **MA** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

A indicates marks for accurate working, whether in calculation, readings from tables, graphs or answers.

MA indicates marks for combined method and accurate working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

It should be noted that where an error trivialises a question, or changes the nature of the skills being tested, then as a general rule, it would be the case that not more than half the marks for that question or part of that question would be awarded; in some cases the error may be such that no marks would be awarded.

Positive marking:
It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

(a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;

(b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examiner).

General Certificate of Secondary Education
2011

Mathematics

Unit T1
Foundation Tier

[CODE]

SPECIMEN

MARK SCHEME

1	**(a)**	0.8	A1		
	(b)	35%	A1		
	(c)	48,000,000	A1		
	(d)	**(i)** 5730	A1		
		(ii) 5700	A1		5
2	**(a)**	26, 31	A1,A1		
		Add on 5 each time	A1		
	(b)	3.2	A1		4
3	Any 2 answers from the following combinations		A1, A1		2
	48×1 24×2 12×4 8×6				
4	**(a)**	Frequencies: 3, 7, 9, 5, 4	A1		
	(b)	Scales, bars (Allow A1 for 4 correct)	A1, A2		
	(c)	White	A1		
	(d)	3/34	A1		6
5	**(a)**	**(i)** Correct shading	A1		
		(ii) Chord	A1		
	(b)	**(i)** Correct shading	A1		
		(ii) Radius	A1		4

6	**(a)**	2007	A1		
	(b)	Line graph or bar chart	A1		
		Shows improvement between each year	A2 (QWC)		
		Correct response	A1		4
7	**(a)**	**(i)** 25, 35	A1		
		(ii) 9, 27	A1		
	(b)	**(i)** $\frac{157}{7} = 22.4$	M1, A1		
		(ii) 25	M1, A1		6
8	**(a)**	$75 \times 20/100$	MA1		
		£15.00	A1		
	(b)	£60.00	MA1		3
9	$2p + 3r$		A1, A1		2
10	**(a)**	$6 \times 67 = 402$	MA1,		
		$500 - 402 = 98$	A1		
		£0.98			
	(b)	5kg of potatoes cost £3.10	MA1		
		2kg of onions cost £4.10 – £3.10 = £1.00	MA1		
		1 kg of onions cost £0.50	MA1		
		Total = £0.62 + £0.50 = £1.12	MA1		6
11	$6.4 \times 3.2 \times 2.6$		MA1		
	$= 53.248$		A1		
	$53.248m^3$		Units A1		3

12 **(a)** 1.2 A1

(b) 21.952 A1

(c) 6.59 A1

(d) 75 M1, A1

(e) 27.96 M1, A1 7

13 **(a)** -1^{o} A1

(b) London and Paris A1, A1

(c) 9°C A1 4

14 **(a)** 20 A1

(b) 79% A1

(c) 51% A1 3

15 **(a)** $20 \times 16.5 = 330$ M1, A1

(b) $\frac{8 \times 10}{2} = 40$ M1, A1

(c) $2(20 + 16.5) = 73$ M1, A1 6

16 **(a)** $\frac{6}{8} = \frac{3}{4}$ M1, A1

(b) 25% A1 3

17 $\frac{16}{28}, \frac{12}{16}$ A1, A1 2

18 **(a)** $54° \pm 2°$ A1

(b) $\frac{1}{4}$ A1

(c) $\frac{72}{360} \times 300 = 60$ M1, A1 4

19 **(a)** $3x + 3$ M1, A1

(b) $2y = 16$
$y = 8$ M1, A1 4

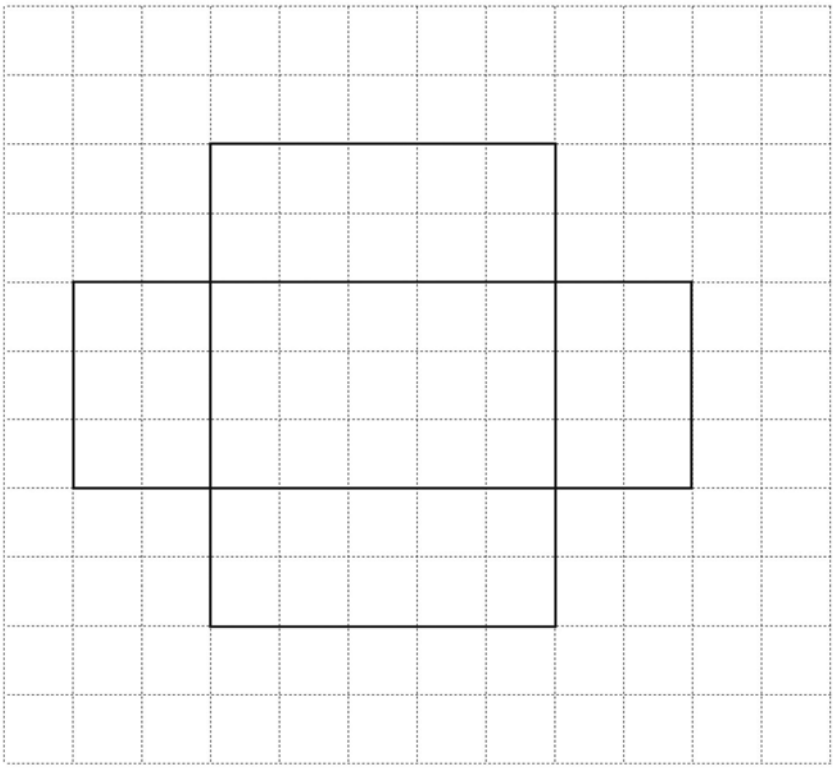
20 **(a)** Points plotted correctly A1, A1, A1

