Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics

Paper 3 (Calculator)

Aiming for 9

Higher Tier

Spring 2023 Practice Paper
Time: 1 hour 30 minutes

Paper Reference
1MA1/3H

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.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **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 80. There are 23 questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by students achieving Grade 9 in the Summer and November 2022 examinations.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

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.

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 There are only blue counters, red counters and green counters in a box.

The probability that a counter taken at random from the box will be blue is 0.4
The ratio of the number of red counters to the number of green counters is 7 : 8

Sameena takes at random a counter from the box.
She records its colour and puts the counter back in the box.

Sameena does this a total of 50 times.
Work out an estimate for the number of times she takes a green counter.

.....

(Total for Question 1 is 3 marks)

2 The equation of a curve is $y = 4x^2 - 56x$
The curve has one turning point.

By completing the square, show that the coordinates of the turning point are $(7, -196)$
You must show all your working.

(Total for Question 2 is 3 marks)

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3 Jane bought a new car three years ago.

At the end of the first year the value of the car had decreased by 12.5%
The value of the car then decreased by 10% each year for the next two years.

At the end of the three years, the value of the car was £17 010

Work out the value of the car when Jane bought it three years ago.

£.....

(Total for Question 3 is 3 marks)

4 The profit made by a shop increases each year.

The profit made by the shop in year n is £Pn

Given that the profit made by the shop in the next year is £P_{n+1} then

$$P_{n+1} = aP_n + 800 \text{ where } a \text{ is a constant.}$$

The table shows the profit made by the shop in 2018 and in 2019

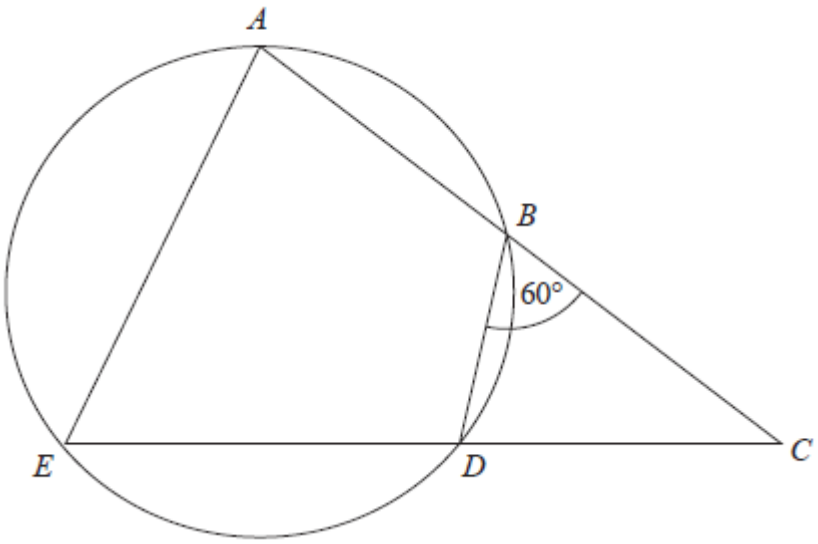
Year	2018	2019
Profit	£24 000	£29 600

Work out the profit predicted to be made by the shop in 2021

£.....

(Total for Question 4 is 4 marks)

5



ABDE is a cyclic quadrilateral.
ABC and *EDC* are straight lines.
Angle *DBC* = 60°

