NAME ……..…… **ADM NO**……..… **DATE** ……..……

SCHOOL……...…… **SIGNATURE** ……...…….

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MATHEMATICS

FORM 3 PAPER 1

OCTOBER 2024

TIME: 2 ½ HOURS

END OF TERM THREE EXAMINATION

Kenya Certificate of Secondary Education 2024

INSTRUCTIONS TO CANDIDATES

1. *Write your name and admission number in the spaces provided at the top of this page.*
2. *This paper consists of two sections:* **Section I and Section II.**
3. *Answer **al**l questions in* **section I** and any five questions in Section **II.**
4. *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*
5. *Marks may be given for correct working even if the answer is wrong.*
6. ***KNEC** Mathematical tables may be used.*

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

17	18	19	20	21	22	23	24

Grand

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SECTION I (50 Marks)

Answer all the questions in this section in the spaces provided.

1. Without using tables or calculator evaluate (3 marks)

$$\frac{0.38\times0.23\times2.7}{0.114\times0.0575}$$

2. All prime numbers less than ten are arranged in descending order to form a number.
   a) Write the number formed (1 mark)

   b) State the total value of the second digit in the number formed in (a) above (1 mark)

3. Use reciprocals, square and square roots tables to evaluate, to 4 significant figures, (4 marks)

$$\frac{2}{\sqrt{0.3446}} + (0.8673)^2$$

4. Solve for x in $32^{(x-3)} \times 8^{(x+4)} = 64 \div 2^x$ (3 marks)

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5. Two lines $l_1 and\ l_2$ intersect at a point **P**. l_1 passes through points $(-4,0)\ and\ (0,6)$ .Given that l_2 has an equation $y = 2x - 2$, find by calculation, the coordinates of point **P**

(3 marks)

6. The length of a rectangle is $(x + 3)$ cm. If the width of the rectangle is two thirds its length and the perimeter is 40 cm, find its width. (3 marks)

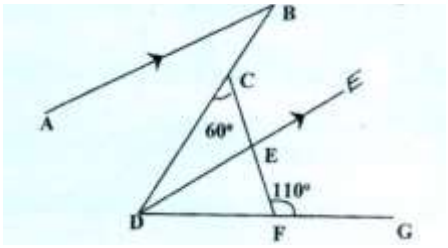
7. A Kenyan bank buys and sells currencies at the exchange rates below

Currency	Buying Ksh	Selling Ksh
1Euro	147.87	148.00
1Us dollar	74.22	74.50

An American tourist arrived in Kenya with 24,000 Euros He converted all the Euros to Kenya shillings at the bank .He spent a total of Sh. 200,000 while in Kenya and converted the rest to into US dollars at the bank. Find the amount in dollars that he received to the nearest whole number. (3 marks)

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8. In the figure below AB is parallel to DE ,DE bisects angle BDG ,angle $DCF = 60^0$ and angle $CFG = 110^0$

