Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics A

Paper 1 (Non-Calculator)

Higher Tier

Thursday 25 May 2017 – Morning
Time: 1 hour 45 minutes

Paper Reference
1MA0/1H

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. 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 must not be used.**

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 5 3 4 4 0 A 0 1 2 8

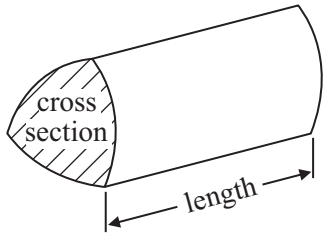
Pearson

GCSE Mathematics 1MA0

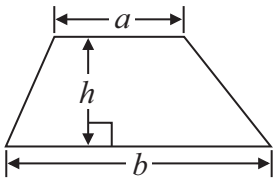
Formulae: Higher Tier

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

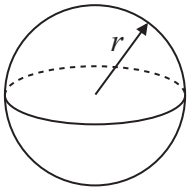


Area of trapezium = $\frac{1}{2}(a + b)h$



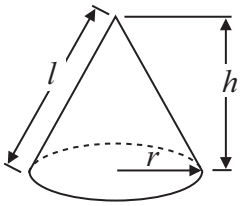
Volume of sphere = $\frac{4}{3}\pi r^3$

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

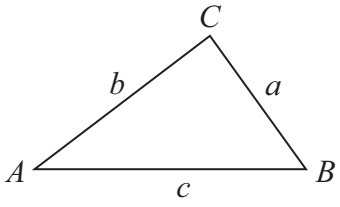


Volume of cone = $\frac{1}{3}\pi r^2 h$

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.

You must NOT use a calculator.

1 (a) Simplify $x^7 \times x^5$

.....

(1)

(b) Simplify $2y \div y$

.....

(1)

$v = 2t^2$

$t = 3$

(c) Work out the value of v.

.....

(1)

(d) Give an example to show that, when n is a whole number, $6n + 1$ is **not** always a prime number.
You must give your value of n.

$n =$ .....

(1)

(Total for Question 1 is 4 marks)

***2** Bill buys and sells laptops.

Last month Bill bought 50 laptops.
He paid £400 for each laptop.

He sold
40 of these laptops at a profit of 30% on each laptop
10 of these laptops at a profit of 15% on each laptop

Bill's target last month was to sell all 50 laptops for a total of at least £25 000

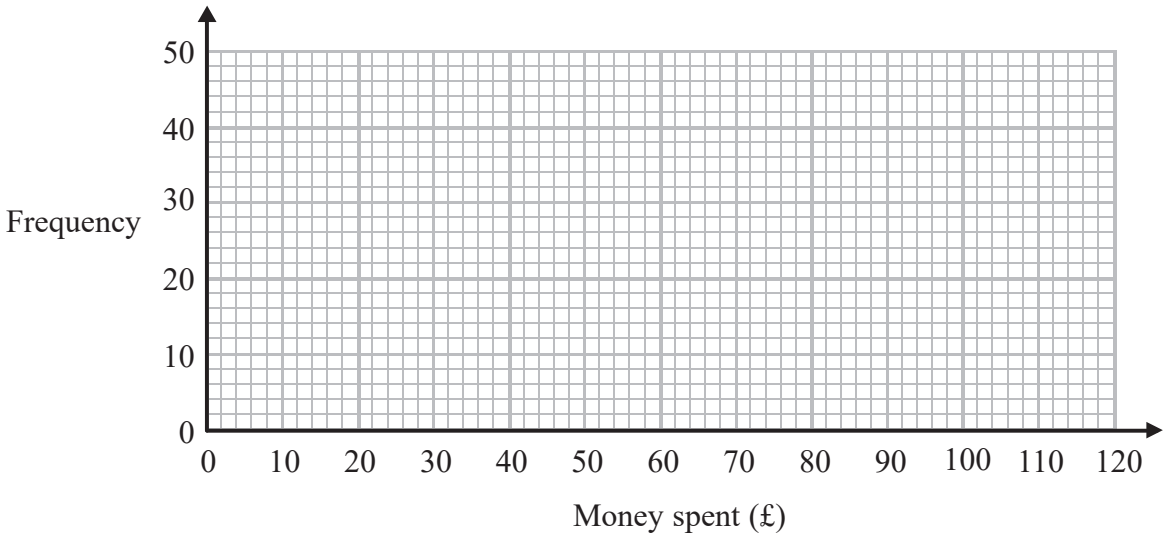
Did Bill reach this target?