Given that

size of angle *EAB* : size of angle *BCD* = 2 : 1

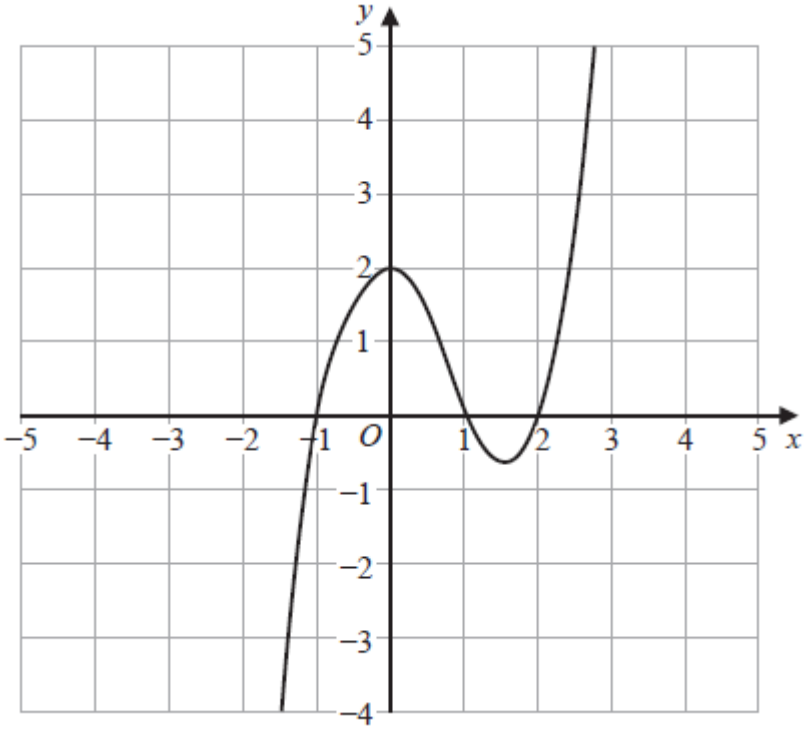
work out the size of angle *BCD*.

You must show all your working.

.....°

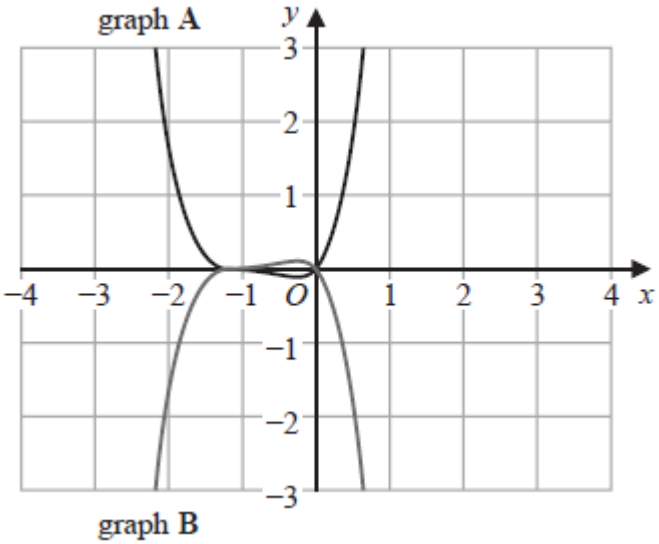
(Total for Question 5 is 4 marks)

6 The graph of $y = f(x)$ is shown on the grid below.



(a) On the grid above, sketch the graph of $y = f(x + 2)$

(1)



On this grid, graph **A** has been reflected to give graph **B**.
The equation of graph **A** is $y = g(x)$

(b) Write down an equation of graph **B**.

.....

(1)

(Total for Question 6 is 2 marks)

7 $\frac{2x+3}{x-5}+\frac{x-4}{x+5}-3$ can be written in the form $\frac{ax+b}{x^2-25}$ where a and b are integers.

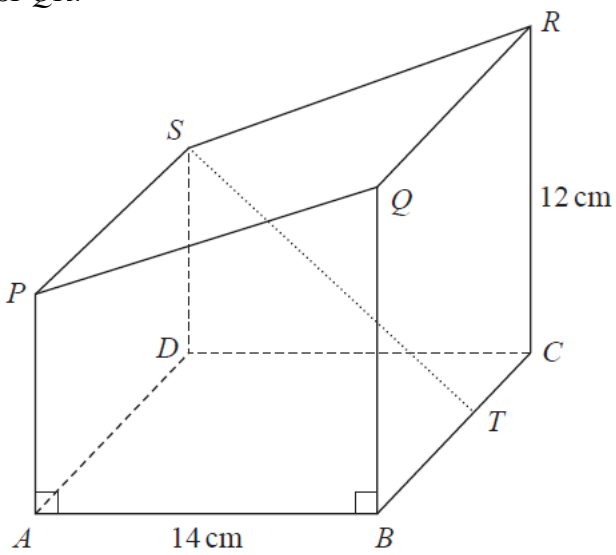
Work out the value of a and the value of b.
You must show all your working.

a = ...

b = ...