(b) Parallelogram A1 4

21 **(a)** $x = 102°$ A1

(b) $y = 143°$ A1 2

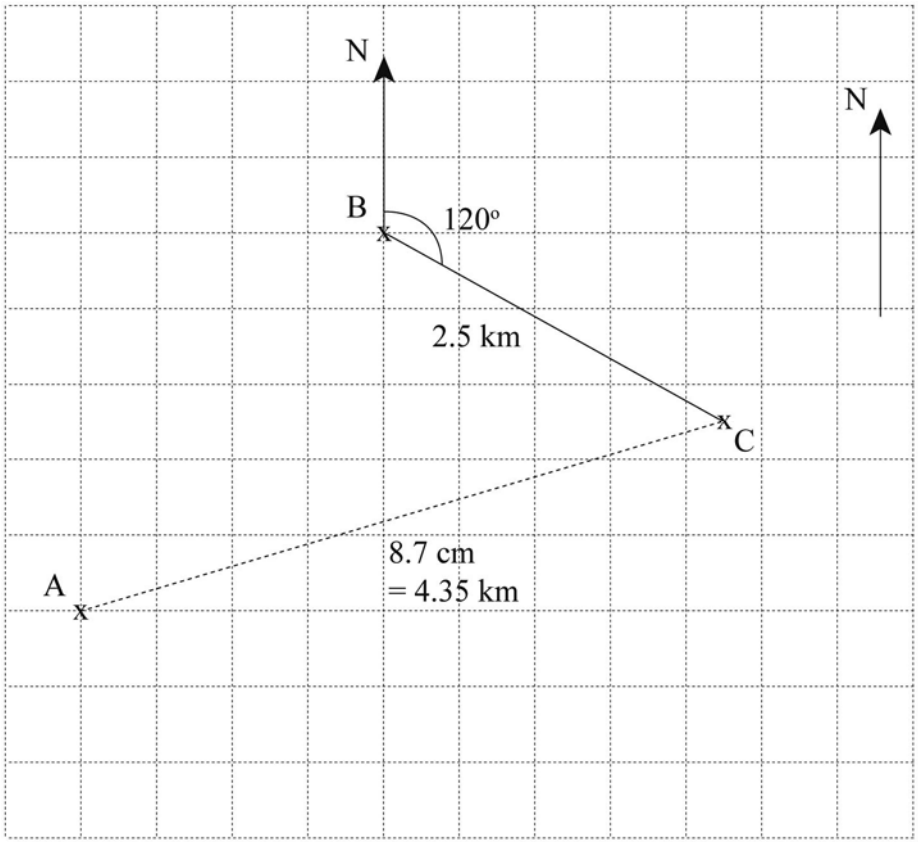
22



M1, A2 3

23 1/5 of £900 = £180 MA1
1/4 of £900 = £225 MA1
£180 + £225 = £405 MA1
£900 – £405 = £495 MA1
(QWC) 4

24



(a) Correct position of C MA2

(b) Distance approximately 7.2 cm MA2
Actual distance approximately 3.6 km A1 5

25 Angles 30°, 75°, 60°, 45°, 30°, 120° MA2

Sectors, labels A2 4

Total Marks 100

General Certificate of Secondary Education
2011

Mathematics

Unit T2
Foundation Tier

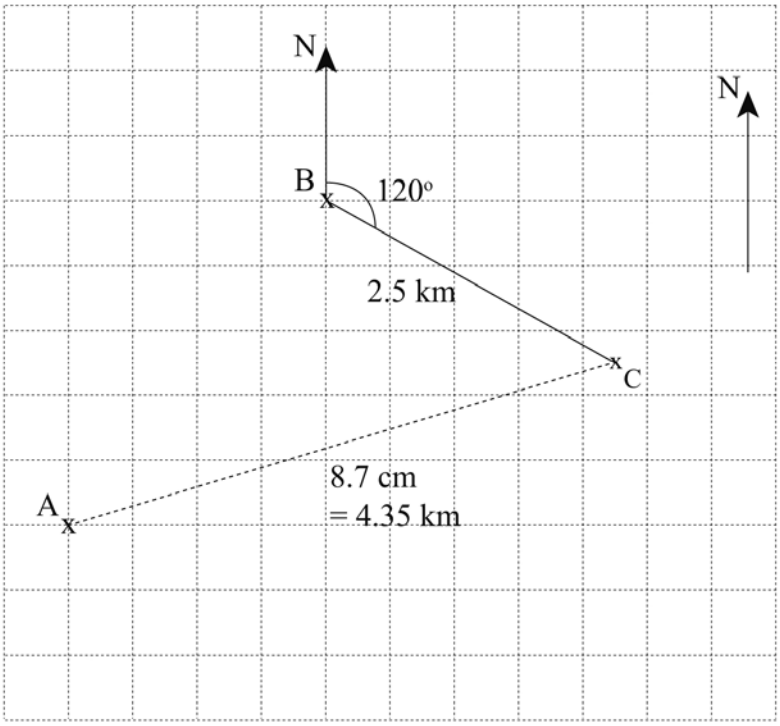
[CODE]

SPECIMEN

MARK SCHEME

1	5kg of potatoes cost £3.10		MA1	
	2kg of onions cost £4.10 − £3.10 = £1.00		MA1	
	1 kg of onions cost £0.50		MA1	
	Total = £0.62 + £0.50 = £1.12		MA1	4
2	**(a)**	$2p + 3r$	A1, A1	
	(b)	$-4y + 6$	A1, A1	4
3	**(a)**	21.952	A1	
	(b)	6.59	A1	
	(c)	9.22 (Allow 9.2, 9.2235, 9.224)	A2	4
4	**(a)**	20	A1	
	(b)	79%	A1	
	(c)	51%	A1	3
5	1/5 of £900 = £180		MA1	
	1/4 of £900 = £225		MA1	
	£180 + £225 = £405		MA1	
	£900 – £405 = £495		MA1	
			(QWC)	4

6



Line from B at correct bearing $120 \pm 2°$	A1	
C shown on line, 5cm from B	M1, A1	
Line measured from A to C = 8.7cm	A1	
$4.35\text{km} \pm 0.5$ km	A1	
(Allow FT from first part)		5

7 Angles 30°, 75°, 60°, 45°, 30°, 120° M1

Sector, labels A2, A1 4

8 **(a)** $x = 60$ A1

(b) $6y = 15$ A1

$y = 2.5$ MA1 3

9 1, –4 A1, A1 2

10 **(a)** $48 \div (4 \times 3)$ MA1

$= 4$ MA1

cm Units A1

(b) $4 \times 6 \times 2$

$8 \times 3 \times 2$

$48 \times 1 \times 1$

$24 \times 2 \times 1$ or any other suitable combination A1 4

11	**(a)**	3.68125	A1	
		3.7	A1	
	(b)	£790 × 0.15 = £118.50	M1, A1	
		790 – 118.50 = £671.50	A1	
	(c)	$\frac{3}{5} \times 7 = \frac{21}{5} = 4\frac{1}{5}$	M1, A1	
		5 cartons	A1	8
12		$35x + 50y$	A1, A1	2
13		Correct graph (Allow A1 for 1 point, A2 for 2 points)	A3	3
14		$x + 3x + 97 + 79 = 360$	MA1	
		$4x + 176 = 360$	MA1	
		$4x = 184$	MA1	
		$x = 46$	A1	4
15	**(a)**	½ × 8.5 × 6.4 = 27.2	M1, A1	
	(b)	360° ÷ 5 = 72°	M1, A1	4
16		$\pi \times 1.5^2 = 7.0685\ldots$	M1, A1	2
17	**(a)** **(i)**	A2 all bars drawn to the correct height (A1 if only 1 incorrect) A1 for appropriate scales on both axes.	A3	
	(ii)	16 – 20	A1	
	(b)	Suitable answer, e.g. Sample is made up of young people/teenagers. Sample does not represent all age groups. The pupils in her school may not come from her town.	A1 (QWC)	6
		Correct response	A1	