(Total for Question 2 is 5 marks)

3 The table gives information about the money, £A, some people spent on an internet site one day.

Money spent (£A)	Frequency
$0 < A \leqslant 20$	10
$20 < A \leqslant 40$	15
$40 < A \leqslant 60$	25
$60 < A \leqslant 80$	40
$80 < A \leqslant 100$	6

(a) On the grid, draw a frequency polygon for this information.



(2)

(b) Write down the modal class interval.

.....

(1)

(Total for Question 3 is 3 marks)

4 Solve $4(x + 3) = 2x + 8$

$x =$ .....

(Total for Question 4 is 3 marks)

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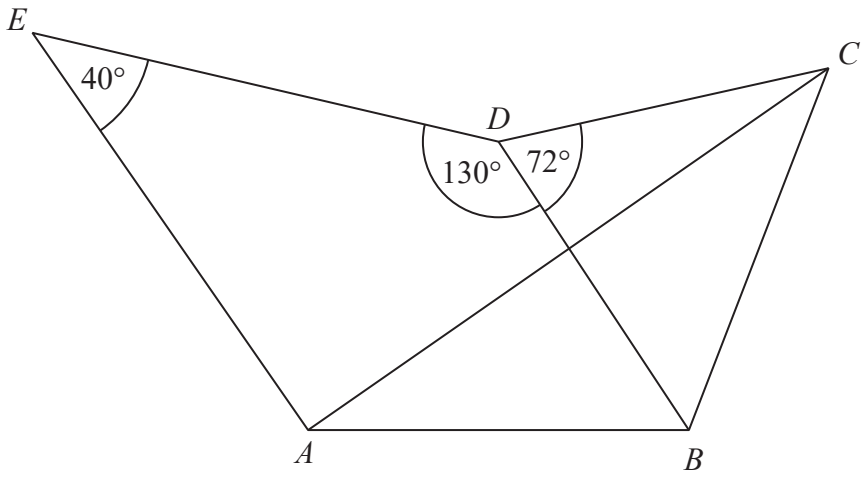
5 Here is a pentagon *ABCDE*.

Diagram **NOT** accurately drawn



AB = *BC* = *BD*
ABDE is a kite.

Angle *AED* = 40°
Angle *EDB* = 130°
Angle *BDC* = 72°

Work out the size of angle *ACB*.

.....°

(Total for Question 5 is 3 marks)

6 Babajan makes breakfast cereal.
She mixes nuts, raisins and oats in the ratio 3 : 2 : 5 by weight.

On Monday, Babajan uses 60 grams of nuts.

(a) Work out the weight of raisins and the weight of oats she uses to make the breakfast cereal.

raisins ..... grams

oats ..... grams

(3)

On Tuesday, Babajan makes 300 grams of the breakfast cereal.

500 grams of nuts cost £8

(b) Work out the cost of the nuts used to make 300 grams of the breakfast cereal.

£ .....