(Total for Question 7 is 3 marks)

8 Here is a prism *ABCDSPQR*.



The base *ABCD* of the prism is a square of side 14 cm
T is the point on *BC* such that *BT* : *TC* = 4 : 3

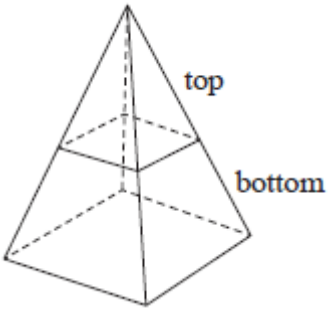
The cross section of the prism is in the shape of a trapezium of area 147 cm^2
CR = 12 cm

Find the size of the angle between the line *ST* and the base *ABCD*.
Give your answer correct to 1 decimal place.

.....°

(Total for Question 8 is 5 marks)

9 The pyramid **P** is formed from two parts made of different materials.



The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm^3

The bottom part of **P** has a mass of 972.8 g
The average density of **P** is 4.7 g/cm^3

Calculate the volume of the top part of **P** as a percentage of the total volume of **P**.
Give your answer correct to 1 decimal place.

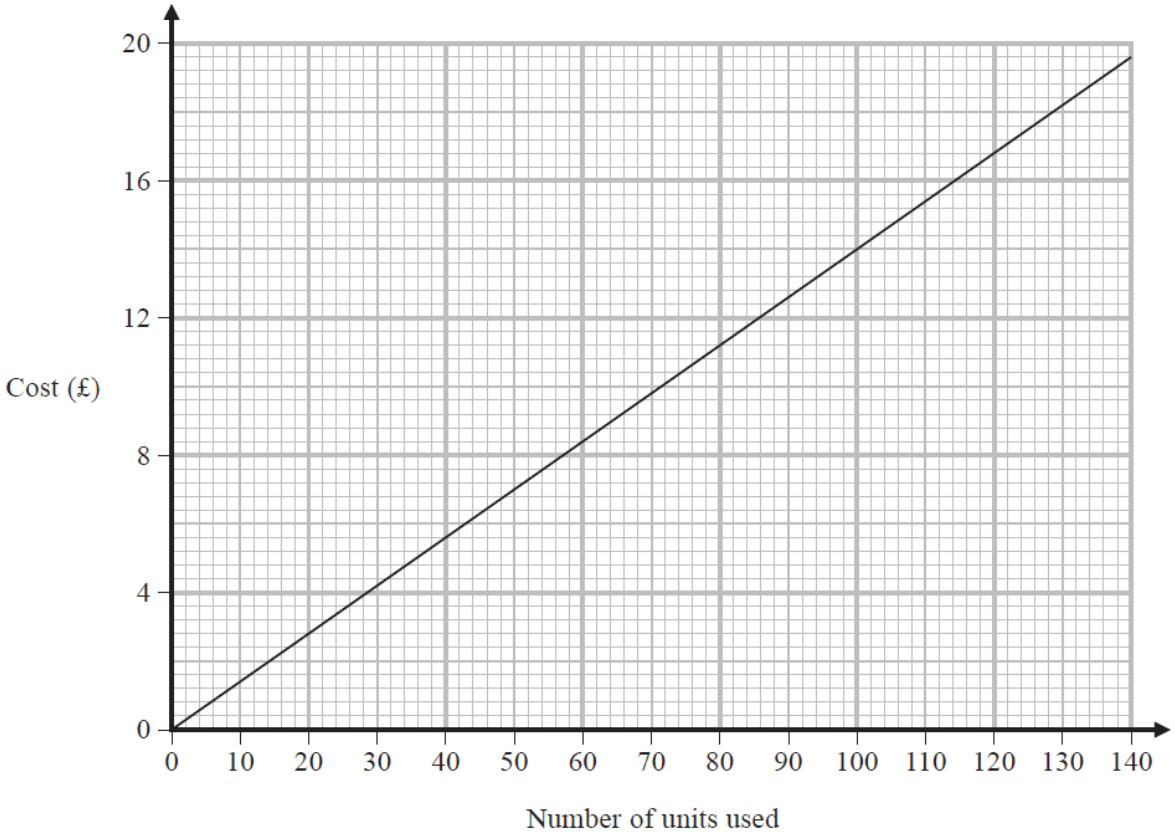
You must show all your working.