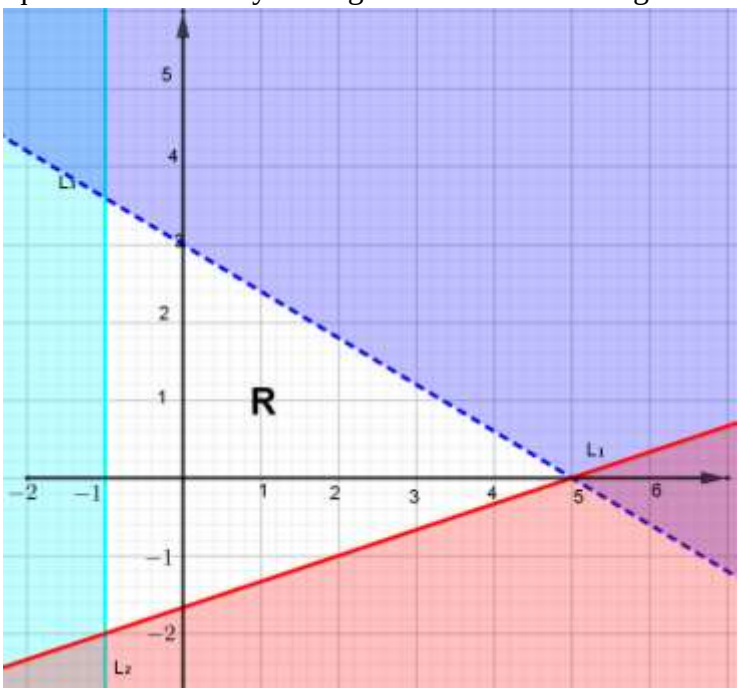


Find giving reasons for your answers

a) $< CDF$ (2 marks)

b) $< ABD$ (1 mark)

9. Find the inequalities that satisfy the region R shown in the figure below. (3 marks)

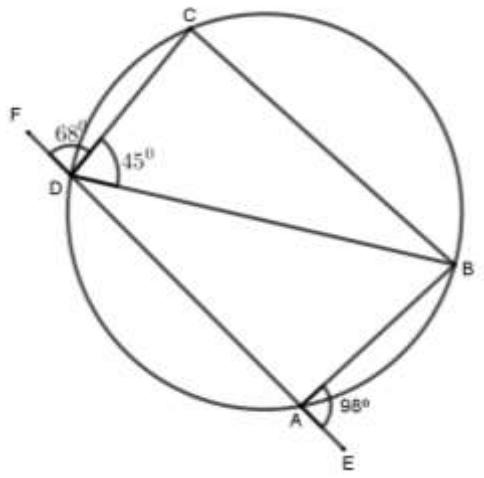


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10. (i) Solve for x given that $sin2x = \cos(x - 30)$ (2 marks)

(ii) Hence find the value of $\tan(x + 20^0)$ (1 mark)

11. In the figure below ABCD is a cyclic quadrilateral and BD is a diagonal .EADF is a straight line, $< CDF = 68^0$, $< BDC = 45^0$ and $< BAE = 98^0$



Calculate the size of

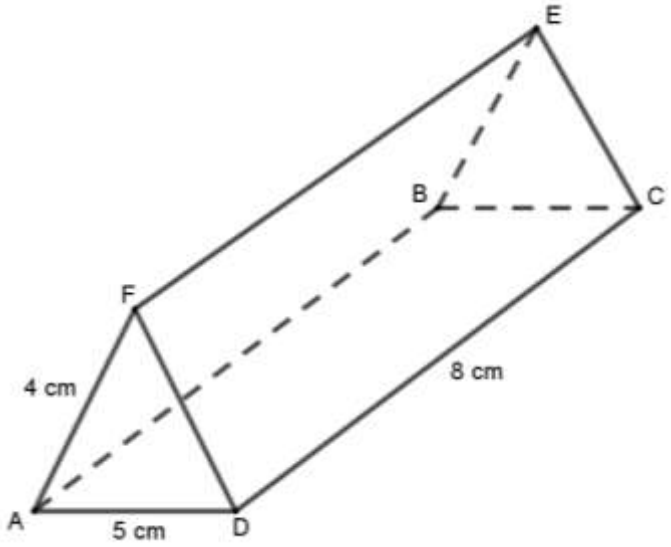
a) $< ADB$ (2 marks)

b) $< ABD$ (2 marks)

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12. A cube of metal of side 6.7 cm was melted and the molten material used to make a sphere. Find to 4 significant figures the radius of the sphere. (3 marks)

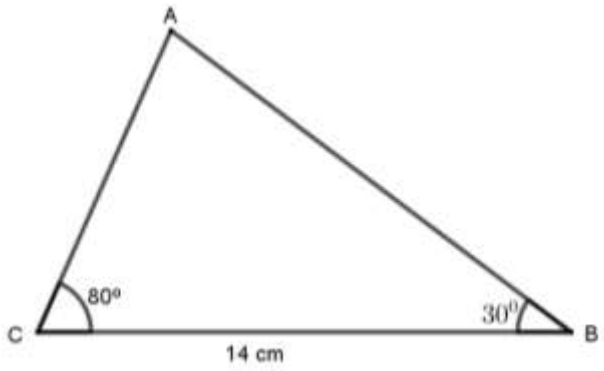
13. The figure below is a triangular prism of uniform cross-section in which $AF = BE = 4cm$ $AD = 5cm$ and $DC = 8cm$.Draw a clearly labeled net of the prism. (3 marks)



14. Simplify the expression $\frac{p^2+2pq+q^2}{p^3-pq^2+p^2q-q^3}$ (4 marks)

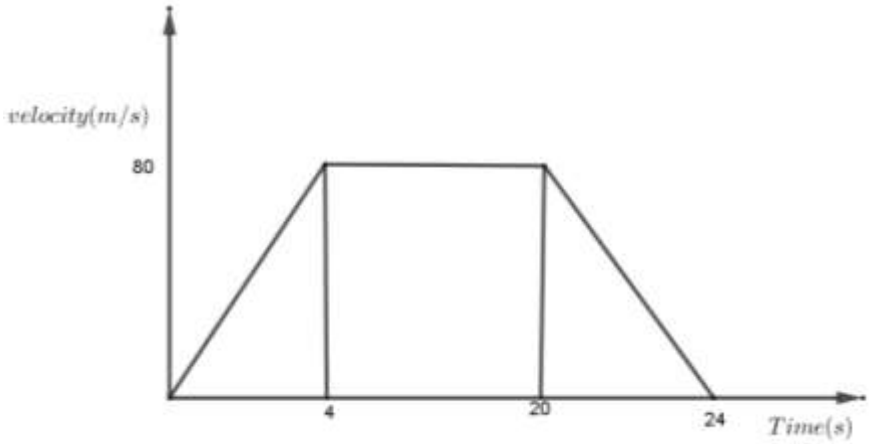
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15. In the triangle ABC below, BC = 14 cm, $\angle ABC = 30°$ and $\angle ACB = 80°$



Calculate, correct to 4 significant figures, the area of the triangle ABC. (3 marks)

16. The figure below is a velocity time graph of a car



Calculate the time taken to travel half the distance by the car (3 marks)

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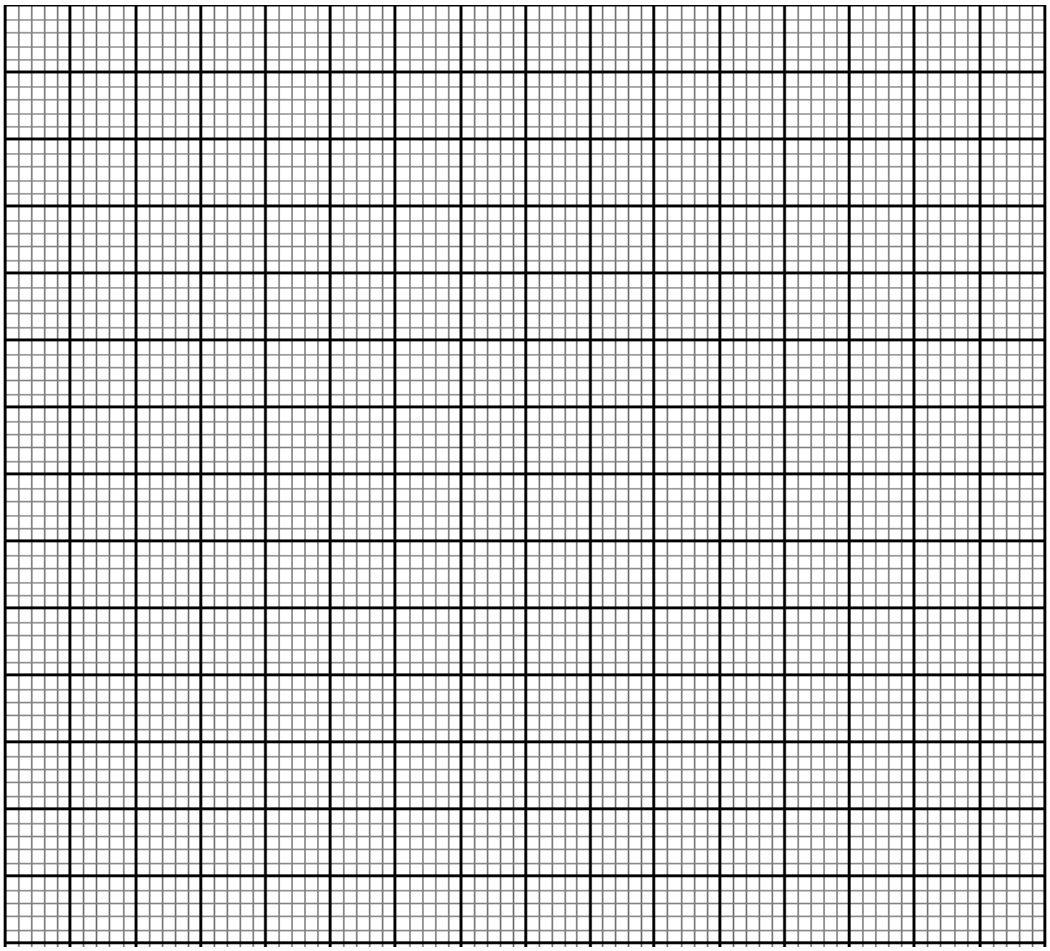
SECTION II (50 marks)