(3)

(Total for Question 6 is 6 marks)

7 Frances grows plants in a container.
Each of the 5 faces of the container is made of glass.

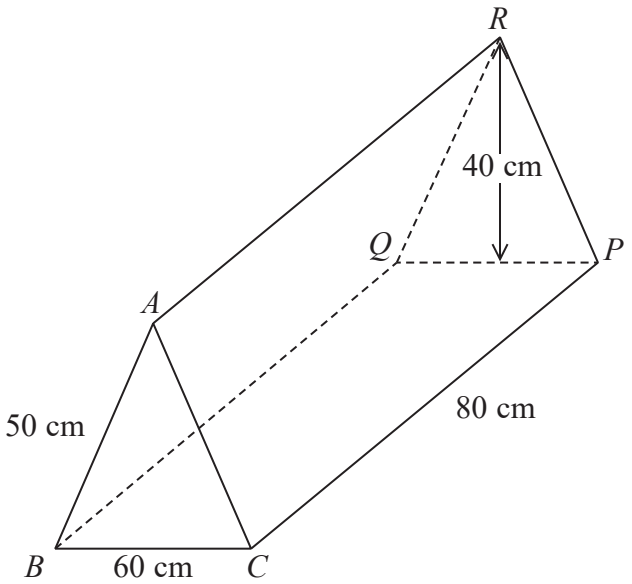


Diagram **NOT** accurately drawn

The container is in the shape of a prism.
The cross section of the prism is an isosceles triangle with height 40 cm.

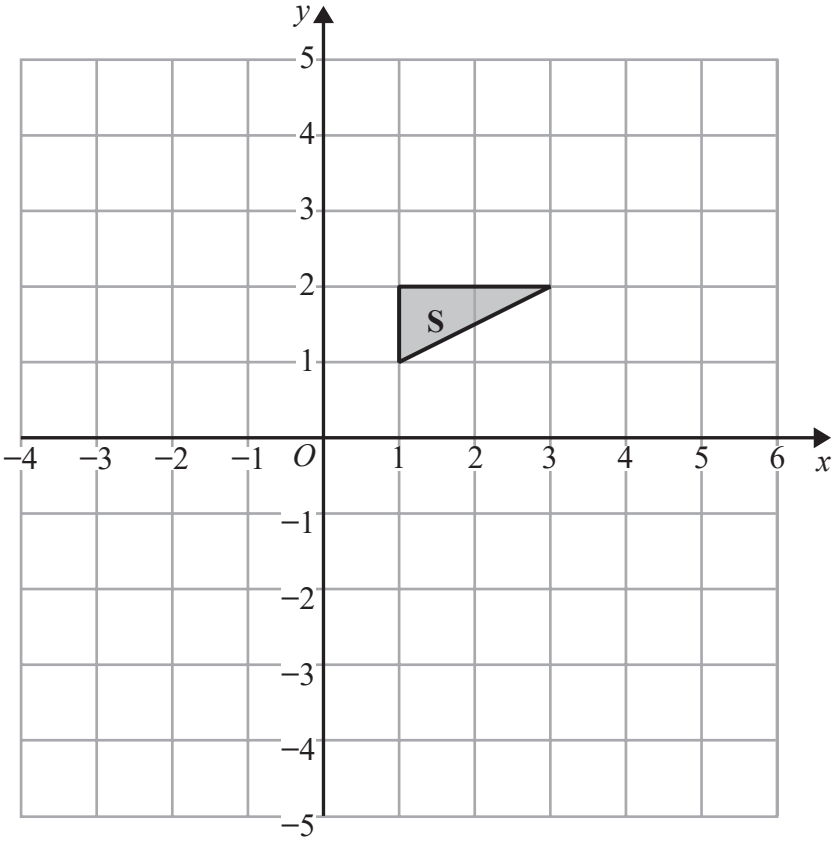
$BC = 60$ cm
$AB = AC = 50$ cm
$CP = 80$ cm

Work out the total area of glass needed to make the container.