.....%

(Total for Question 9 is 5 marks)

10 An electricity company charges the same fixed amount for each unit of electricity used.

David uses this graph to work out the total cost of the electricity he has used.



(*a*) Work out the gradient of the straight line.

.....

(2)

(*b*) What does the gradient of this line represent?

.....

.....

.....

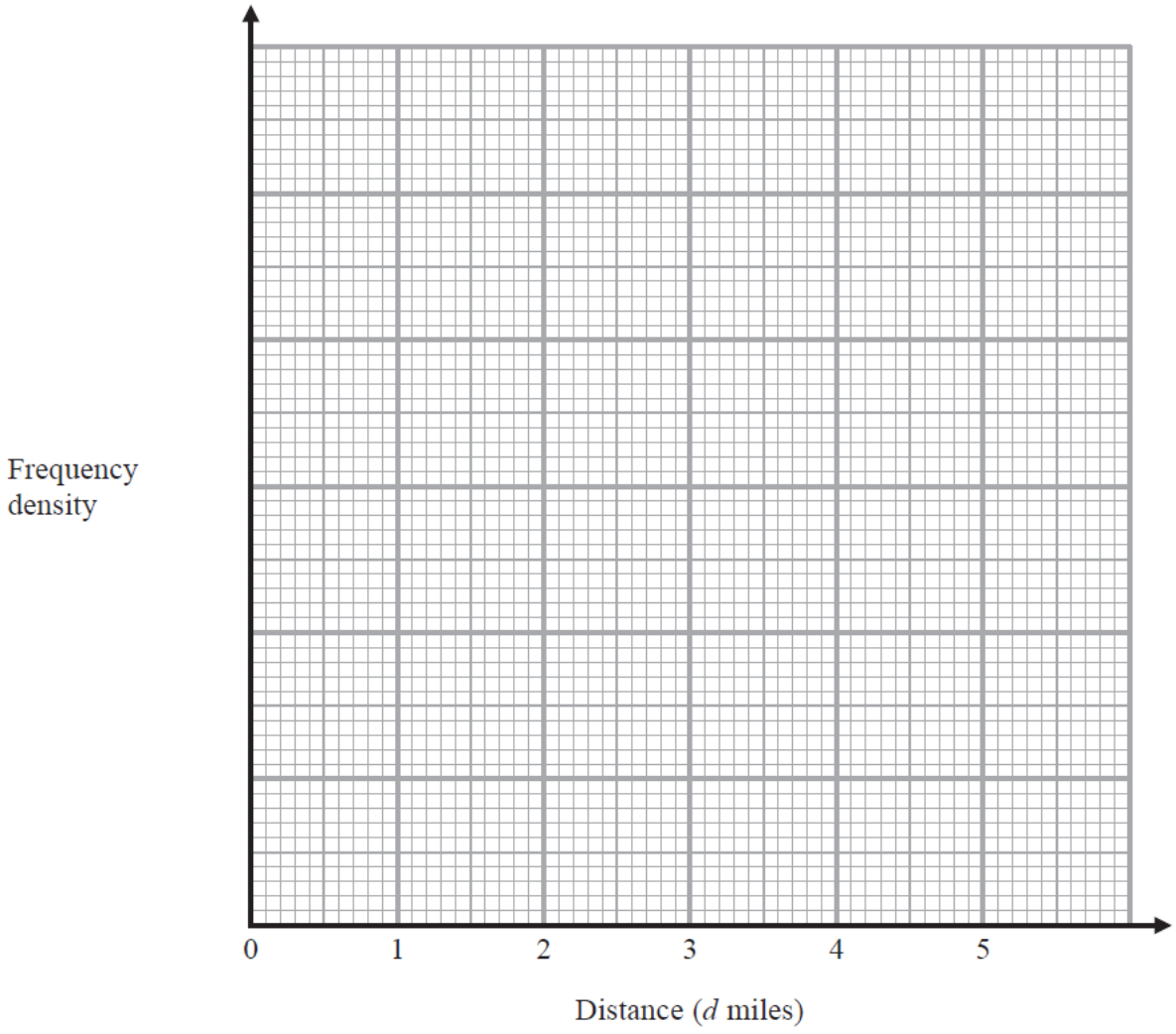
(1)

(Total for Question 10 is 3 marks)