Answer any five questions in this section only

17. (a) Complete the table below for $y = 2x^2 - x - 3$ (2 marks)

x	-3	-2	-1	0	1	2	3
$2x^2$	18		2	0			18
$-x$	3		1	0	-3	-2	
-3	-3	-3	-3	-3	-3	-3	-3
y	18	7				3	12

(b) Draw the graph of $y = 2x^2 - x - 3$for $-3 \leq x \leq 3$ (3 marks)



(b) Using a suitable straight line, solve

i. $2x^2 - x - 3 = 0$ (1 mark)

ii. $2x^2 - 3x - 5 = 0$ (2 marks)

iii. $2x^2 - 2x - 1 = 0$ (2 marks)

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18. (a) The length of each side of an equilateral triangle ABC is 12 cm. Calculate the area of the triangle correct to 2 decimal places. (2 marks)

(b) The triangle ABC in (a) forms the base of a solid triangular pyramid VABC. The perpendicular height of the pyramid is 21 cm. Calculate the volume of the pyramid.(2 marks)

(c) The pyramid VABC in (b) above is recast into a cone of base radius 4.2 cm. Calculate, correct to 2 decimal places:

i. The slant height of the cone. (2 marks)

ii. The surface area of the cone. (4 marks)

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19. Four towns **P**,**Q**,**R** and **S** are such that **Q** is 350km on a bearing of $N30^0E$ from town **P**. Town **R** is 500km from town **Q** and on a bearing of $S60^0E$ from town **Q** .Town **S** is 600km due south of town Q

a) Using a scale of $1cm\ to\ represent\ 100km$,draw a diagram to show the relative positions of town **P,Q** ,R and S (4 marks)

b) Find the bearing and distance of

i) P from S (2 marks)