.....cm^2

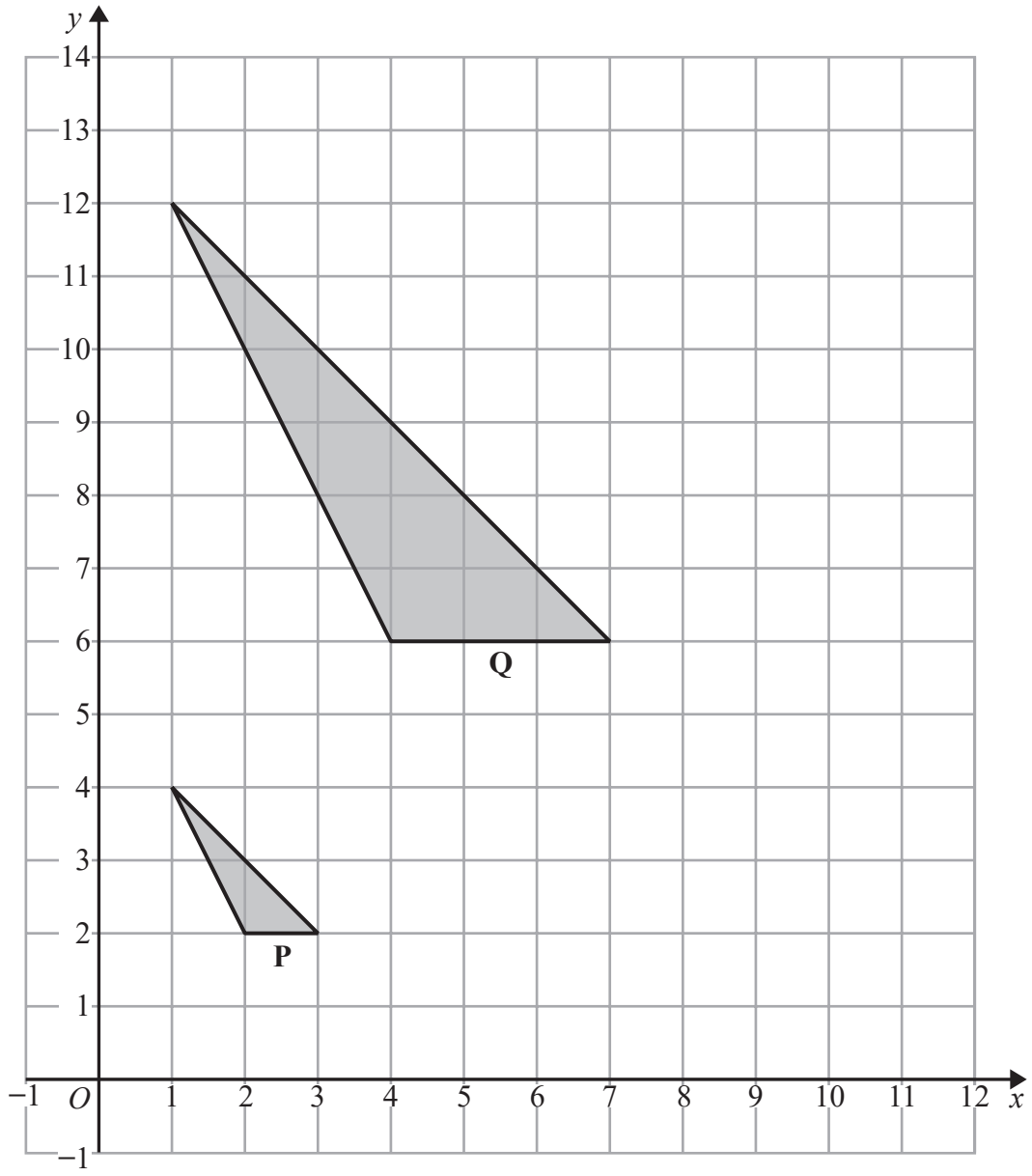
(Total for Question 7 is 3 marks)

8



(a) On the grid, rotate shape **S** by 90° anticlockwise about the origin.

(2)



(b) Describe fully the single transformation that maps shape **P** onto shape **Q**.

.....

.....

(3)

(Total for Question 8 is 5 marks)

9 There are 5 girls, 6 boys and some adults in a room.
Jenny selects at random one of these people.

The probability that Jenny selects a girl is $\frac{1}{3}$

Work out the probability that Jenny selects an adult.