11 The table gives information about the distances, in miles, that some Year 10 students live from school.

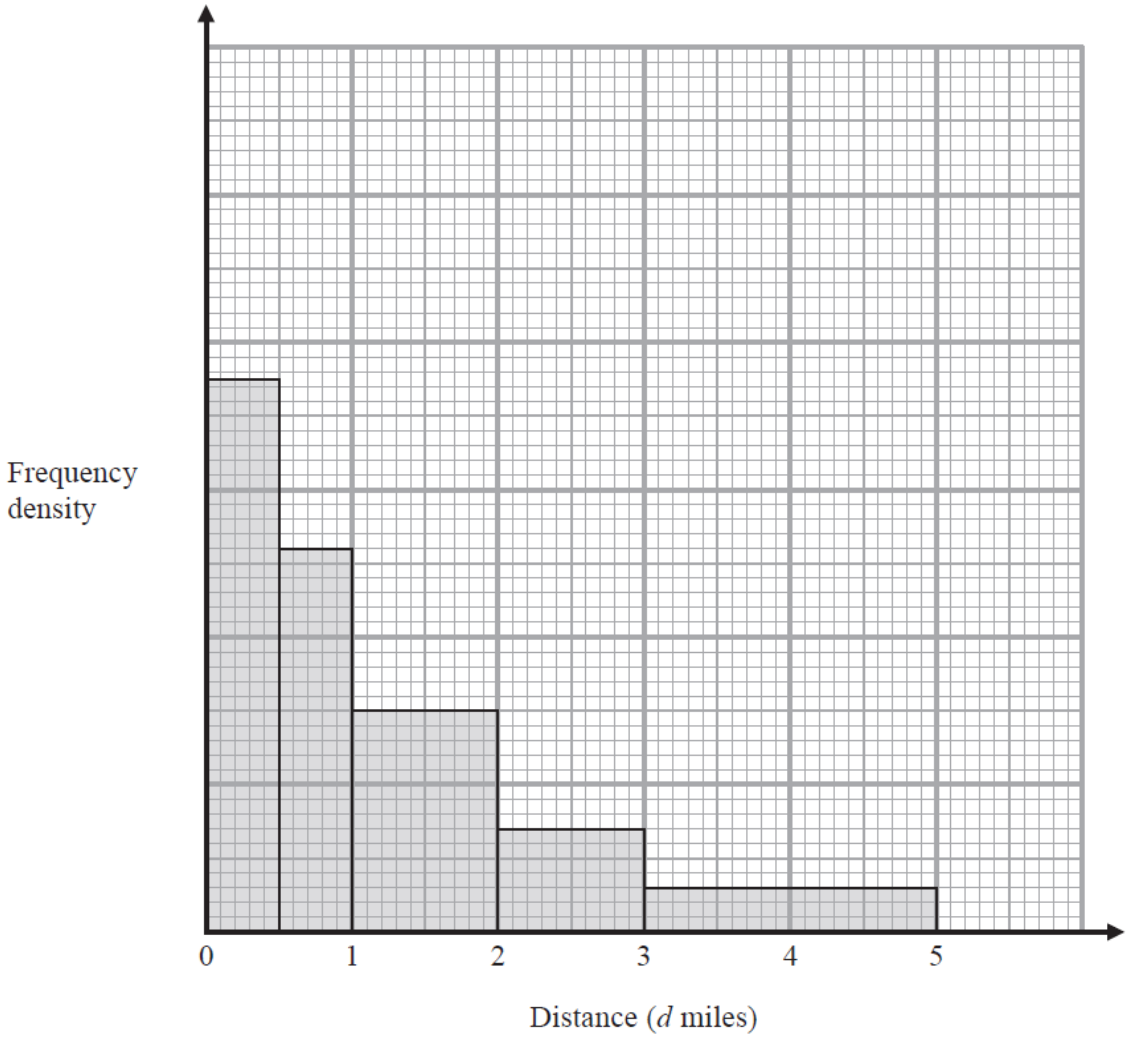
Distance (d miles)	Frequency
$0 < d \leq 1.0$	90
$1.0 < d \leq 1.5$	48
$1.5 < d \leq 2.0$	22
$2.0 < d \leq 3.0$	8
$3.0 < d \leq 5.0$	12

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



(3)

The histogram below shows information about the distances, in miles, that some Year 11 students live from school.



