

Please check the examination details below before entering your candidate information

Candidate surname					Other names				
Centre Number				Candidate Number					
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Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Wednesday 14 June 2023

Morning (Time: 1 hour 30 minutes) Paper reference **1MA1/3H**

Mathematics
PAPER 3 (Calculator)
Higher Tier
Shadow Set 1

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator, Formulae Sheet (enclosed). 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.
- 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 questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Simplify $(k^3)^4$

.....
(1)

(b) Simplify $y^6 \times y^9$

.....
(1)

(c) Expand $5m^2(m^2 + 2m)$

.....
(2)

(Total for Question 1 is 4 marks)

2 Jenny wants to know how many sandwiches she will need for 550 people at a meeting.

Each person who eats sandwiches will eat 3 sandwiches.

2 slices of bread are needed for each sandwich.

Jenny assumes 76% of the people will eat sandwiches.

(a) Using this assumption, work out the number of slices of bread Jenny needs.

Give your answer correct to the nearest hundred slices.

..... slices

(4)

Jenny's assumption is wrong.

68% of the people will eat sandwiches.

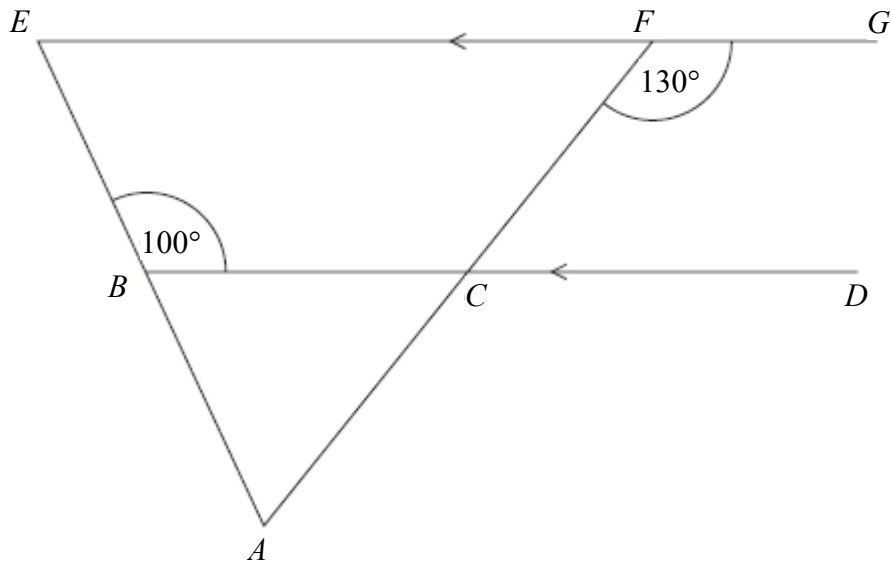
(b) How does this affect your answer to part (a)?

.....
.....
.....

(1)

(Total for Question 2 is 5 marks)

- 3 *ACF* and *ABE* are straight lines.
EFG and *BCD* are parallel lines.



Show that triangle *ABC* is isosceles.
Give a reason for each stage of your working.

(Total for Question 3 is 5 marks)

4 It takes 24 hours for 9 identical pumps to fill a swimming pool.

How many hours would it take 15 of these pumps to fill another swimming pool of the same size?

..... hours

(Total for Question 4 is 2 marks)

5 P and Q are numbers such that

$$P = 2^3 \times 3^5 \times 5$$

$$Q = 3^2 \times 5^3$$

(a) Find the highest common factor (HCF) of P and Q .

.....
(1)

(b) Find the lowest common multiple (LCM) of P and Q .