.....

(Total for Question 9 is 3 marks)

10 Here are the first five terms of an arithmetic sequence.

2 5 8 11 14

(a) Write down an expression, in terms of n, for the nth term of this sequence.

.....

(2)

(b) Is 299 a term of this sequence?
You must give a reason for your answer.

.....

.....

(2)

(c) Write down an expression, in terms of n, for the $(n + 1)$th term of this sequence.

.....

(1)

(Total for Question 10 is 5 marks)

11 Q, R and S are points on a grid.

Q is the point with coordinates (106, 103)
R is the point with coordinates (106, 105)
S is the point with coordinates (104, 105.5)

P and A are two other points on the grid such that

R is the midpoint of PQ
S is the midpoint of PA

Work out the coordinates of the point A.

(..... , ...)

(Total for Question 11 is 3 marks)

12 Sanders has a water tank for storing rainwater.

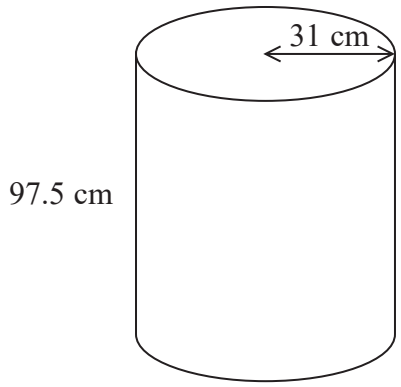


Diagram **NOT** accurately drawn

The tank is in the shape of a cylinder.
The radius of the cylinder is 31 cm.
The height of the cylinder is 97.5 cm.

The tank is full of water.

Work out an estimate for the volume of water in the tank.
Give your answer in litres.
You must show your working.

Use 1000 cm^3 = 1 litre.

.....litres

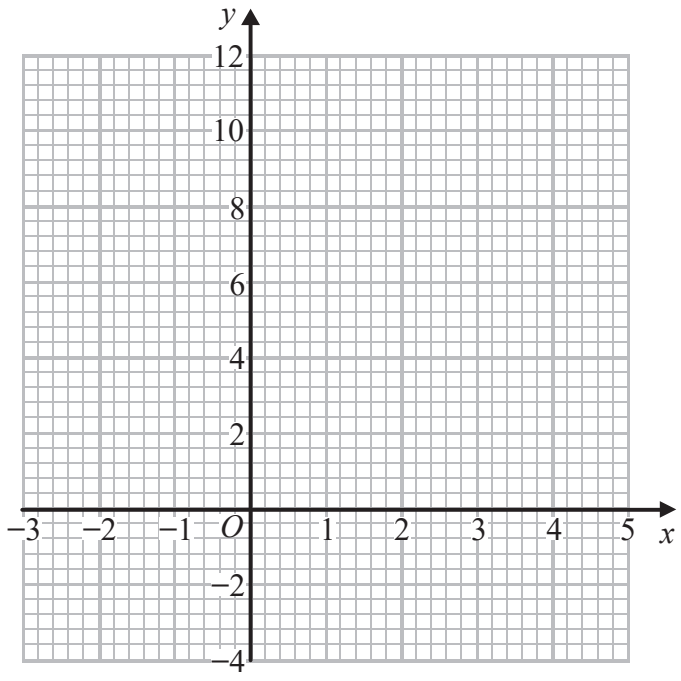
(Total for Question 12 is 3 marks)

13 (a) Complete the table of values for $y = x^2 - 3x + 1$

x	−2	−1	0	1	2	3	4
y	11		1	−1		1	

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$ for values of x from −2 to 4



(2)

(c) By drawing a suitable straight line on the grid, find estimates for the solutions of

$$x^2 - 3x + 1 = 3$$

.....

(2)

(Total for Question 13 is 6 marks)

14 3 kg of potatoes and 4 kg of carrots have a total cost of 440p.
4 kg of potatoes and 3 kg of carrots have a total cost of 470p.