The number of Year 11 students who live between 1 and 2 miles from school is n.

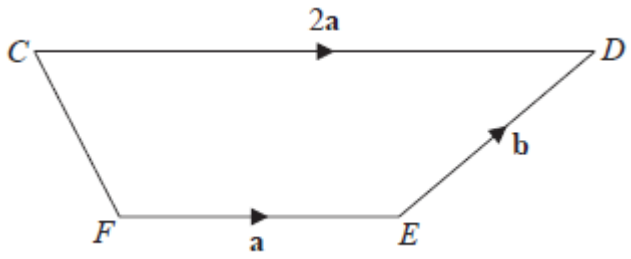
(b) Find an expression, in terms of n, for the number of Year 11 students who live between 3 and 5 miles from school.

.....

(2)

(Total for Question 11 is 5 marks)

12 *CDEF* is a quadrilateral.



$\overrightarrow{FE} = \mathbf{a}$ $\overrightarrow{ED} = \mathbf{b}$ $\overrightarrow{CD} = 2\mathbf{a}$

The point P is such that CEP is a straight line and that $CE = EP$

Use a vector method to prove that CF is parallel to DP.

(Total for Question 12 is 4 marks)

13 **L** is the straight line with equation $y = 2x - 5$

C is a graph with equation $y^2 = 6x^2 - 25x - 8$

Using algebra, find the coordinates of the points of intersection of **L** and **C**.
You must show all your working.

(..... , ...)

(..... , ...)

(Total for Question 13 is 5 marks)

14 Show that $\frac{3x}{x+2} - \frac{2x+1}{x-2} - 1$ can be written in the form $\frac{ax+b}{x^2-4}$ where a and b are integers.

(Total for Question 14 is 4 marks)

15 There are four boxes on a shelf, **A**, **B**, **C** and **D**.

The total weight of **A** and **B** is 3 times the total weight of **C** and **D**.

The weight of **A** is $\frac{2}{3}$ of the weight of **B**.

The weight of **C** is 75% of the weight of **D**.

Find the ratio

weight of **A** : weight of **B** : weight of **C** : weight of **D**

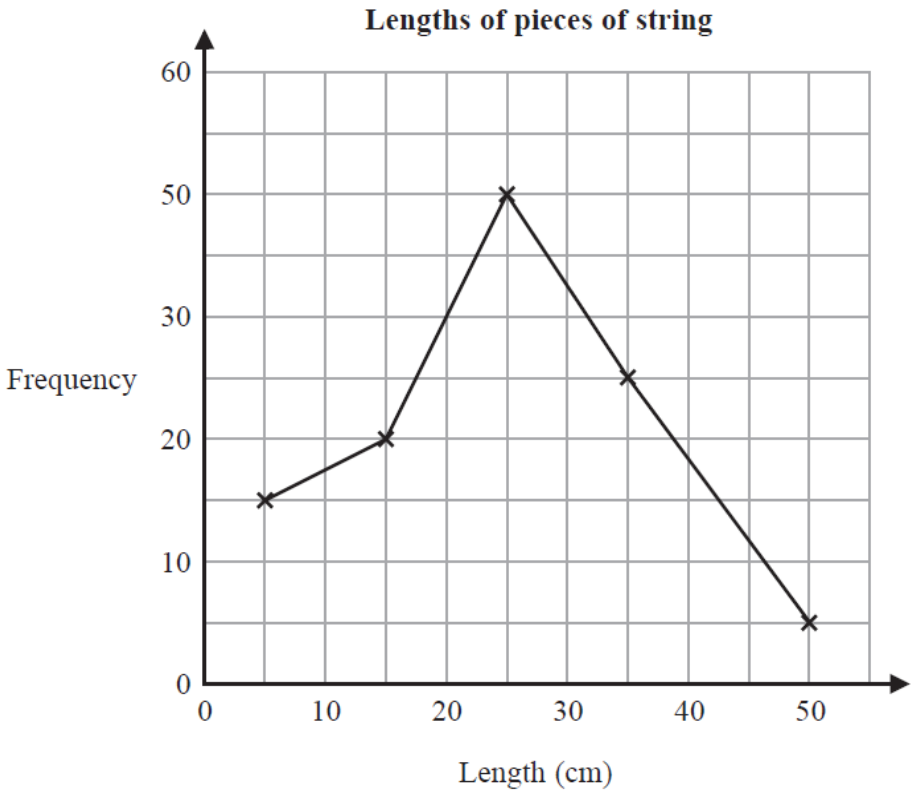
.....