.....
(2)

(Total for Question 5 is 3 marks)

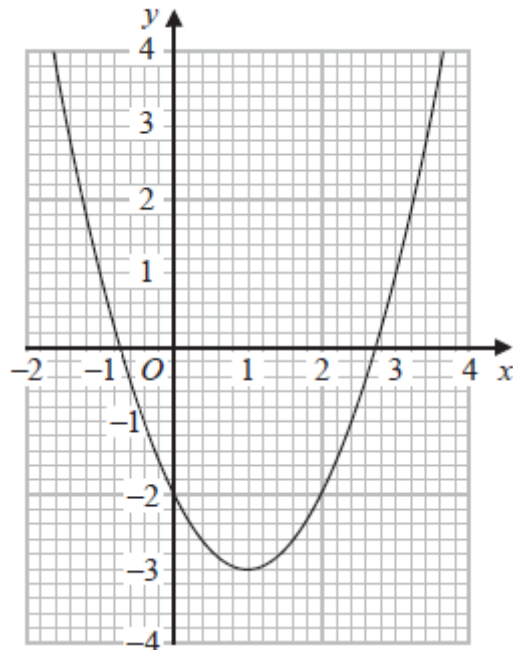
6 Sludge leaks from a pipe at a constant rate of $8.7 \text{ m}^3/\text{s}$

How many hours does it take for $98\,310 \text{ m}^3$ of sludge to leak from the pipe?
Give your answer correct to the nearest hour.

..... hours

(Total for Question 6 is 3 marks)

7 Here is the graph of $y = x^2 - 2x - 2$



(a) Write down the coordinates of the turning point on the graph of $y = x^2 - 2x - 2$

(.....,)
(1)

(b) Write down an estimate for one of the roots of $x^2 - 2x - 2 = -2$

.....
(1)

(Total for Question 7 is 2 marks)

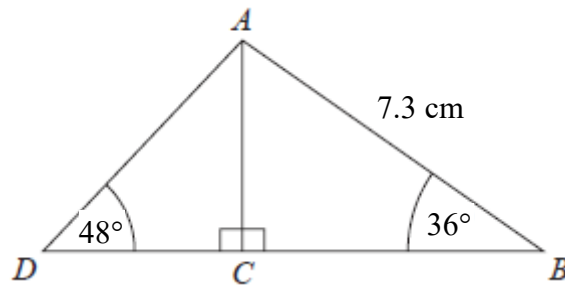
8 A solid cube is made of stone.
The stone has a density of 3.5 g/cm^3
The volume of the cube is 216 cm^3
Work out the mass of the cube.

..... g
(Total for Question 8 is 2 marks)

9 Some people were asked if they wanted a new car.
60% of the people said yes.
35% of the people who said yes wanted a car with a soft top.
What percentage of the people asked said they wanted a car with a soft top?

.....%
(Total for Question 9 is 2 marks)

- 10 ABD is a triangle.
 C is a point on BD .



Work out the length of DC .
Give your answer correct to 1 decimal place.

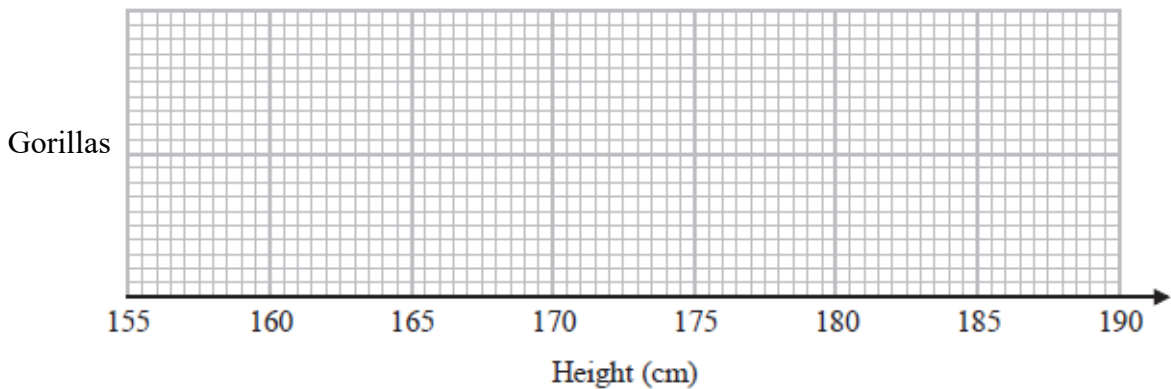
..... cm

(Total for Question 10 is 3 marks)