Work out the total cost of 1 kg of potatoes and 1 kg of carrots.

.....p

(Total for Question 14 is 4 marks)

15

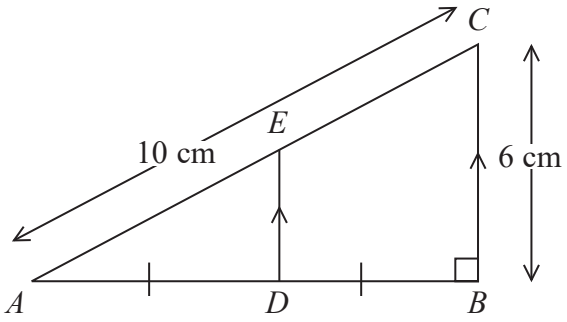


Diagram **NOT** accurately drawn

ADB and *AEC* are straight lines.
DE is parallel to *BC*.

Angle *ABC* = 90°
AC = 10 cm.
BC = 6 cm.

D is the midpoint of *AB*.

Work out the area of trapezium *BCED*.

.....cm^2

(Total for Question 15 is 4 marks)

16 The table gives information about the marks gained by some students in an exam.

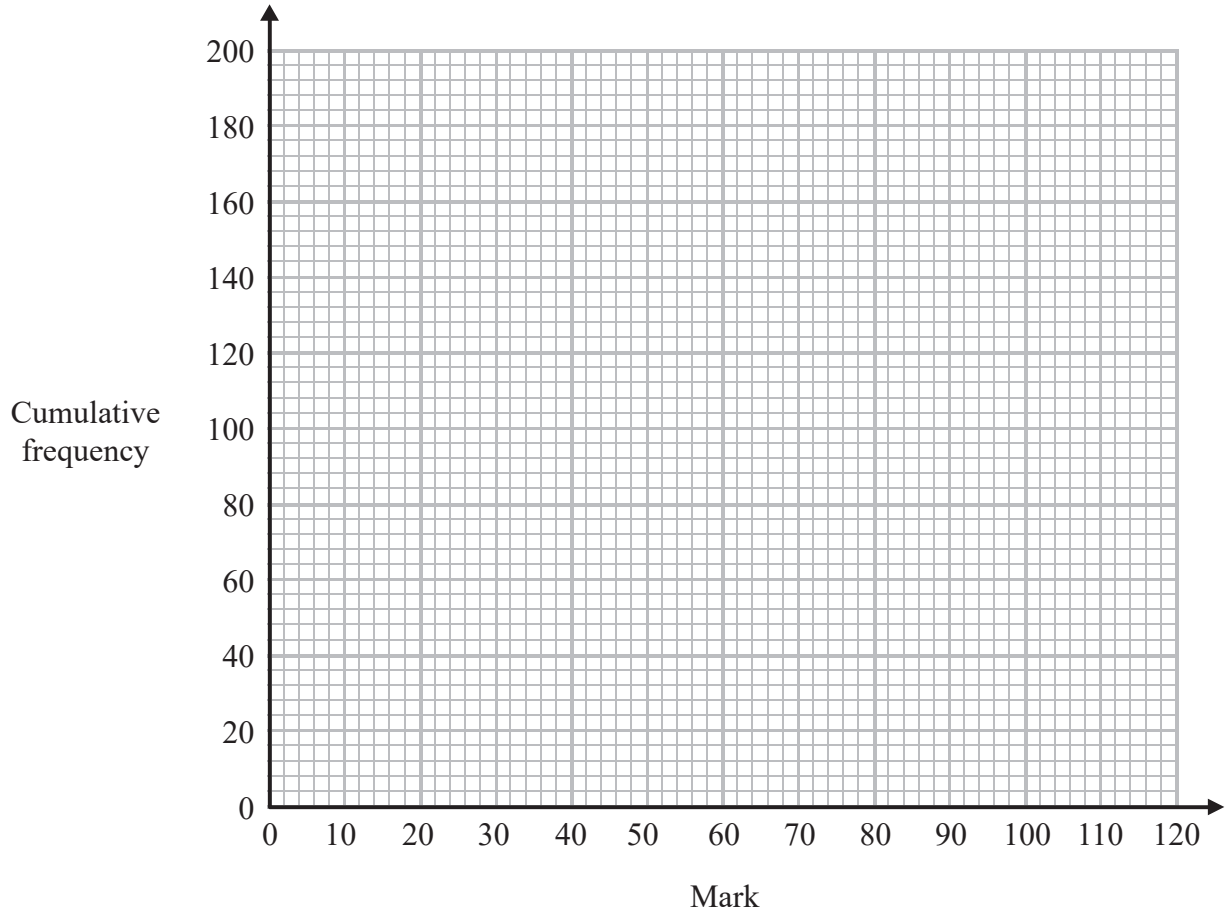
Mark (m)	Frequency
$0 < m \leqslant 20$	40
$20 < m \leqslant 40$	70
$40 < m \leqslant 60$	60
$60 < m \leqslant 80$	15
$80 < m \leqslant 100$	10
$100 < m \leqslant 120$	5

(a) Complete the cumulative frequency table for this information.

Mark (m)	Cumulative frequency
$0 < m \leqslant 20$	
$0 < m \leqslant 40$	
$0 < m \leqslant 60$	
$0 < m \leqslant 80$	
$0 < m \leqslant 100$	
$0 < m \leqslant 120$	

(1)

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



(2)

(c) Use your graph to find an estimate for the number of students who gained a mark of more than 54

.....

(2)

(Total for Question 16 is 5 marks)

17 Solve $\frac{x+1}{3} + \frac{2x+5}{4} = 2$

$x =$ .....

(Total for Question 17 is 4 marks)

18 (a) Write 5 400 000 as a number in standard form.

.....

(1)

(b) Write 3.2×10^{-4} as an ordinary number.

.....

(1)

The mass of the Sun is 2×10^{30} kg.
The mass of the largest known star is 315 times the mass of the Sun.

(c) Work out the mass of this star.
Give your answer in kg in standard form.

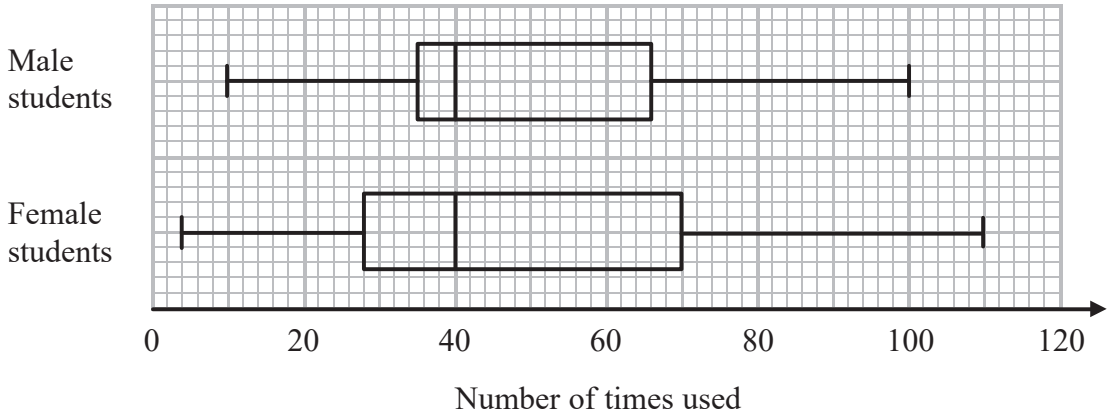
.....kg

(2)

(Total for Question 18 is 4 marks)

***19** Some students were asked how many times they each used their mobile phones last week.

The box plots give information about the male students' answers and about the female students' answers.



Compare the two distributions represented by the box plots.

.....

.....

.....

.....

(Total for Question 19 is 3 marks)

20 (a) Simplify $(x^{-2})^{-3}$

.....

(1)

(b) Factorise $2y^2 - 5y - 3$

.....

(2)

(Total for Question 20 is 3 marks)

21 $a = \sqrt{8} + 2$

$b = \sqrt{8} - 2$

$T = a^2 - b^2$

Work out the value of T.
Give your answer in the form $c\sqrt{2}$ where c is an integer.

.....

(Total for Question 21 is 4 marks)

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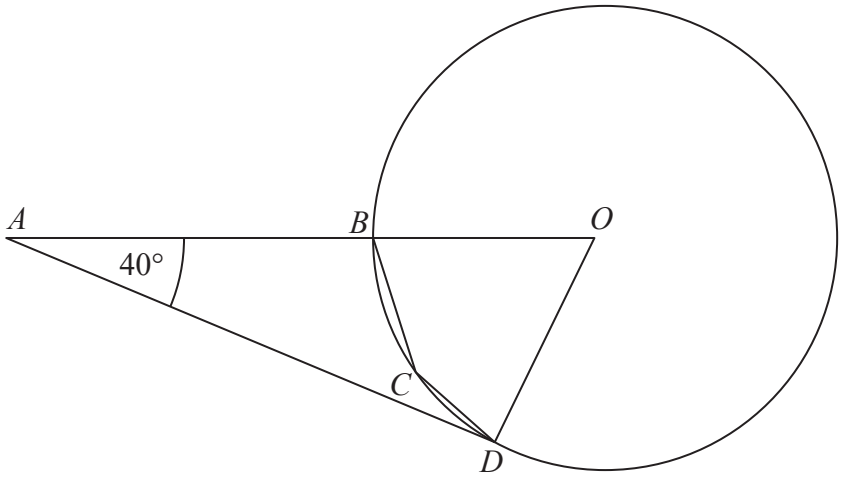
***22**

Diagram **NOT** accurately drawn



B, *C* and *D* are points on the circumference of a circle, centre *O*.
ABO is a straight line.
AD is the tangent at *D* to the circle.
Angle *DAO* = 40°

Work out the size of angle *BCD*.
Give a reason for each stage of your working.

(Total for Question 22 is 5 marks)

23 There are 7 blue counters, 3 green counters and 1 red counter in a bag.
There are no other counters in the bag.

Hubert takes at random 2 counters from the bag.

(a) Work out the probability that both counters are blue.

.....

(3)

(b) Work out the probability that the 2 counters are different colours.

.....

(3)

(Total for Question 23 is 6 marks)

24

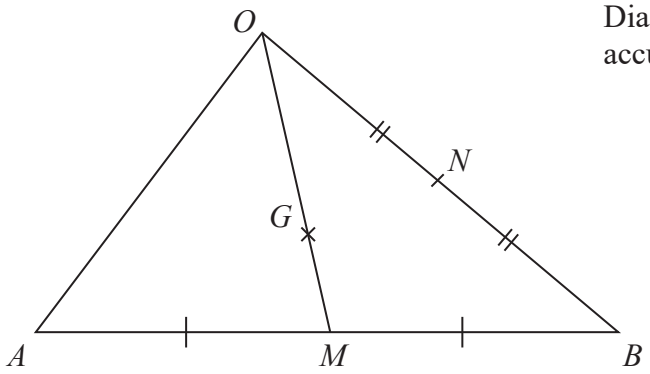


Diagram **NOT** accurately drawn

$\overrightarrow{OA} = 6\mathbf{a}$ and $\overrightarrow{OB} = 6\mathbf{b}$
M is the midpoint of AB.

(a) Write $\overrightarrow{OM}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

(2)

N is the midpoint of OB.
G is the point on OM such that $OG : GM = 2 : 1$

*(b) Show that AGN is a straight line.

(4)

(Total for Question 24 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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