(Total for Question 15 is 4 marks)

16 The table gives information about the lengths, in cm, of some pieces of string.

Length (t cm)	Frequency
$0 < t \leq 10$	15
$10 < t \leq 20$	20
$20 < t \leq 30$	50
$30 < t \leq 40$	25
$40 < t \leq 50$	5

Amos draws a frequency polygon for the information in the table.



Write down **two** mistakes that Amos has made.

1.....

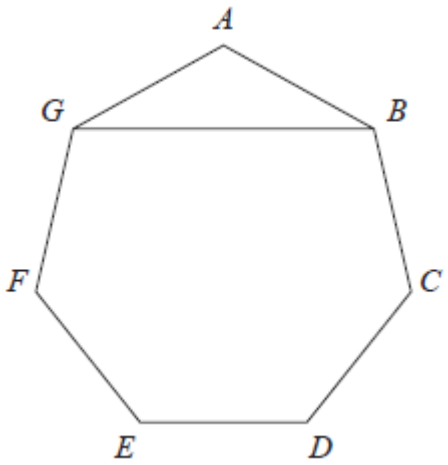
.....

2.....

.....

(Total for Question 16 is 2 marks)

17 *ABCDEFG* is a regular heptagon.



The area of triangle *ABG* is 30 cm^2

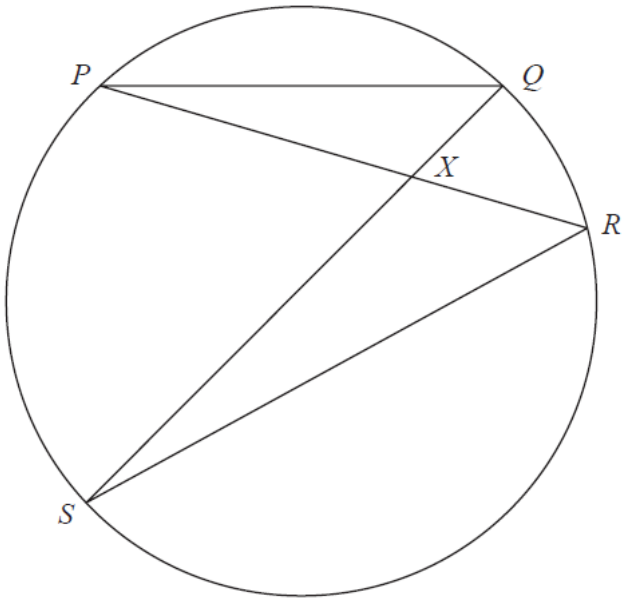
Calculate the length of *GB*.

Give your answer correct to 3 significant figures.
You must show all your working.

..... cm

(Total for Question 17 is 5 marks)

18 P, Q, R and S are four points on a circle.



PXR and SXQ are straight lines.

Prove that triangle PQX and triangle SRX are similar.

(Total for Question 18 is 3 marks)

19 Ray has nine cards numbered 1 to 9

Ray takes at random three of these cards.

He works out the sum of the numbers on the three cards and records the result.

Work out the probability that the result is an even number.