11 The table shows some information about the heights of a group of gorillas.

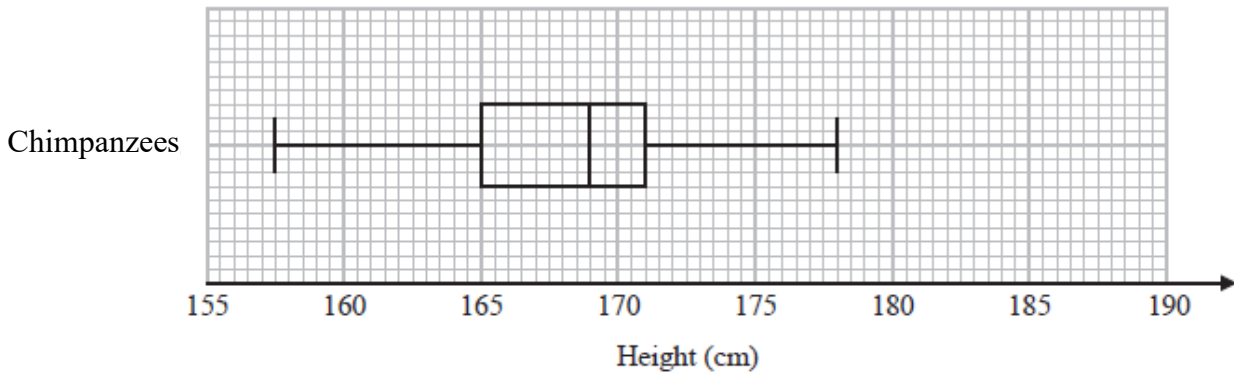
least height	159 cm
greatest height	188 cm
median	179 cm
lower quartile	172 cm
upper quartile	182 cm

(a) On the grid, draw a box plot for the information in the table.



(3)

The box plot below shows the distribution of the heights of a group of chimpanzees.



(b) Compare the distribution of the heights of the gorillas with the distribution of the heights of the chimpanzees.

.....

.....

.....

.....

(2)

(Total for Question 11 is 5 marks)

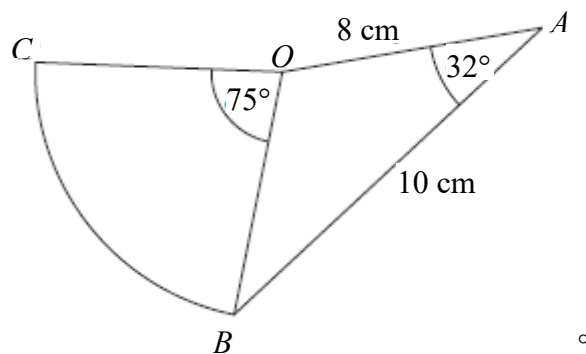
- 12** Show that $(x + 2)(x - 3)(x + 4)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are integers.

(Total for Question 12 is 3 marks)

- 13** Show algebraically that the sum of any 3 consecutive even numbers is always a multiple of 6.

(Total for Question 13 is 3 marks)

- 14 OAB is a triangle.
 OBC is a sector of a circle, centre O .



Calculate the area of OBC .
 Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 14 is 4 marks)