18 **(a)** $72 = 2 \times 2 \times 2 \times 3 \times 3$ M1, A1

(b) $108 = 2 \times 2 \times 3 \times 3 \times 3$ A1
LCM $= 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 216$ MA1

(c) HCF $= 2 \times 2 \times 3 \times 3 = 36$ M1, A1 6

19 Year 1 = £1771.40 MA1
Year 2 = £1845.80 MA1
Year 3 = £1923.32 MA1 3

20 **(a)** $8 - 12x + 3x + 12$ MA1
$-9x + 20$ MA1

(b) $x^3 - 6x$ A1, A1

(c) $7x + 18 = 2x - 12$ MA1
$5x = -30$ MA1
$x = -6$ MA1 7

21 **(a)** $\frac{360}{18} = 20$ sides M1, A1

(b) $80^2 + x^2 = 100^2$ M1, A1
$x = 60$ cm MA1
Area of end $= 80 \times 60/2$ MA1
$= 2400\text{cm}^2$ MA1
Vol $= 2400 \times 120 = 288{,}000$ MA1 8

22 **(a)** Midpoint values 1.5, 4.5, 7.5, 10.5, 13.5, 17.5 A1
fx values 3, 22.5, 82.5, 126, 202.5, 87.5 MA1
Sum of *fx* values = 524 MA1
524/ 50 = 10.48 MA1

(b) $9 \leq h \leq 12$ A1 5

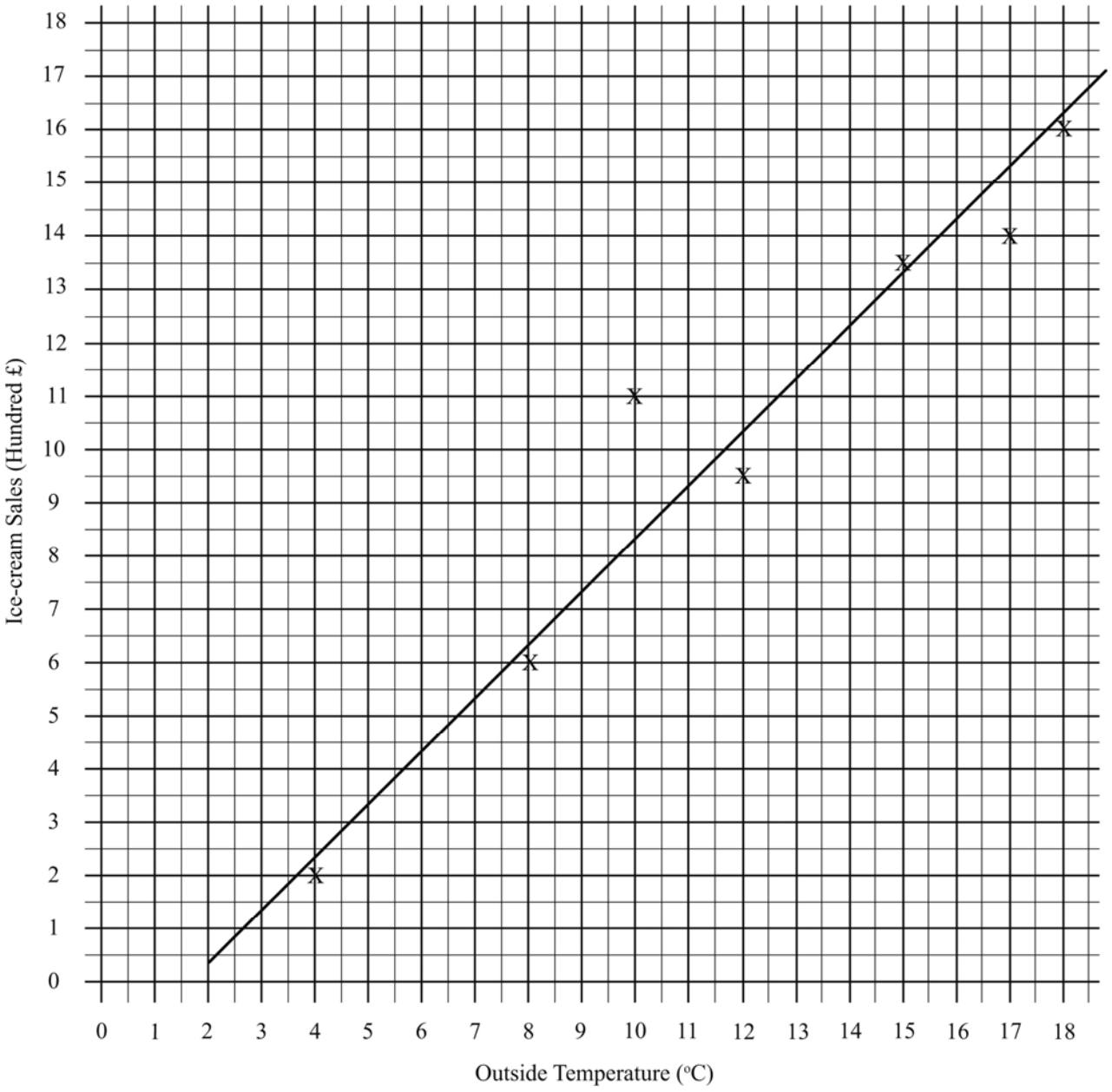
23 **(a)** See overlay 7 correct points MA2
(Allow A1 for 5 correct points)

(b) Positive correlation A1

(c) Line of best fit A1

(d) To predict how many ice-creams would be sold at different temperatures A1 5

Total Marks 100



General Certificate of Secondary Education
2011

Mathematics

Unit T3
Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

1	**(a)**	3.68125	A1	
		3.7	A1	
	(b)	£790 × 0.15 = £118.50	A1	
		790 – 118.50 = £671.50	A1	
	(c)	$\frac{3}{5} \times 7 = \frac{21}{5} = 4\frac{1}{5}$	M1, A1	
		5 cartons	A1	7
2		$35x + 50y$	A1, A1	2
3		Correct graph (A1 for 1 point correct, A2 for 2 points)	A3	3
4		$x + 3x + 97 + 79 = 360$	MA1	
		$4x + 176 = 360$	MA1	
		$4x = 184$	MA1	
		$x = 46$	A1	4
5	**(a)**	$\frac{1}{2} \times 8.5 \times 6.4 = 27.2$	M1, A1	
	(b)	360 ÷ 5 = 72	M1, A1	4
6		Minimum = 3.205 m	A1	
		Maximum = 3.215 m	A1	2
7	**(a)**	$\frac{45}{360} \times \pi \times 18$	MA1	
		7.07	A1	
		7.07 + 18 = 25.07	MA1	
	(b)	$\frac{45}{360} \times \pi \times 9^2$		
		31.8 cm^2	A1	5

8

1	1	3	6	8	9
2	2	6	7		
3	2	4	4	5	
4	4	6			

Key 3|2 means 32 A1
correct stems A1
correct ordered leaves A1 3

9 **(a)** All bars drawn to the correct height (A1 if only 1 incorrect) A2
Appropriate scales on both axes. A1

(b) 16 – 20 A1 4

10 **(a)** $72 = 2 \times 2 \times 2 \times 3 \times 3$ M1, A1

(b) $108 = 2 \times 2 \times 3 \times 3 \times 3$ M1, A1
LCM $= 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 216$

(c) HCF $= 2 \times 2 \times 3 \times 3 = 36$ M1, A1 6

11 Year 1 = £1771.40 MA1
Year 2 = £1845.80 MA1
Year 3 = £1923.32 MA1 3

12 **(a)** $8 - 12x + 3x + 12$ MA1
$-9x + 20$ MA1

(b) $x^3 - 6x$ A1, A1

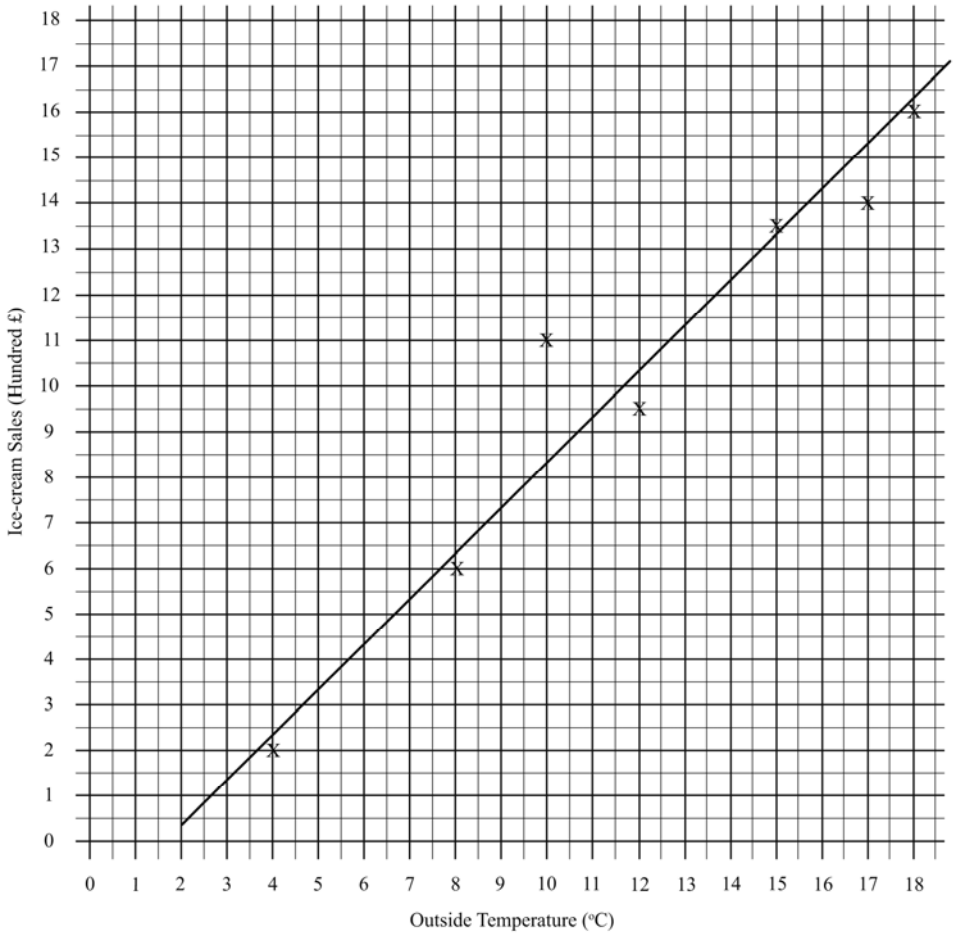
(c) $7x + 18 = 2x - 12$ MA1
$5x = -30$ MA1
$x = -6$ MA1 7

13	**(a)**	$\frac{360}{18} = 20$ sides	M1, A1	
	(b)	$80^2 + x^2 = 100^2$	MA1	
		$x = 60$ cm	M1, A1	
		Area of end $= 80 \times 60/2$	MA1	
		$= 2400$ cm^2	MA1	
		Vol $= 2400 \times 120 = 288{,}000$cm^3	MA1	8
14	**(a)**	Midpoint values 1.5, 4.5, 7.5, 10.5, 13.5, 17.5	A1	
		fx values 3, 22.5, 82.5, 126, 202.5, 87.5	MA1	
		Sum of *fx* values = 524	MA1	
		524/50 = 10.48	MA1	
	(b)	student $9 \le h < 12$	A1	5

15 **(a)** See overlay 7 correct points MA2
(allow A1 for 5 correct points)

(b) The graph shows positive correlation A2 (QWC)

(c) Line of best fit A1 5



16 **(a)** $12500 - 7600 = 4900$ MA1

$\frac{4900}{12500} \times 100 = 39.2\%$ A1

(b) 3×0.6
1.8×0.6
1.08×0.6
0.648×0.6
0.3888 M1
4 times A1

(c) $65\% = 117$ MA1

Original price $= \frac{117}{65} \times 100 = £180$ M1, A1 7

17 **(a)** **(i)** $(x + 4)(x – 3)$ MA2

(ii) $x = – 4$, $x = 3$ (A1 both correct) A1

(b) $3(x + 3) – 4(2x – 1) = 3$ M1, A1
$3x + 9 – 8x + 4 = 3$
$–5x + 13 = 3$ MA1
$–5x = –10$ MA1
$x = 2$ (QWC) (4)

(c) $6y – 15x = 54$ or $4y – 10x = 36$
$6y + 4x = –22$ $15y + 10x = −55$ M1, A1
$–19x = 76$ $19y = −19$
$x = −4$ $y = −1$ MA1

$2y + 20 = 18$ $−3 + 2x = −11$ MA1
$y = −1$ $x = −4$ MA1
(QWC) (5) 12

18 **(a)** $\text{Tan } 37° = \frac{AB}{85}$ MA1
$AB = 85 \times \tan 37°$ MA1
$AB = 64(052..)$ A1

(b) $\frac{QT}{5} = \frac{3.1}{7.5}$ MA1
$QT = 2.0666….$ MA1
$QT = 2.07$ A1 6

19 **(a)**

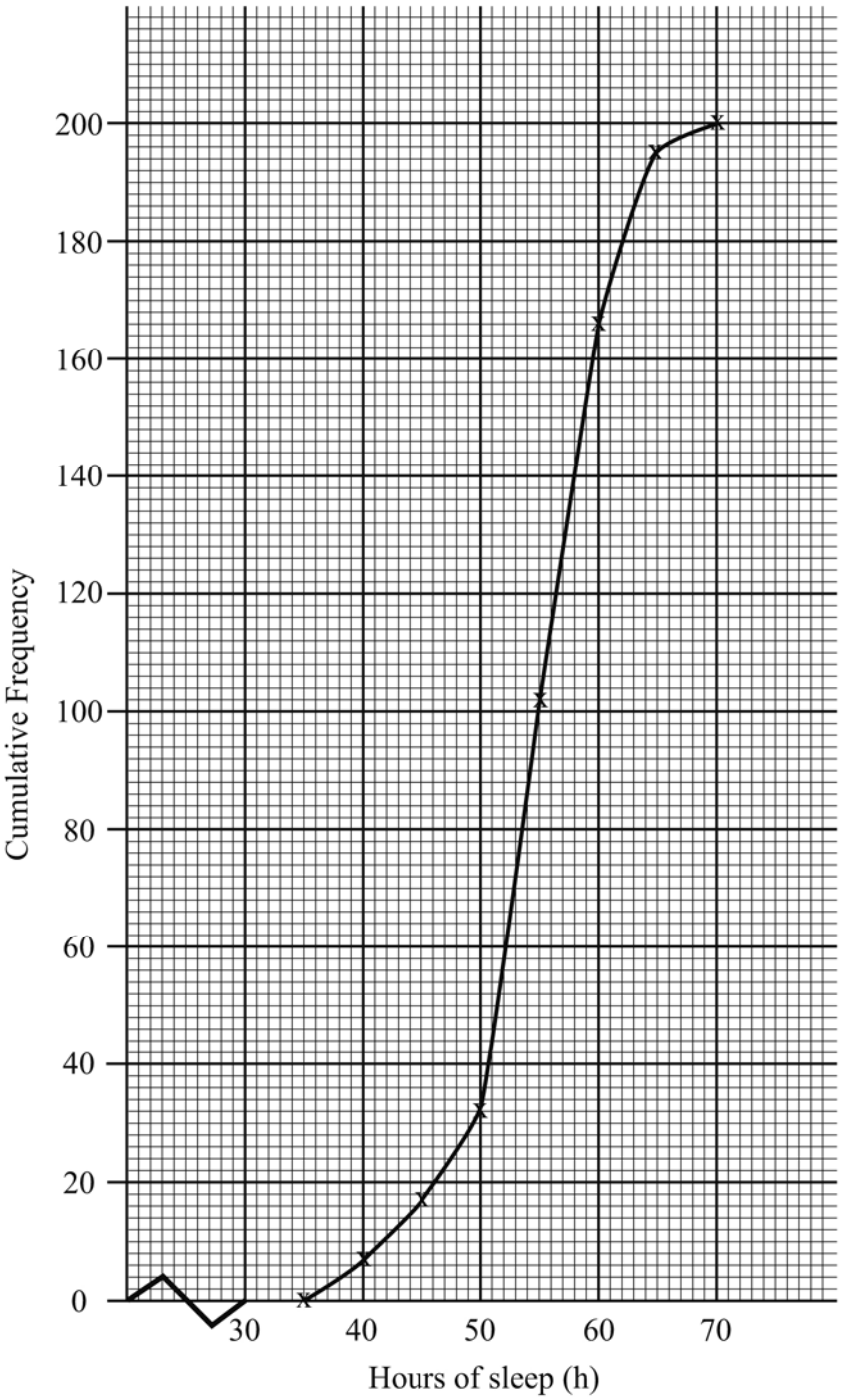
Hours of sleep (h)	h≤35	h≤40	≤45	h≤50	h≤55	h≤60	h≤65	h≤70
Frequency	0	7	17	33	102	166	195	200

Cumulative frequency values in table complete MA1
All eight points plotted correctly A2
5, 6 or 7 points plotted correctly A1
Points joined with a smooth curve A1

(b) **(i)** 55 hours A1

(ii) 58 – 52 = 6 hours MA2 7

Total Marks 100


200
180
160
140
120
100
80
60
40
20
0
Cumulative Frequency
30
40
50
60
70
Hours of sleep (h)

General Certificate of Secondary Education
2011

Mathematics

Unit T4
Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

1 **(a)** 3×0.6
1.8×0.6
1.08×0.6
0.648×0.6
0.3888 M1
4 times A1

(b) 65% = 117 MA1
Original price = $\frac{117}{65} \times 100 = £180$
M1, A1 5

2 **(a)** **(i)** $(x + 4)(x - 3)$ MA2

(ii) $x = -4, x = 3$ A1

(b) $3(x + 3) - 4(2x - 1) = 3$ M1, A1
$3x + 9 - 8x + 4 = 3$
$-5x + 13 = 3$ MA1
$-5x = -10$ MA1
$x = 2$ (QWC) (4)

(c) $6y - 15x = 54$ or $4y - 10x = 36$ M1, A1
$6y + 4x = -22$ $15y + 10x = -55$
$-19x = 76$ $19y = -19$ MA1
$x = -4$ $y = -1$

$2y + 20 = 18$ $-3 + 2x = -11$ MA1
$y = -1$ $x = -4$ MA1
(QWC) (5) 12

3 $\text{Tan } 37° = \frac{AB}{8.5}$
$AB = 8.5 \times \text{Tan } 37°$ MA1
$AB = 6.4(052\ldots)$ MA1 2

4 $\frac{LM}{MP} = \frac{2.5}{6}$ MA1
Ratio is 5:12 A1
LM = 5/17 of 10.2 = 3cm A1
MP = 12/17 of 10.2 = 7.2 cm A1 4

5 $\angle BCD = x \Rightarrow$ obtuse angle $BOD = 2x$ MA1
$\angle BAD = y \Rightarrow$ reflex angle $BOD = 2y$ MA1
$2x + 2y = 360° \Rightarrow x + y = 180°$ MA1 3

6 **(a)**

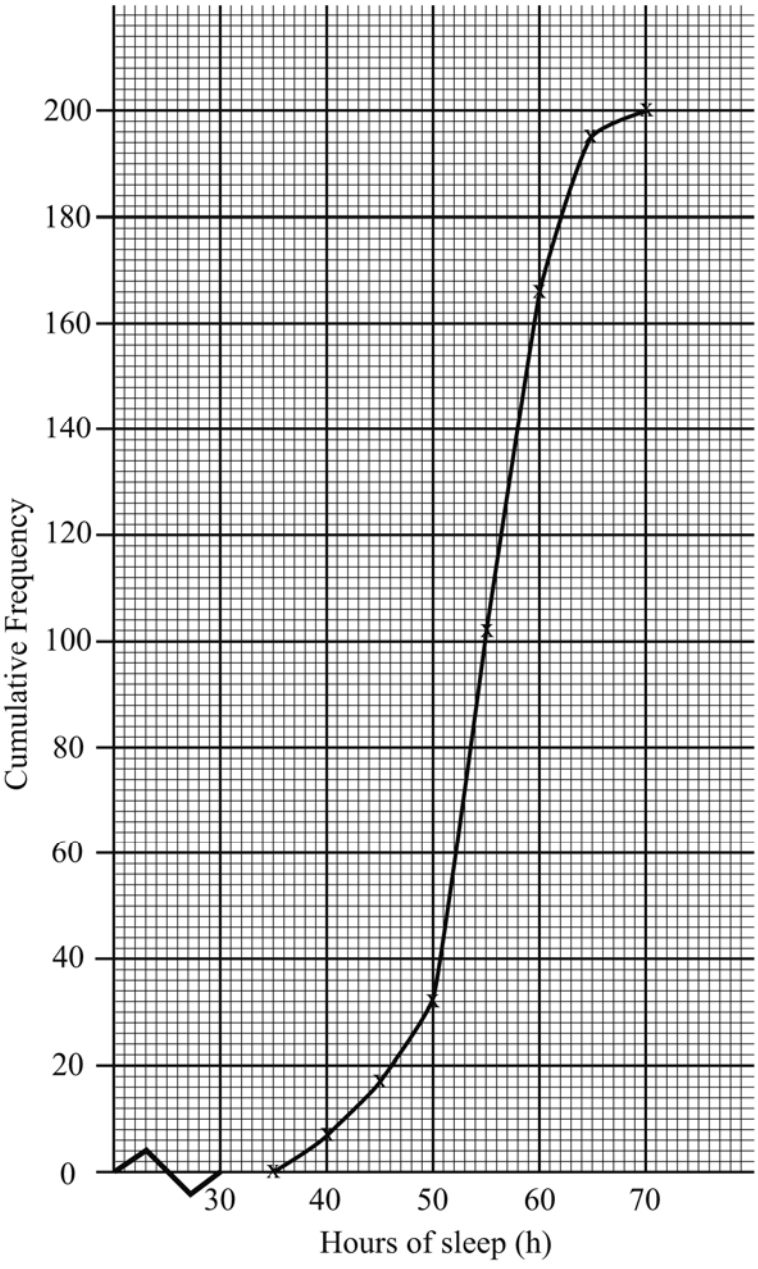
Hours of sleep (h)	h≤35	h≤40	h≤45	h≤50	h≤55	h≤60	h≤65	h≤70
Frequency	0	7	17	33	102	166	195	200

Cumulative frequency values in table complete MA1
All eight points plotted correctly A2
5, 6 or 7 points correctly plotted (A1)
Points joined with a smooth curve A1

(b) **(i)** 55 hours A1

(ii) 58 – 52 = 6 hours MA2

(c) On average they both get same amount of sleep but the amount of sleep is more variable for people aged over 55. A1 8



7 **(a)** River B. Their median is bigger then median for River A. A1

(b) River A. Their interquartile range is bigger. A1 2

8 **(a)** $512 \times \frac{1}{9} = 56\frac{8}{9}$ MA1, A1

(b) $\frac{\frac{1}{27}}{1 \times 2} = \frac{1}{54}$ MA2, A1

(c) $\frac{1}{216^{2/3}} = \frac{1}{6^2} = \frac{1}{36}$ MA1, A1 7

9 **(a)** $6x^2 - 4xy + 3xy - 2y^2$ MA2
$6x^2 - xy - 2y^2$ A1

(b) $\frac{(x+3)(x-3)}{(2x-1)(x+3)}$ MA1
MA1
$\frac{x-3}{2x-1}$ A1 6

10 Gradient = –1/4 A1
$y = -\frac{1}{4}x - 1$ MA1
4y = –x – 4
$x + 4y + 4 = 0 \Rightarrow a = 1, b = 4, c = 4$ A1 3

11 **(a)** $3x(2x - 5) + 2x(x + 1) = 35$ MA1
$6x^2 - 15x + 2x^2 + 2x = 35$
$8x^2 - 13x - 35 = 0$ MA1

(b) $x = \frac{13 \pm \sqrt{169 + 1120}}{16} = \frac{13 \pm \sqrt{1289}}{16}$ MA1
$x = \frac{13 \pm 35.902646...}{16}$
$x = \frac{48.902646}{16}$ A1
$x = 3.0564 \approx 3.06$ A1 5

12 **(a)** $BC^2 = 70^2 + 90^2 - 2 \times 70 \times 90 \times \cos 60°$ MA1
$BC^2 = 6700$
$BC = 81.85\ldots$ m A1

(b) $\frac{1}{2} \times 90 \times 70 \times \sin 60°$ MA1

$= 2727.98\ldots$ m^2 Units A1 5

13 **(a)** $AG = \sqrt{4.3^2 + 6.7^2 + 8.5^2}$ M1
$AG = \sqrt{135.63}$
$AG = 11.646\ldots$ m A1

(b) Angle identified MA1
$\sin \angle AGE = \frac{4.3}{11.646...} = 0.3692\ldots$ MA1
$\angle AGE = 21.6678 \approx 21.7°$ A1 5

14 A. $x^2 = 10$
B. $x^2 = 3$ MA1
C. $x^3 = 27$

C because solution is $x = 3$ A1 2

15 **(a)** $2a(6x^2 + 7xy - 3y^2)$ MA1
$2a(2x + 3y)(3x - y)$ MA2

(b) $x^2 - 14x + p \equiv x^2 + 2qx + q^2$
$2q = -14$ MA1
$q = -7$ A1
$p = q^2$
$p = 49$ A1 6

16 $2x(x+1) - 4(x - 2) = 5(x - 2)(x + 1)$ M1, A1
$2x^2 + 2x - 4x + 8 = 5x^2 - 5x - 10$ MA1
$0 = 3x^2 - 3x - 18$ MA1
$0 = x^2 - x - 6$ MA1
$0 = (x - 3)(x + 2)$ A1
$x = 3, x = -2$ A1 7

17 **(a)** $\frac{\sin T}{50} = \frac{\sin 23^0}{20}$ MA1

sin T = 0.9768…

T = 77.64

77.64 – 27 = 50.64

051° A1

(b) $\angle S = 79.36°$

$\frac{PT}{\sin 79.36^0} = \frac{20}{\sin 23^0}$ MA1

$PT = \frac{20 \times \sin 79.36^0}{\sin 23^0}$

PT = 50.3… km A1 4

18 **(a)** 0.6, 0.8, 1.8, 3.7, 1.2 A1

Rectangles drawn at correct heights A1

Rectangle drawn for correct intervals A1

(b) $\frac{12}{20} \times 24$ MA1

$= 14.4 \approx 14$ cars A1

(c) $\frac{11}{37} \times 10 = \frac{110}{37} = 2.97$ MA1

Median = 72.97 mph A1 7

19 **(a)** It does not guarantee that there will be a mixture of different year groups. A1

(b) $\frac{422}{800} \times 50$ MA1

$= 26.375 \approx 26$ boys A1

(c) $\frac{88}{378} \times 24$ MA1

$= 5.587 \approx 6$ year 8 girls A1

(d) Year 8 boys = $\frac{110}{422} \times 26 = 6.7777 \approx 7$

Year 12 girls = $\frac{55}{378} \times 24 = 3.492 \approx 3$

So the editor is incorrect. MA2 7

Total Marks 100

General Certificate of Secondary Education
2012

Mathematics

Unit T5 Paper 1
Foundation Tier

[CODE]

SPECIMEN

MARK SCHEME

1	**(a)**	**(i)**	5390	A1	
		(ii)	5400	A1	
	(b)	**(i)**	100×7 700	MA1 A1	
		(ii)	$800 \div 4$ 200	MA1 A1	
		(iii)	9.5	A1	7
2	Correct reflection			A2	2
3	$30 \div 4 = 7.5$ 7			MA1 A1	2
4	Correct lines			A2	2
5	**(a)**		32	MA1	
	(b)		15	MA1	2
6	$2 \times 11 + 3 \times 5$ $22 + 15$ 37			MA1 A1	2
7	**(a)**		$\frac{2}{11}$	A1	
	(b)		$\frac{6}{11}$	A1	
	(c)		$1 - \frac{5}{11}$ $\frac{6}{11}$	MA1 A1	4

8 A square has four sides, all of equal length
It has four angles, all of size 90^o
It has four lines of symmetry
It has order of rotation four
Diagonals are equal in length
Diagonals meet at right angles

Or other correct response.

6 marks for 4 correct responses making correct use of mathematical terms, correct spelling.
5 marks for 4 correct responses with limited use of mathematical terms.
4 marks for 3 correct responses with very good use of mathematical terms.
3 marks for 3 correct responses with limited use of mathematical terms.
2 marks for 2 correct responses.
1 mark for 1 correct response. (QWC) (6) 6

9 **(a)** 3 : 4 = 12 : 16 M1
16 A1

(b) 28 – 2 = 26 MA1

$\frac{10}{26}$ or $\frac{5}{13}$ MA1 4

10 **(a)** 0.85 MA1

(b) $\frac{2+1}{2+1+13+12}$ MA1

$\frac{3}{28}$ A1

(c) Survey (a), uses a bigger sample A1
A2 (QWC) 6

11	**(a)**	$\frac{1}{4}$ or 0.25	MA1	
	(b)	–3	A1	
	(c)	e.g. 6 – 3 = 3	A2	
	(d)	7, –7	A1	
	(e)	0.5757… (must show dots to gain mark)	A1	6
12	**(a)**	Correct size Correct position	A1 A1	
	(b)	7 left 3 down	A1 A1	
	(c)	Rotation, 90° clockwise, centre (1.0)	A1, A1, A1	7
			Total Marks	**50**

General Certificate of Secondary Education
2012

Mathematics

Unit T5 Paper 2
Foundation Tier

[CODE]

SPECIMEN

MARK SCHEME

1	**(a)**	65	A1	
	(b)	Correct arrow	A1	
	(c)	32.7	A1	3
2	$24 \times 5.6 = 134.4$		MA1, A1	2
3	**(a)**	$18 \times 3 + 25$ 79	MA1 A1	
	(b)	$165 - 25 = 140$ $140 \div 20$ 7	MA1 M1 A1	
	(c)	25	A1	6
4	**(a)**	8	A1	
	(b)	5	A1	
	(c)	4	A1	3
5	**(a)**	All points correct (award [1] for at least 5 points correct) line drawn	A2 A1	
	(b)	7 – 7.5	A1	
	(c)	90	A1	5

6	**(a)**	No. 1 litre ≈ 1.75 pints. Therefore 2 litres ≈ 3 ½ pints. She would need another ½ pint. Or other appropriate response.		A1 M1	
	(b)	1 kg ≈ 2.2 lbs 8.8 or 9		A1 A1	
	(c)	5 miles = 8 km (or equivalent) 32		A1 A1	
	(d)	1 hour 55 mins		MA2	8
7	**(a)**	B		A1	
	(b)	C		A1	
	(c)	G		A1	3
8	**(a)**	Ben		A1	
	(b)	$\frac{4}{8} \times 400$ 200		MA1 A1	3
9	**(a)**	$14.50 \div 1.12$ 12.95		M1 A1	
	(b)	$\frac{6}{100} \times 3500$ 210×3 630		MA1 MA1 A1	
	(c)	$\frac{1}{2}(85 + 112)\ 29$ 2856.5 2900 or 2860	(accuracy)	MA1 A1 A1	8

10 **(a)** 46 — A1

(b) $\frac{5\times12}{2} = 30$

$5 \times 8 = 40$ — M1, A1

$30 + 40 = 70$ — MA1 4

11 **(a)** a^7 — MA1

(b) $\frac{1}{b^3}$ or b^{-3} — MA1 2

12 $-5 < 3n \leq 9$ — MA1

$-\frac{5}{3} < n \leq 3$ — MA1

$-1, 0, 1, 2, 3$ — MA1 3

Total Marks 50

General Certificate of Secondary Education
2012

Mathematics

Unit T6 Paper 1
Higher Tier

[CODE]

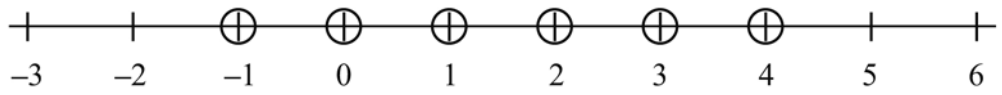
SPECIMEN

MARK SCHEME

1 3:4 = 12:16 M1
16 A1 2

2 $\frac{1}{4}+\frac{2}{5}+\frac{3}{10}=\frac{5}{20}+\frac{8}{20}+\frac{6}{20}=\frac{19}{20}$ MA1
$\frac{1}{20}$ A1 2

3 $1\frac{1}{2} \le n < 20$
$n = -1, 0, 1, 2, 3, 4$ MA3



A1 4

4 **(a)** $(400 - 32) \times \frac{5}{9}$ MA1
204.44 A1
204 A1

(b) R = 10 – T + 14 MA1
R = 24 – T MA1 5

5 **(a)** $\frac{2+1}{2+1+13+12}$
$\frac{3}{28}$ MA1
A1

(b) Survey 2, because it uses a bigger sample. A1, A1 4

6	**(a)**	Correct size Correct position	A1 A1	
	(b)	Rotation, 90° clockwise, centre (1.0)	A1, A1, A1	5
7	**(a)**	a^{-3} or $\frac{1}{a^3}$	MA1	
	(b)	b^{12}	MA1	2
8	**(a)**	59400	A1	
	(b)	45000	A1	2
9		$8x + 4y = 16y$ $12y = 8x$ $y = \frac{2x}{3}$	MA1, MA1 MA1 A1	4
10		C A	A1 A1	2
11	**(a)**	Correct size Correct position	A1 A1	
	(b)	1 : 8 480	A1 A1	4
12	**(a)**	All probabilities correct (at least 3 probabilities correct A1)	A2	
	(b)	$(0.3 \times 0.3) + (0.3 \times 0.7) + (0.7 \times 0.3)$ $0.09 + 0.21 + 0.21$ 0.51	MA1 MA1 MA1	5

13 **(a)** Let $x = 0.2727272727\ldots$

$100x = 27.272727\ldots$ MA1

So $99x = 27$

$x = \frac{27}{99}$ or $\frac{3}{11}$ A1

(b) $\left(\sqrt[3]{64}\right)^2 = 4^2 = 16$ MA1, A1 4

14 $25 - 10\sqrt{3} + 3 = 28 - 10\sqrt{3}$ MA1, MA1 2

15 $y = 2x + 3$ drawn MA1

3 solutions MA2

(2 solutions MA1) 3

Total Marks 50

General Certificate of Secondary Education
2012

Mathematics

Unit T6 Paper 2
Higher Tier

[CODE]

SPECIMEN

MARK SCHEME

1	$\frac{105}{250} \times 100$		MA1	
	42		A1	2
2	**(a)**	$10y - 15$	A1	
	(b)	$x\,(x + 3)$	A1	
	(c)	$5n + 8n$	MA1	
		$13n$	MA1	4
3	**(a)**	$8 + 13 + 12 + 8 + 5$	MA1	
		46	A1	
	(b)	$\frac{5 \times 12}{2} = 30$	M1, A1	
		$5 \times 8 = 40$		
		$30 + 40 = 70$	MA1	5
4	**(a)**	$84 + 27.8n \leq 300$	M1, A1	
	(b)	$27.8n \leq 216$	A1	
		$n \leq 7.76$	A1	
		7 football tops	MA1	5
5	**(a)**	$70 \times \pi = 219.9$	M1, A1	
		$219.9 + 200 = 419.9$	MA1	
	(b)	$35^2 \times \pi = 3848.45$	MA1	
		$3848.45 + 7000 = 10848.45$	MA1	
			A1	6
6	Circle centre A radius 4 cm		MA1	
	Bisector of AB		MA1	
	Correct region shaded		MA1	3

7 **(a)** 3.62×10^8 MA1

(b) $A = 4 \times \pi \times (6.28 \times 10^3)^2$ M1, A1

$A = 1.58\pi \times 10^8 \text{ km}^2$ A1

(c) $\frac{3.62 \times 10^8 \times 100}{1.58\pi \times 10^8} = 72.9\%$ M1, A1 6

8 $H = \frac{G+b}{a}$ MA1

$a = vH + v$

$a = \frac{v(G+b)}{a} + v$ MA1

$a^2 = v(G+b) + av$ M1

$a^2 = v(G+b+a)$

$v = \frac{a^2}{G+b+a}$ MA1 4

9 **(a)** $(\frac{6}{25} \times \frac{5}{24}) + (\frac{7}{25} \times \frac{6}{24}) + (\frac{12}{25} \times \frac{11}{24})$ MA1

$\frac{5}{100} + \frac{7}{100} + \frac{22}{100}$ MA1

$\frac{34}{100} = 0.34$ A1

(b) No, because having shoe size 7 and wearing glasses are not mutually exclusive, so the addition of probabilities does not apply.

2 marks for concise explanation with explicit reference to mutually exclusive events

1 mark for reasonable explanation without reference to mutually exclusive events A2 (QWC) 5

10 Rosalyn's data capture form has the following issues:

- She does not ask whether the patrons are male or female.
- She should have included a closed question asking if they are male or female.
- The options she gives for age do not include the age bracket previously mentioned in the hypothesis.
- The options she gives for age are not discrete, they include an overlap of age at 25 and 35, and she stops at 45.
- She should have included discrete options for age i.e. under 20, 20 – 29, 30 – 39, 40 – 49, 50 – 59, over 60.
- She gives a limited number of options for why the patrons use the leisure centre. She should have asked as an open question to allow a wide range of responses.
- The question on why patrons use the leisure centre is not essential in relation to the hypothesis.
- She could also have included a closed question for how often the patron's use the leisure centre to help collate the data better.

6 marks	4 or more satisfactory reasons expressed using concise mathematical terms
5 marks	4 reasons expressed in good mathematical language
4 marks	3 issues expressed well
3 marks	2 issues expressed well
2 marks	1 reason expressed well
1 mark	1 reason expressed in poor mathematical language

(QWC) (6) 6

11 $\frac{2h}{x} = \frac{3h}{r}$ M1

$x = \frac{2}{3}r$ A1

$\frac{1}{3}\pi r^2(3h) - \frac{1}{3}\pi(\frac{2}{3}r)^2(2h)$ MA1

$\frac{19\pi r^2 h}{27}$ A1 4

Total Marks 50

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