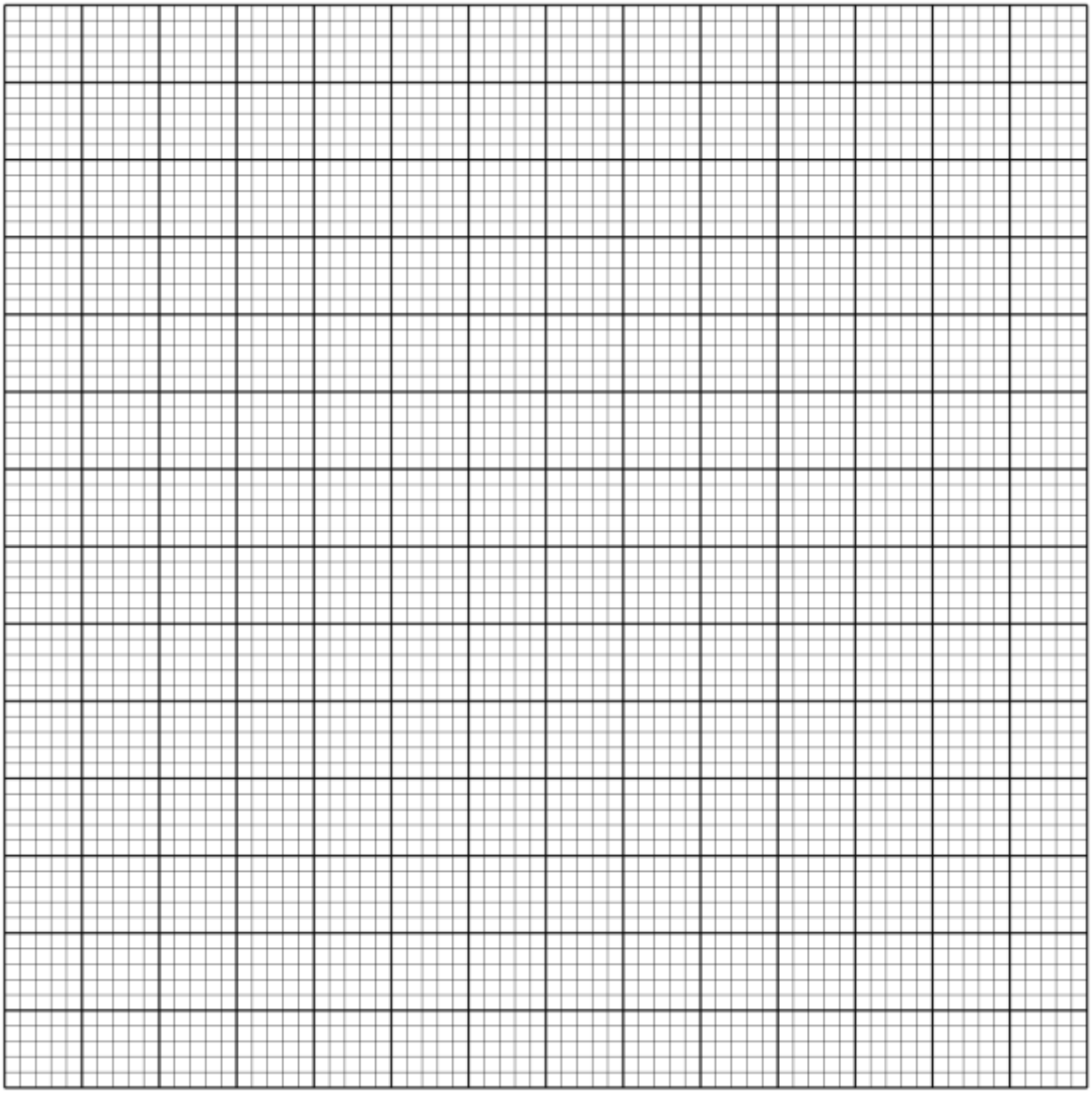
ii) S from R (2 marks)

iii) Calculate the actual area bounded by PQ, QR, RS and PS to the nearest whole number. (2 marks)

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20. The vertices of a triangle PQR are $P(0,0)$, $Q(6,0)$ and $R(2,4)$.

a) Draw triangle PQR on the grid provided. (1 mark)



b) Triangle $P'Q'R'$ is the image of triangle PQR under an enlargement scale factor $\frac{1}{2}$ and centre $(2,2)$. Write down the co-ordinates of $P'Q'R'$ and plot on the same grid. (3 marks)

c) Draw triangle $P''Q''R''$ the image of triangle $P'Q'R'$ under a positive quarter turnabout point $(1,1)$. State the co-ordinates of $P''Q''R''$. (3 marks)

d) Draw triangle $P'''Q'''R'''$ the image of $P''Q''R''$ under a reflection in the line $y = 1$. (2 marks)

e) State the type of congruence between triangle $P'Q'R'$ and $P'''Q'''R'''$. (1 mark)

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21. A school intended to buy a certain number of chairs for Ksh 16 200. The supplier agreed to offer a discount of Ksh 60 per chair which enabled the school to get 3 more chairs. Taking x as the originally intended number of chairs,

a) Write an expression in terms of x for:

i. Original price per chair. (1 mark)

ii. Price per chair after discount. (1 mark)

b) Determine:

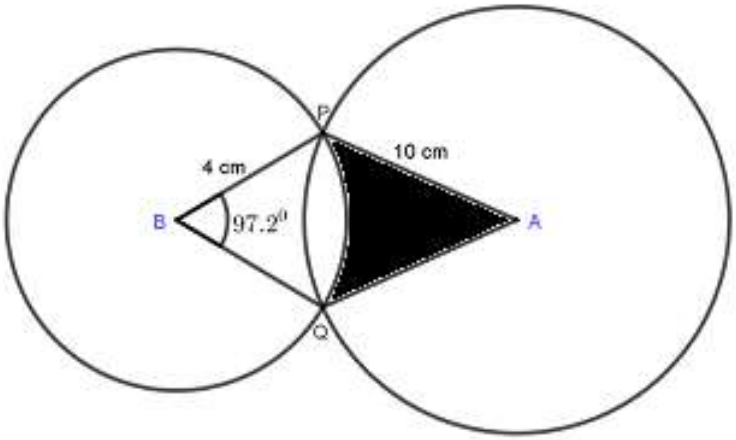
i. The number of chairs the institution intended to buy. (4 marks)

ii. Price per chair after discount. (2 marks)

iii. The amount of money the institution would have saved per chair if it bought the intended number of chairs at a discount of 15%. (2 marks)

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22. In the figure below A and B are centres of the circle intersecting at point P and Q angle $PBQ = 97.2^0$ while $PAQ = 52^0$ $PB = 4cm$ while $AP = 10cm$ (Use $\pi = 3.142$).



Determine

a) The length of AB (3 marks)

b) Area of sector PBQ (2 marks)

c) Area of quadrilateral APBQ (3 marks)

d) Area of the shaded region (2 marks)

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23. Two alloys A and B, are each made up of copper, zinc and tin. In alloy **A** ,the ratio of copper to zinc is 3:2 and the ratio of zinc to tin is 3:5

a) Determine the ratio, copper: zinc: tin, in alloy **A.** (2 marks)

b) The mass of alloy **A** is 250 kg. Alloy **B** has the same mass as alloy **A** but the amount of copper is 30% less than that of alloy **A .**Calculate

i) The mass of tin in alloy **A ;** **(**2 marks)

ii) The total mass of zinc and tin in alloy **B** (3 marks)

iii) Given that the ratio of zinc to tin in alloy **B** is 3:8, determine the amount of tin in alloy **B** than in alloy **A** (3 marks)

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24. The examination marks in a Geography test for 60 students were as follows:

66	54	34	83	52	74	61	27	65	22
60	71	47	60	63	59	58	46	39	35
79	42	58	74	92	19	39	41	49	54
35	51	76	59	68	73	90	88	93	85
36	82	54	85	61	69	24	40	88	34
30	26	17	15	80	90	65	55	69	89

a) Complete the frequency distribution table below for the above examination. Use classes of size 10 starting with the class $10 - 19$. (4 marks)

Class	Mid point x	Frequency f	fx	Cumulative frequency
$10 - 19$				

b) State the modal class. (1 mark)

c) Estimate:

i. The mean mark. (2 marks)

ii. The median mark. (3 marks)

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