15 (a) Factorise $p^2 - q^2$

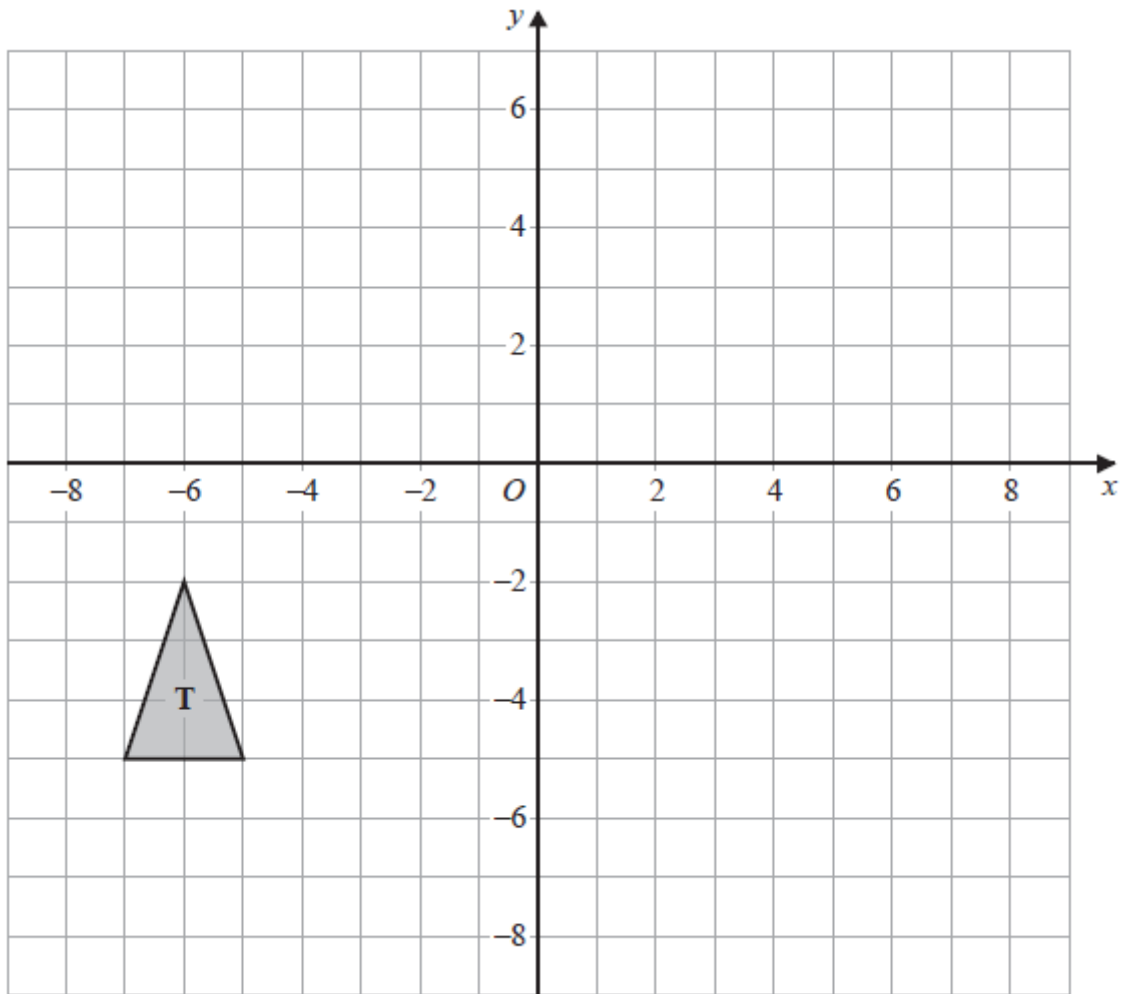
.....
(1)

(b) Show that $3^{60} - 1$ is the product of two consecutive even numbers.

(2)

(Total for Question 15 is 3 marks)

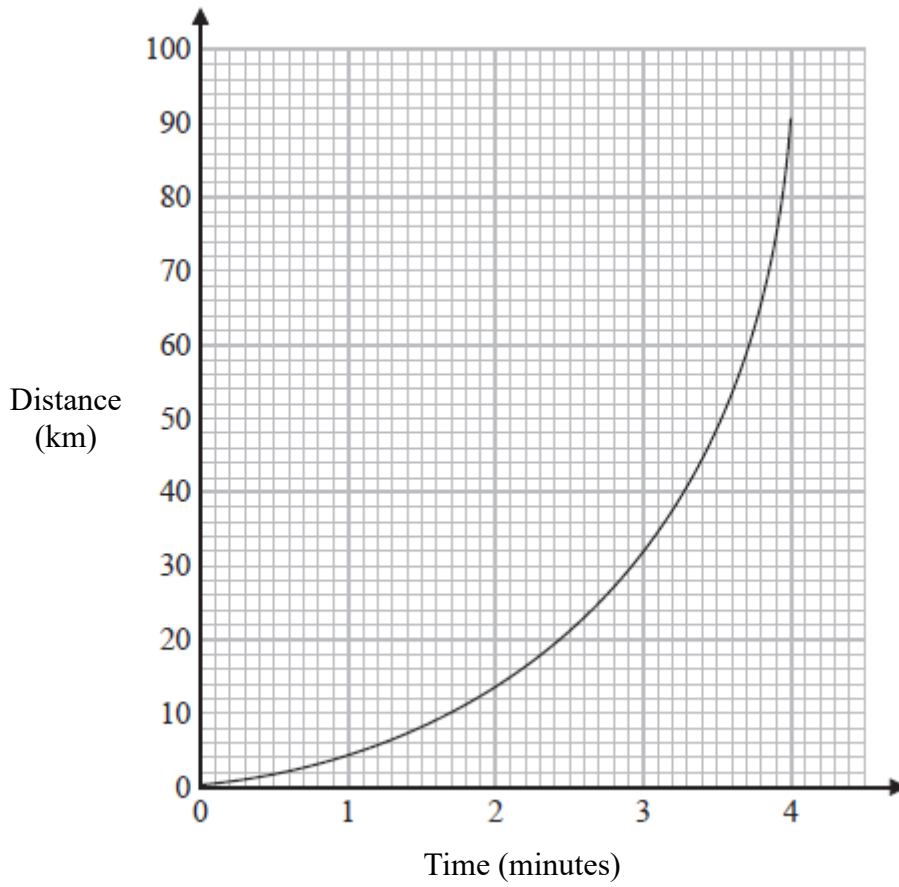
16



On the grid, enlarge triangle **T** by scale factor -2 with centre of enlargement $(-2, -4)$

(Total for Question 16 is 2 marks)

17 Here is a distance-time graph.



- (a) Find an estimate of the gradient of the graph at time 3 minutes.
You must show how you get your answer.

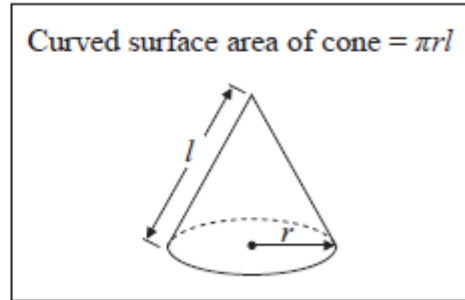
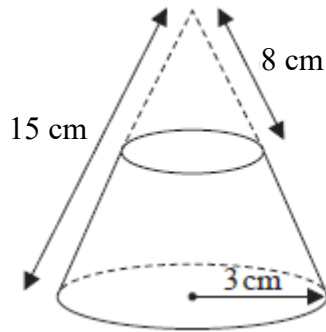
.....
(3)

- (b) What does the gradient of the graph represent?

.....
.....
(1)

(Total for Question 17 is 4 marks)

18 A solid frustum is made by removing a small cone from a large cone as shown in the diagram.



The slant height of the small cone is 8 cm.
 The slant height of the large cone is 15 cm.
 The radius of the base of the large cone is 3 cm.

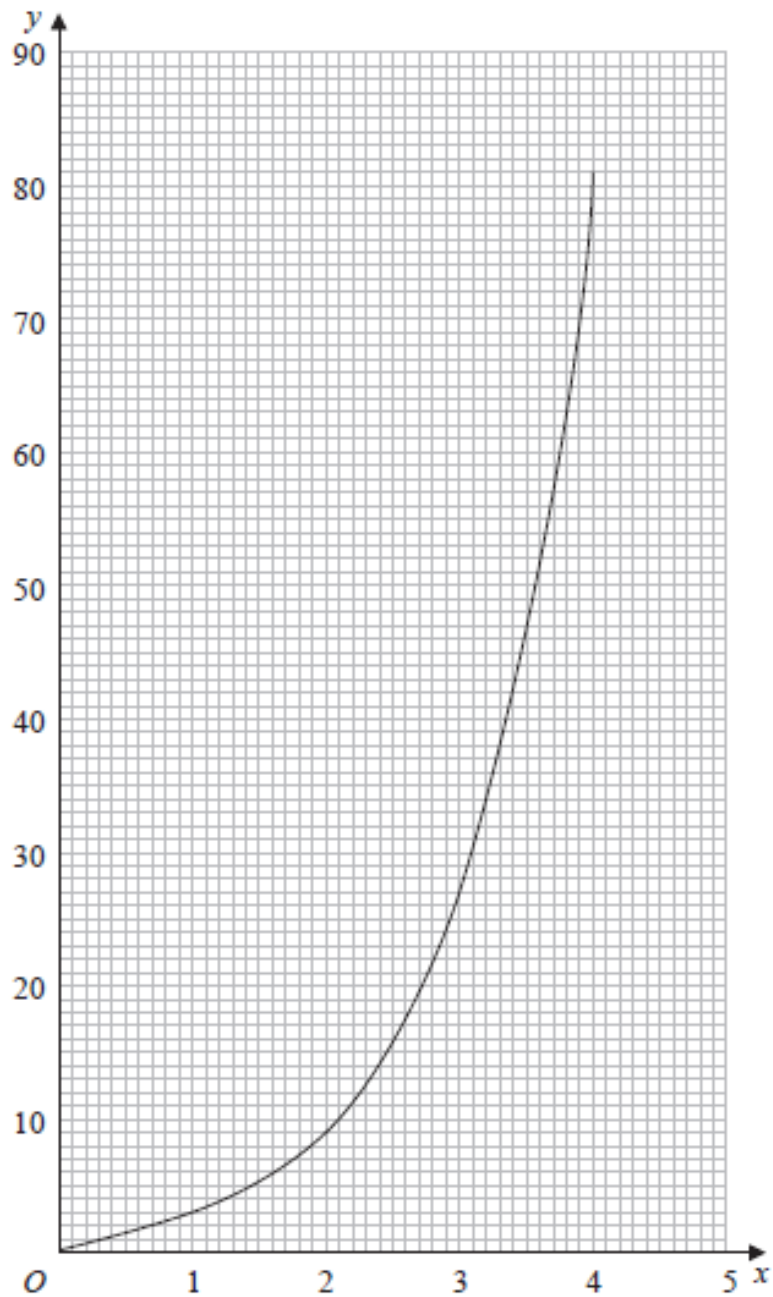
Calculate the total surface area of the frustum.
 Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 18 is 5 marks)

19 Saira needs to draw the graph of $y = 3^x$ for $0 \leq x \leq 4$

She draws the graph shown on the grid.



Write down one thing Saira has done wrong.

.....

.....

.....

(Total for Question 19 is 1 mark)

20 Prove algebraically that $0.2\dot{5}\dot{6}$ can be written as $\frac{127}{495}$

(Total for Question 20 is 3 marks)

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

.....
(Total for Question 21 is 4 marks)

- 22 Given that the vector $p \begin{pmatrix} 3 \\ 5 \end{pmatrix} + q \begin{pmatrix} 4 \\ 8 \end{pmatrix}$ is parallel to the vector $\begin{pmatrix} 26 \\ 50 \end{pmatrix}$
find an expression for q in terms of p .

.....
(Total for Question 22 is 3 marks)

23 A circle has equation $x^2 + y^2 = 100$

The point P with coordinates $(8, -6)$ lies on the circle.

Ayesha says that the tangent to the circle at P crosses the x -axis at the point $(13, 0)$

Is Ayesha correct?

You must show how you get your answer.

(Total for Question 23 is 4 marks)

24 There is a total of y sweets in a packet.

There are x green sweets and 6 orange sweets in the packet.
The rest of the sweets are yellow.

$$x : y = 1 : 4$$

Hannah takes at random two sweets from the packet.

Find, in terms of x , an expression for the probability that Hannah takes two sweets of the same colour.

Give your answer as a fraction in the form $\frac{ax^2 + bx + c}{dx^2 + ex}$ where a, b, c, d and e are integers.

.....
(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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