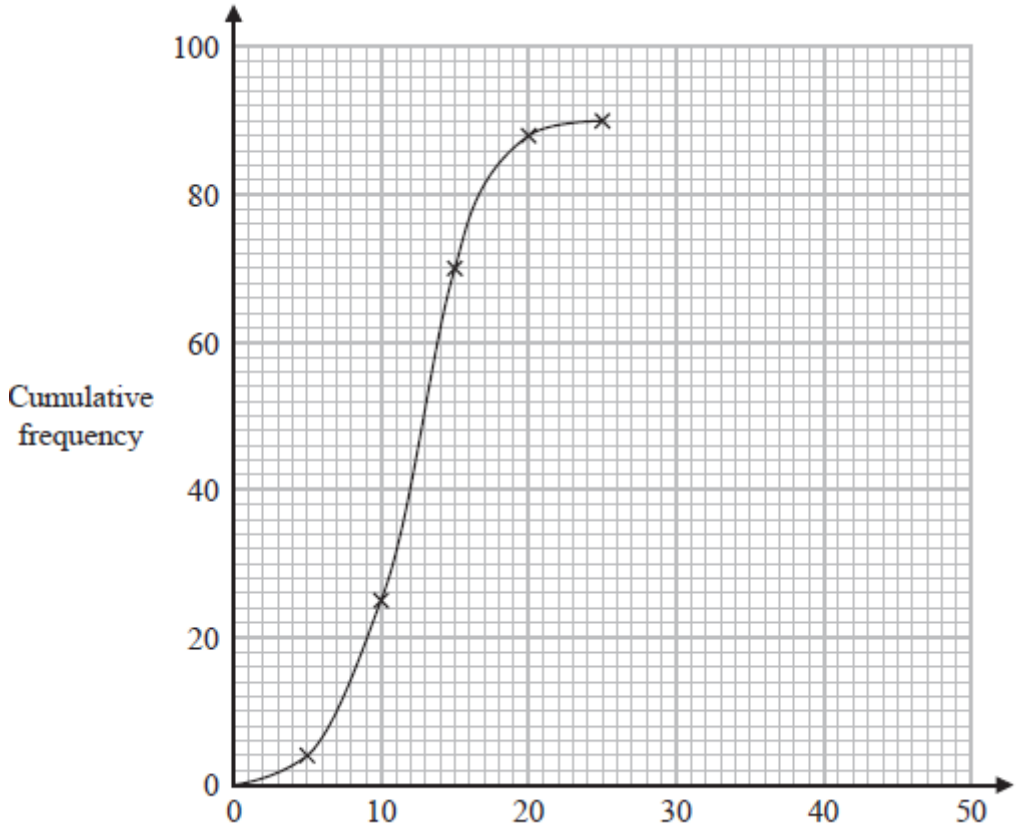
.....

(Total for Question 19 is 4 marks)

20 Chen has this information about the time that it took an operator at a call centre to answer each of 90 calls.

Time (t seconds)	Cumulative frequency
$0 < t \leq 10$	4
$0 < t \leq 20$	25
$0 < t \leq 30$	70
$0 < t \leq 40$	88
$0 < t \leq 50$	90

Chen draws this cumulative frequency graph for the information in the table.



Write down two different things that are wrong with this graph.

1.....

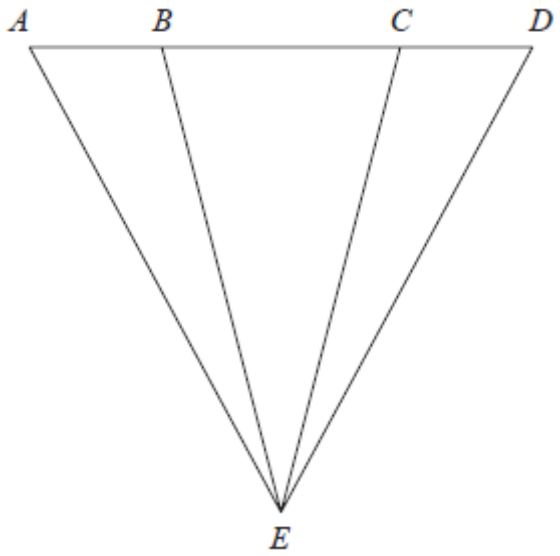
.....

2.....

.....

(Total for Question 20 is 2 marks)

21 The diagram shows a triangle ADE.



$AE = DE$
$AB : BC : CD = 1 : 2 : 1$

Prove that triangle ACE is congruent to triangle DBE.

(Total for Question 21 is 3 marks)

22 Martin used his calculator to work out the value of a number P.

He wrote down the first two digits of the answer on his calculator.
He wrote down 1.2

Complete the error interval for P.

..... $\leq P <$ .....

(Total for Question 22 is 2 marks)

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23 Shape **A** is reflected in the line with equation $x = 2$ to give shape **B**.
Shape **B** is reflected in the line with equation $x = 6$ to give shape **C**.

Describe fully the **single** transformation that maps shape **A** onto shape **C**.

.....

.....

.....

(Total for Question 23 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS