Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 2 (Calculator)

Higher Tier

Friday 4 November 2016 – Morning
Time: 1 hour 45 minutes

Paper Reference
1MA0/2H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 4 8 1 9 6 A 0 1 2 8

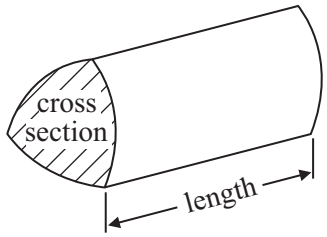
PEARSON

GCSE Mathematics 1MA0

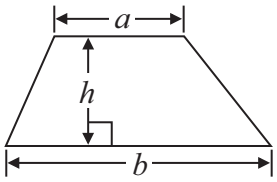
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section × length

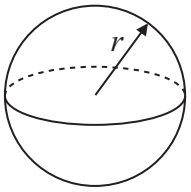


Area of trapezium = $\frac{1}{2}(a + b)h$



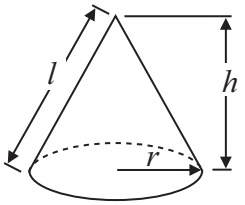
Volume of sphere = $\frac{4}{3}\pi r^3$

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

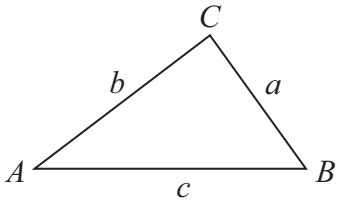


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle *ABC*



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

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

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

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

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

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Here are the heights, in mm, of 20 plants.

53	44	48	56	48	64	51	33	41	44
31	52	55	63	60	56	47	61	37	56

Draw an ordered stem and leaf diagram for these heights.

Key:

(Total for Question 1 is 3 marks)

2 Jon shares £700 equally between his two children, Ellie and Maddie.

Ellie gives £125 of her share of the money to Maddie.

(a) Write down the ratio of the amount of money Ellie now has to the amount of money Maddie now has.

.....

(2)

Jenny shares £630 between her two children, Daniel and Rose, in the ratio 5 : 13

(b) Work out how much money Jenny gives to each child.

Daniel £.....

Rose £.....

(3)

(Total for Question 2 is 5 marks)

3

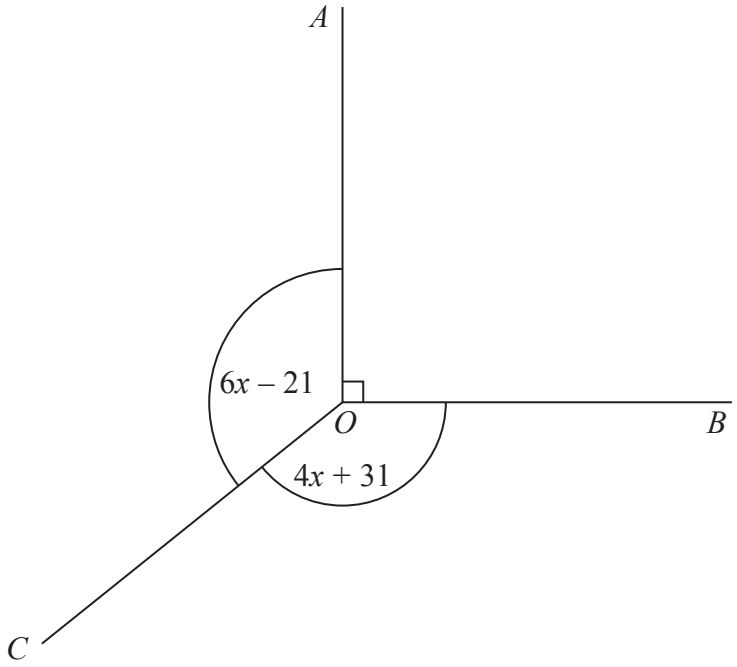


Diagram **NOT** accurately drawn

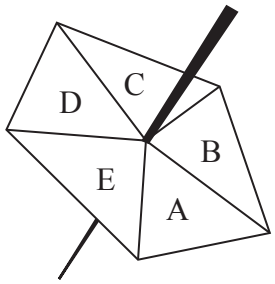
In the diagram, all angles are in degrees.

Angle AOB is a right angle.
Angle AOC = Angle BOC.

Work out the value of x.

(Total for Question 3 is 3 marks)

4 Here is a five-sided spinner.



The table shows the probabilities that the spinner will land on A or on B or on C or on D.

Letter	A	B	C	D	E
Probability	0.25	0.10	0.20	0.15	

Kirsty spins the spinner once.

(a) Work out the probability that the spinner will land on E.

(2)

Chris is going to spin the spinner 60 times.

(b) Work out an estimate for the number of times the spinner will land either on A or on B.

(3)

(Total for Question 4 is 5 marks)

5 Use your calculator to work out $\dfrac{1.45^2}{3.89 - \sqrt{5.75}}$

Write down all the figures on your calculator display.
You must give your answer as a decimal.

.....

(Total for Question 5 is 2 marks)

6 Jack is building a wall.

He uses 300 bricks to build part of the wall.
This part of the wall is 5 metres long and 1.5 metres high.

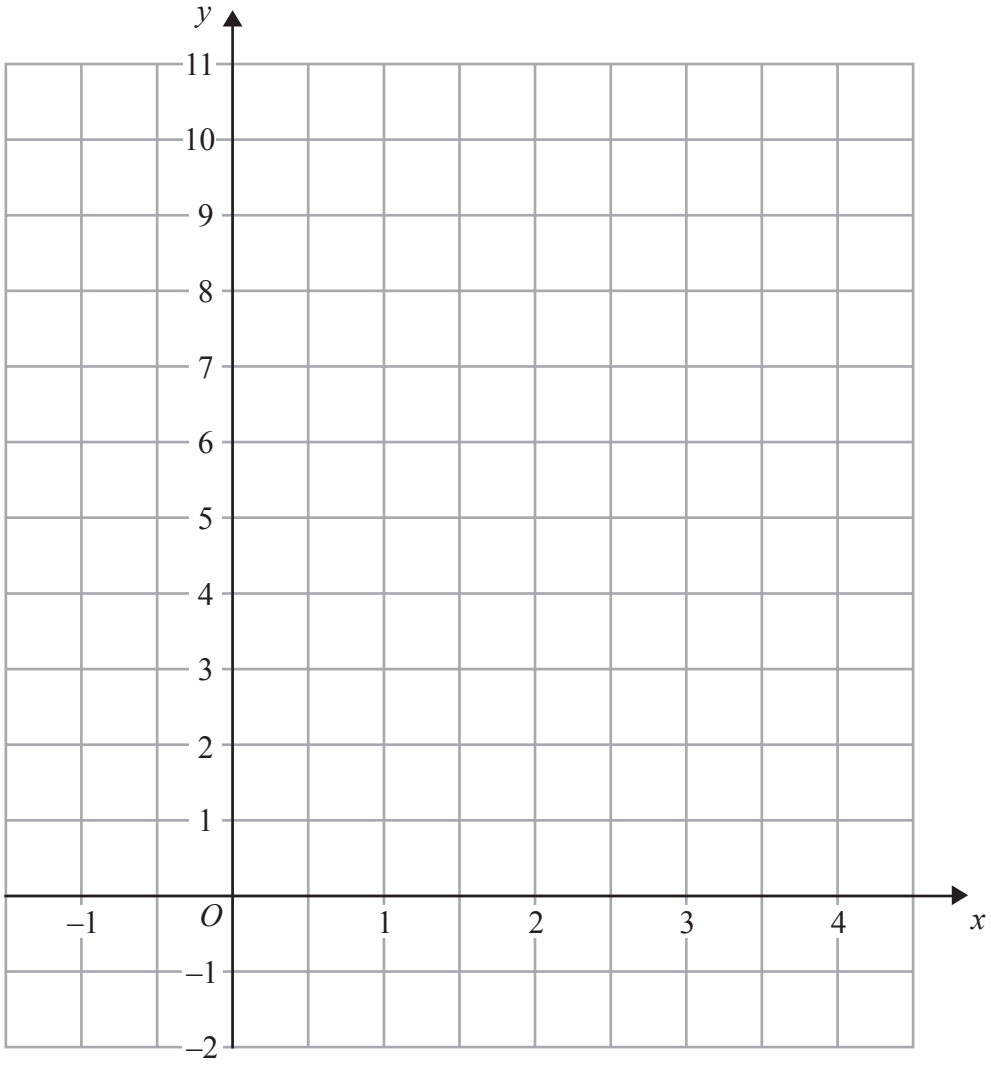
The complete wall will be 8 metres long and 1.5 metres high.

How many more bricks does Jack need to complete the wall?

.....

(Total for Question 6 is 3 marks)

7 On the grid, draw the graph of $y = 8 - 2x$ for values of x from -1 to 4



(Total for Question 7 is 3 marks)

***8** Colin is on holiday in France.
He buys a wallet.
The wallet costs 31 euros.

In London a wallet costs £23.50

The exchange rate is £1 = 1.34 euros.

Compare the cost of the wallet in France with the cost of the wallet in London.

(Total for Question 8 is 3 marks)

9 The diagram shows a rectangular framework.

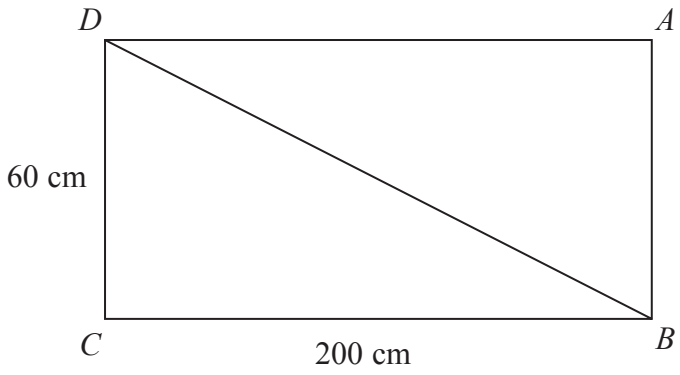


Diagram **NOT** accurately drawn

The framework is made from 5 metal rods.
The metal rods have a weight of 0.9 kg per metre.

Work out the total weight of the framework.
Give your answer, in kg, correct to 3 significant figures.

..... kg

(Total for Question 9 is 4 marks)

***10** Blueberries are sold in small cartons and in large cartons.

small carton

large carton

There are 125 g of blueberries in a small carton.
Each small carton costs £1.60

There are 225 g of blueberries in a large carton.
Each large carton costs £2.80

Which size of carton is the better value for money?
You must show your working.

(Total for Question 10 is 3 marks)

11 The diagram shows a square *ABCD* inside a circle.

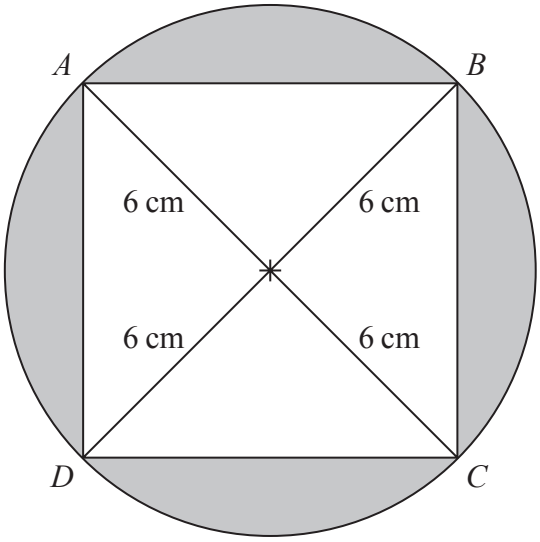


Diagram **NOT** accurately drawn

The points *A*, *B*, *C* and *D* lie on the circle.

The radius of the circle is 6 cm.

Work out the total area of the shaded regions.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 11 is 4 marks)

12 (a) Simplify fully $\dfrac{n^7 \times n^3}{n^6}$

.....

(2)

(b) Expand and simplify $x(x - 2) + 2x(x + 3)$

.....

(2)

(c) Factorise $5y - 15$

.....

(1)

(d) Factorise fully $18ab + 27ab^2$

.....

(2)

(Total for Question 12 is 7 marks)

13 Charlotte grows some potatoes.

The table shows information about the weights of her potatoes.

Weight (w grams)	Frequency
$100 < w \leqslant 120$	5
$120 < w \leqslant 140$	25
$140 < w \leqslant 160$	30
$160 < w \leqslant 180$	15
$180 < w \leqslant 200$	5

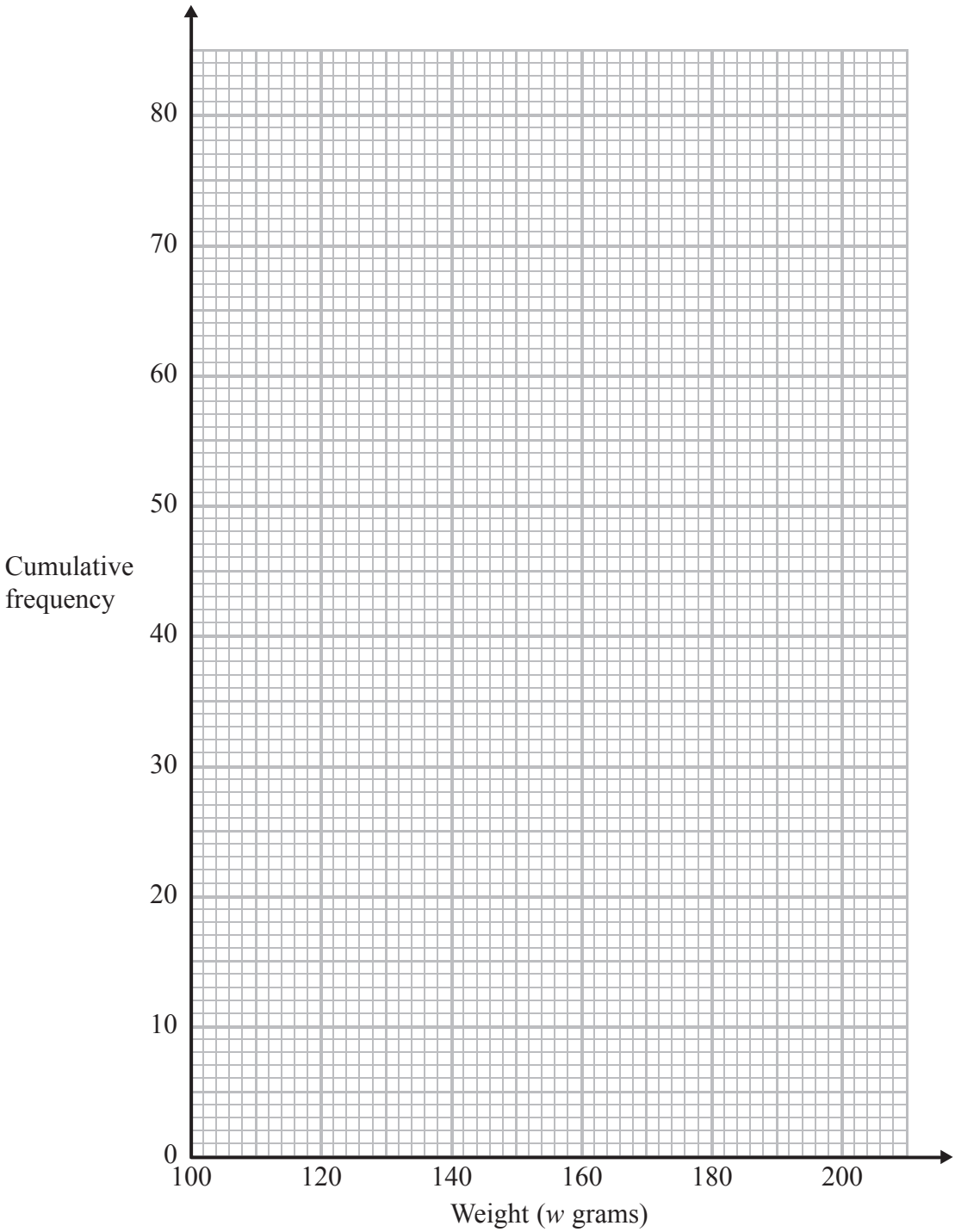
(a) Complete the cumulative frequency table.

Weight (w grams)	Cumulative frequency
$100 < w \leqslant 120$	
$100 < w \leqslant 140$	
$100 < w \leqslant 160$	
$100 < w \leqslant 180$	
$100 < w \leqslant 200$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)



(c) Use your graph to find an estimate for the interquartile range.

..... grams

(2)

(d) Use your graph to find an estimate for the percentage of Charlotte's potatoes with a weight less than 150 grams.

..... %

(3)

(Total for Question 13 is 8 marks)

14 *ABCDE* and *PQRST* are regular pentagons.

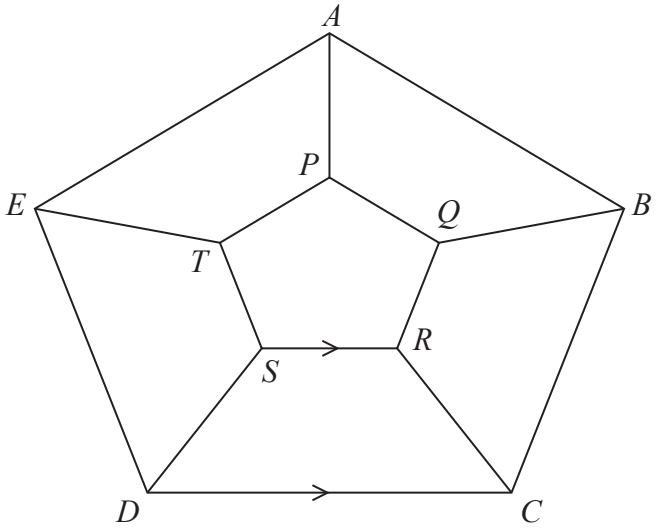


Diagram **NOT** accurately drawn

SR is parallel to *DC*
$AP = BQ = CR = DS = ET$

Work out the size of angle *SRC*.
You must show all your working.

.....°

(Total for Question 14 is 3 marks)

15

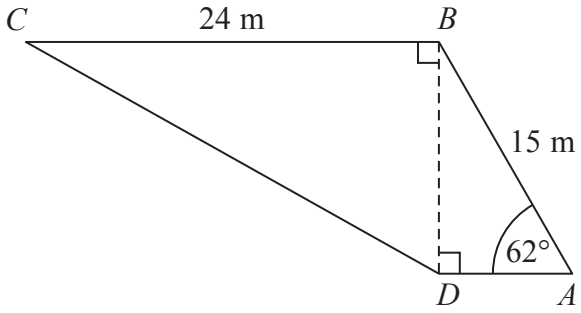


Diagram **NOT** accurately drawn

$AB = 15$ m
$BC = 24$ m
Angle $BAD = 62°$

Work out the size of angle BCD.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 15 is 5 marks)

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16 Julie and Liam write down the same number.

Julie multiplies the number by 5 and then adds 4 to the result.
She writes down her answer.

Liam subtracts the number from 10
He writes down his answer.

Julie's answer is two thirds of Liam's answer.

Work out the number that Julie and Liam started with.
You must show your working.

.....

(Total for Question 16 is 5 marks)

17 Pierre is going to carry out a survey using a questionnaire.
He wants to find out how often people play sport.

(a) Design a suitable question for Pierre to use on his questionnaire.

(2)

The two-way table gives information about the gender and the ages of the people who live in a small town.

	Age (years)			Total
	0–18	**19–60**	**over 60**	
Male	248	503	171	922
Female	198	460	129	787
Total	446	963	300	1709

Pierre gives his questionnaire to a sample of these people.
He uses a sample of 200 of these people stratified by gender and by age.

(b) Calculate the number of females aged 19–60 in the sample.

(2)

(Total for Question 17 is 4 marks)

***18**

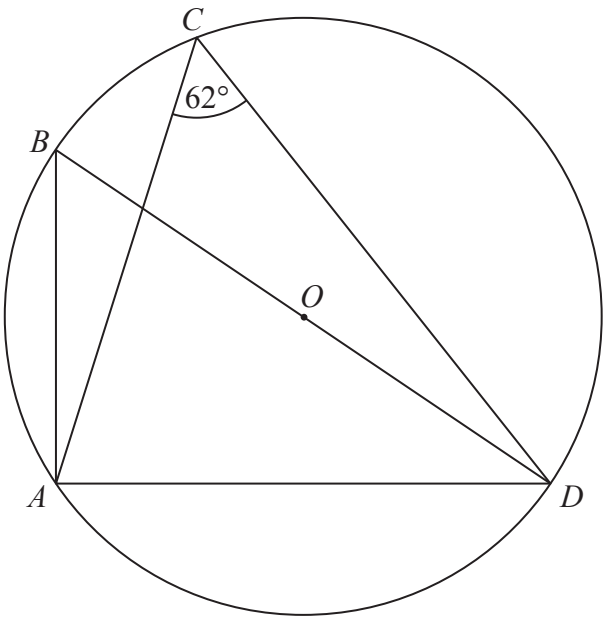


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
BOD is a straight line.
Angle *ACD* = 62°

Find the size of angle *ADB*.
Give a reason for each stage in your working.

(Total for Question 18 is 4 marks)

19 (a) Expand and simplify $(y + 2)(y + 5)$

(2)

(b) Factorise $e^2 + e - 12$

(2)

(c) Solve $3x^2 - x - 1 = 0$
Give your solutions correct to 2 decimal places.

(3)

(Total for Question 19 is 7 marks)

20 Jarek uses the formula

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

to work out the area of a triangle.

For this triangle,

$a = 7.8$ cm correct to the nearest mm.
$b = 5.2$ cm correct to the nearest mm.
$C = 63°$ correct to the nearest degree.

Calculate the lower bound for the area of the triangle.

..... cm^2

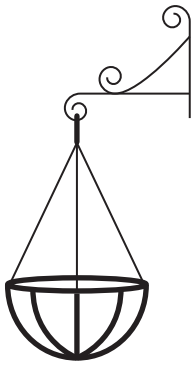
(Total for Question 20 is 3 marks)

***21** Anne wants to fill 12 hanging baskets with compost.

Each hanging basket is a hemisphere of diameter 40 cm.

Anne has 4 bags of compost.
There are 50 litres of compost in each bag.

Has Anne got enough compost to fill the 12 hanging baskets?



hanging basket

(Total for Question 21 is 4 marks)

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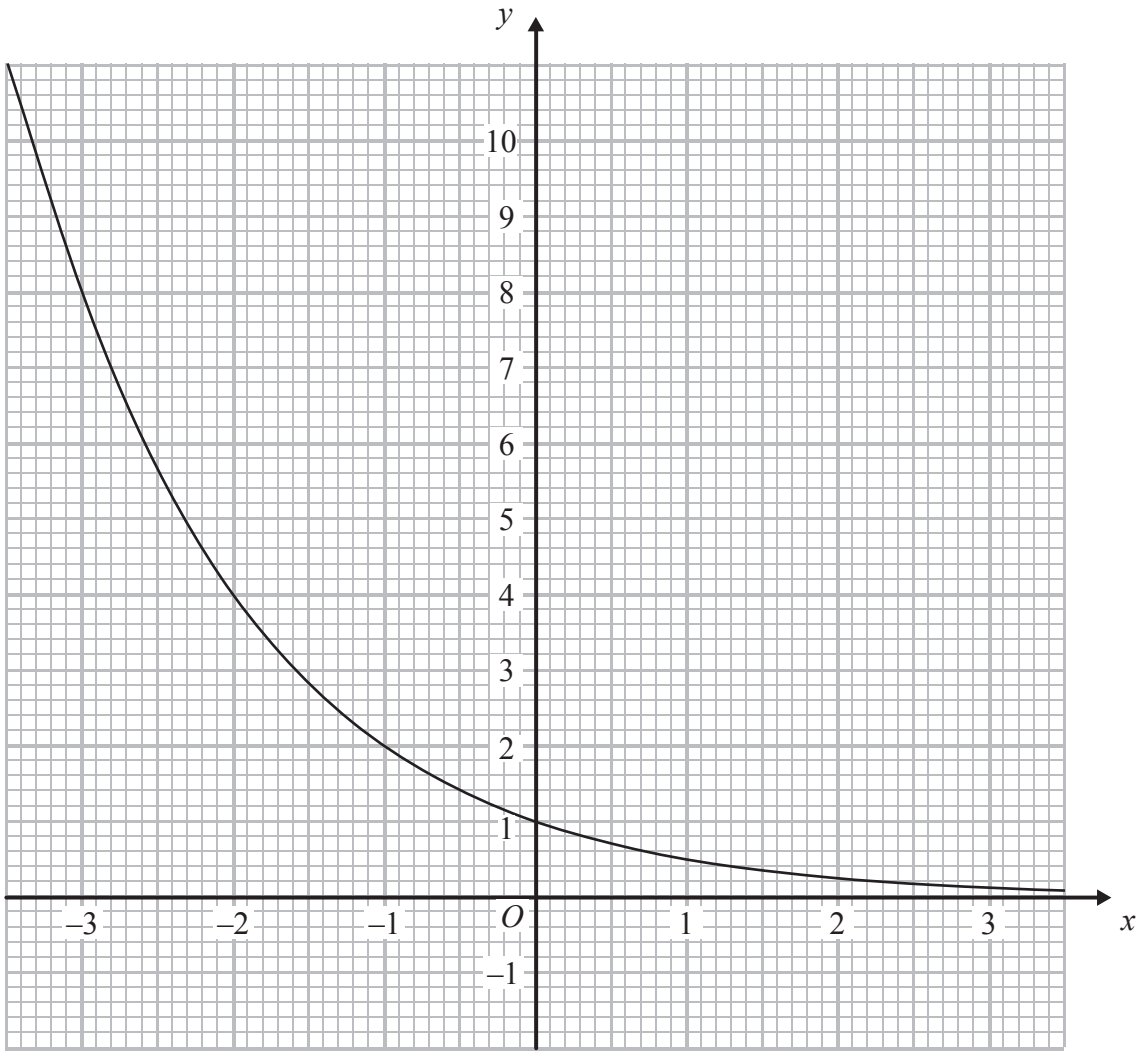
22

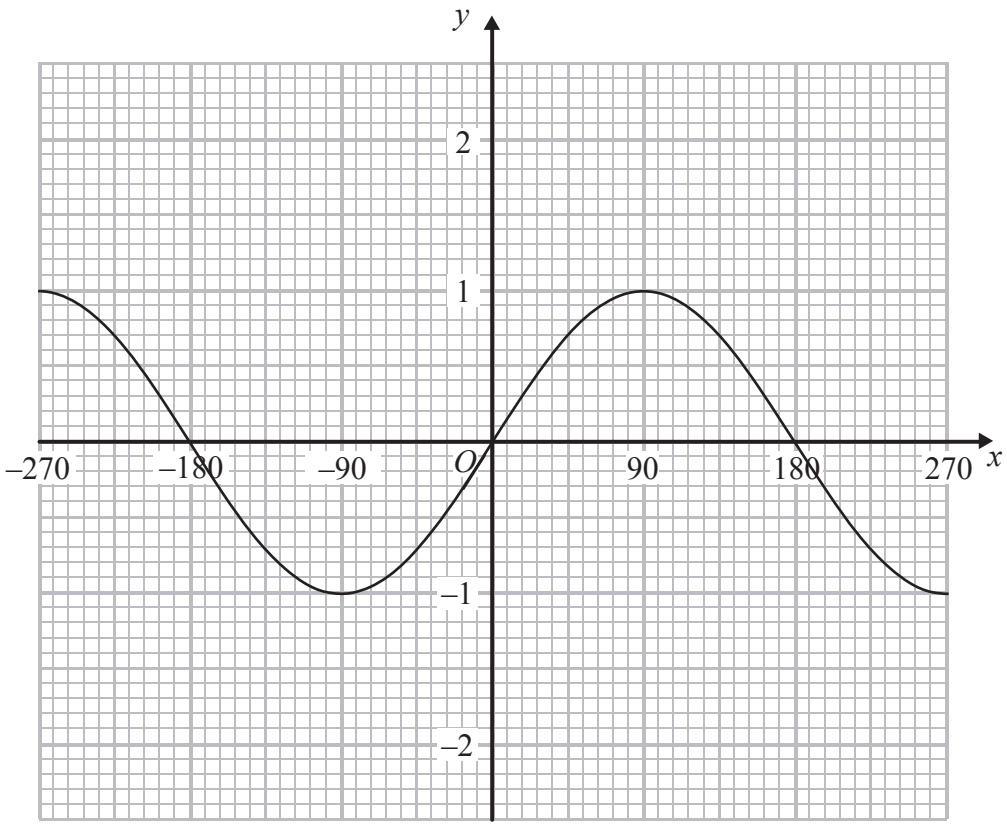


The graph of $y = k^x$, where k is a positive constant, is shown above.

(a) Find the value of k.

$k =$ .....

(2)



The graph of $y = \sin x°$ for values of x from –270 to +270 is shown above.

(b) On the same axes, draw the graph of $y = 1 - \sin x°$ for values of x from –270 to +270

(2)

(Total for Question 22 is 4 marks)

23

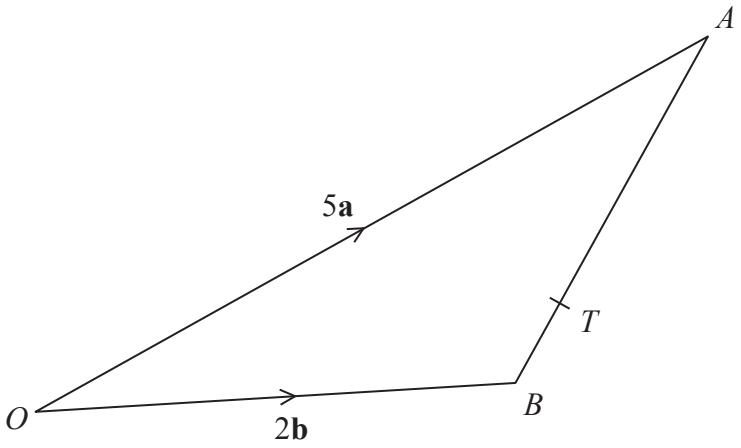


Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = 5\mathbf{a}$

$\overrightarrow{OB} = 2\mathbf{b}$

T is the point on *AB* such that *AT* : *TB* = 5 : 1

Show that *OT* is parallel to the vector $\mathbf{a} + 2\mathbf{b}$

(Total for Question 23 is 4 marks)

***24** Prove that, for all positive values of n,

$$\frac{(n+2)^2 - (n+1)^2}{2n^2 + 3n} = \frac{1}{n}$$

(Total for Question 24 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS

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