

MANGU MOCK TRIAL 3

MATHEMATICS

121/1

PAPER 1

TIME: 2½ HOURS

NAME.....

SCHOOL..... SIGN.....

INDEX NO..... ADM NO.....

INSTRUCTIONS TO DANDIDATES

1. Write your name, index number and class.
2. The paper contains two sections: Section I and II
3. Answer ALL questions in section I and ONLY FIVE questions from section II.
4. All working and answers must be written on the question paper in the spaces provided below each question.
5. Marks may be awarded for correct working even if the answer is wrong.

FOR EXAMINER'S USE ONLY

SECTION 1

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

SECTION II

17	18	19	20	21	22	23	24	25	TOTAL

GRAND TOTAL

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SECTION 1 (50 MARKS)

Answer all the questions in the spaces provided.

1. Simplify the expression

(3mks)

$$\frac{12x^2 - 27}{4 - (2x + 1)}$$

2. Solve the equation

$$\frac{x-1}{x} - \frac{2x-1}{3x} = \frac{1}{4}$$

(3mks)

3. A flag post 10m long is mounted on top of a pillar. The angle of depression from the top of the flag post to a point A on the horizontal ground is 60° while the angle of depression to the same point A from the bottom of the flag post is 40° . Calculate the height of the pillar. **(3mks)**

4. The exchange rates of currencies in a certain bank in Kenya on a certain day were as follows;

Currency	Buying (Ksh)	Selling (Ksh)
1 US dollar	104.37	105.42
1 Euro	121.51	122.62

John exchanged 27,520 US dollars into Ksh in this bank.

- a) How much Ksh did he receive? **(2mks)**
- b) After spending Ksh. 973,289 he converted the remainder to Euros. How many Euros did he finally have? (Give your answer to the nearest Euro). **(2mks)**

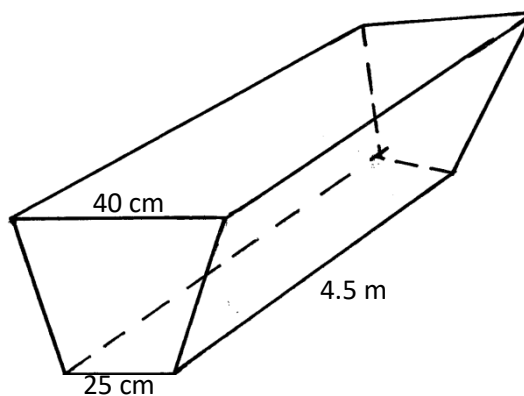
5. An irregular polygon has two of its interior angles as 135° and 105° . The remaining interior angles are all equal to 150° . Calculate the sum of its interior angles. **(3mks)**

6. A fruit juice dealer sell the juice in packet of 300ml, 500ml and 750ml. find the size of the smallest container that can fill each of the packets and leave a remainder of 200ml. **(3mks)**

7. In a fundraising committee of 45 people, the ratio of men to women is 7:2. Find the number of women required to join the existing committee so that the ratio of men to women is changed to 5: 4. **(3mks)**

8. Jemima's team entered a contest where teams of students compete by answering questions that earn either 3 points or 5 points. Jemima's team scored 44 points after answering 12 questions correctly. How many five-point questions did the team answer correctly? **(3mks)**

9. The figure below shows a trough which is 40 cm wide at the top and 25 cm wide at the bottom. The trough is 20cm deep and 4.5 m long. Calculate the capacity of the trough in litres. **(3mks)**



10. Using compass and ruler only construct a triangle ABC such that $AB = 6\text{cm}$, $BC = 5\text{cm}$ and angle $ABC = 67.5^\circ$ measure the length of AC. **(3mks)**

11. The two sides of a triangle are given 6 cm and 5 cm. the angle between them is 130° .

Calculate the area of the triangle (giving your answer to 2 decimal places) **(3mks)**

12. The length of a rectangular mat is 1.5 m longer than its width; Find the length of the mat if its area is 6.5m^2 (give your answer to 4 significant figures) **(3mks)**

13. State the amplitude, period and the phase angle of the curve $Y= 2 \sin (1.5X - 30^\circ)$ **(3mks)**

14. (a) Using line AB given below, construct the locus of point P such that angle APB = 90° . **(2mks)**

A B _____

(b) On the same diagram locate two possible positions of point C such that point C is on the locus of P and is equidistant from A and B. **(2mks)**

15. Given that $\mathbf{OA} = 2\mathbf{i} + 3\mathbf{j}$ and $\mathbf{OB} = 3\mathbf{i} - 2\mathbf{j}$. Find the magnitude of AB to one decimal place.

(3mks)

16. Determine the quartile deviation for the following distribution.

(3mks)

3,4,9,5,4,7,6,2,1,6,7,8,9

SECTION II (50 MARKS)

Answer ONLY FIVE questions in this section.

17. A point A is (-1, 8) and B is (8, 2).

a)

i. Find \overrightarrow{AB} . (2mks)

ii. Find $|\overrightarrow{AB}|$ (2mks)

b) Given that a point P divides \overrightarrow{AB} in the ratio 1:2, find the position vector of point P. (2mks)

c) Another point R has co-ordinates (11, 0). Show that points A, B and R are collinear. (4mks)

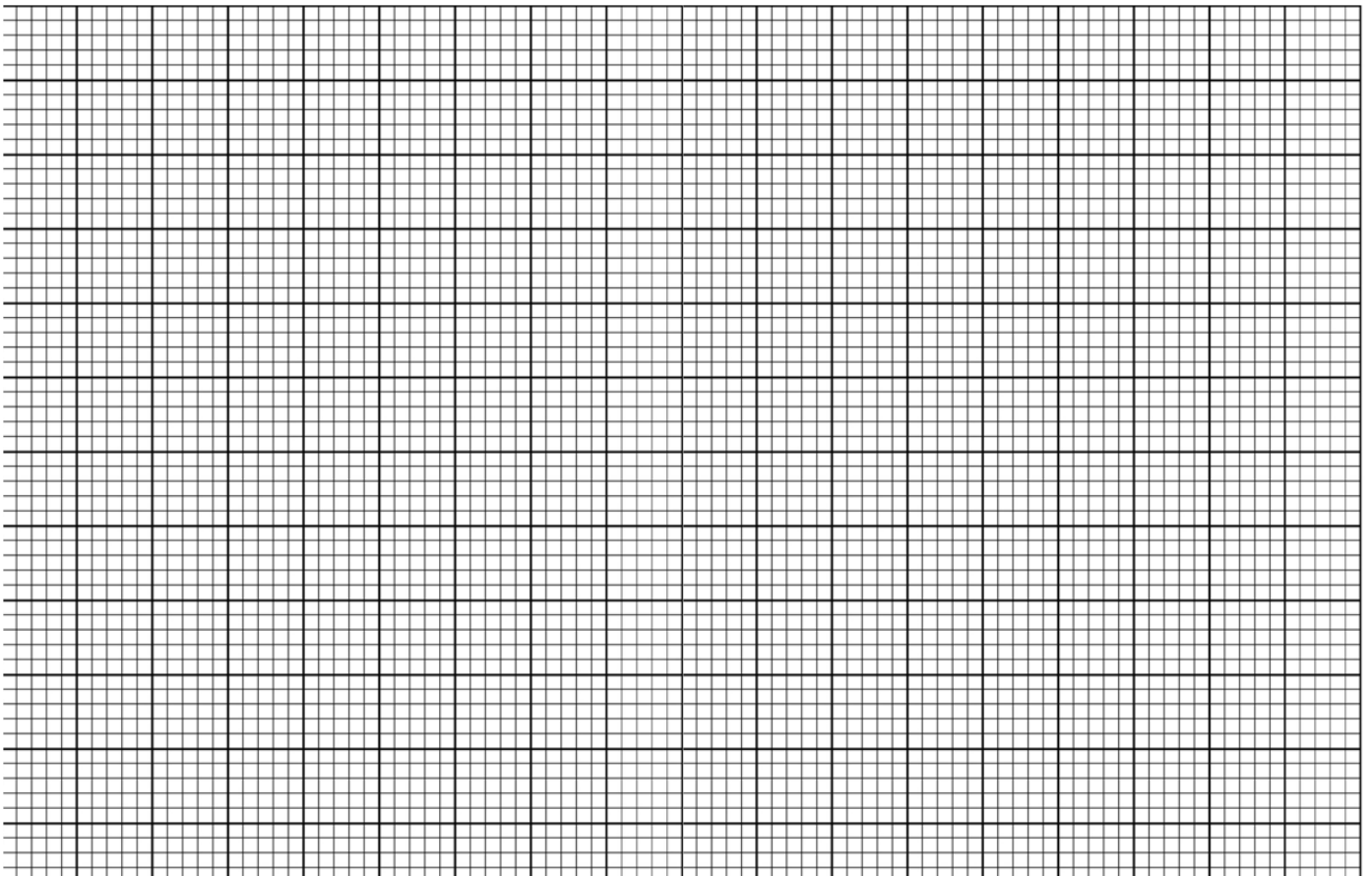
18. The table below shows marks obtained by 40 students in an examination.

Marks	5 - 14	15 - 29	30 - 34	35 - 44	45 - 49
Frequency	2	12	7	15	X

a) Find the value of x. **(1mk)**

b) Calculate the mean mark. **(3mks)**

c) On the grid provided, draw a histogram to represent the data above. **(4mks)**



d) Draw a straight line on the graph above to determine the median mark. **(2mks)**

19. A wooden stool is in the form of a frustum of a cone with slant edge 40cm, the top diameter is 30cm and the bottom diameter is 50cm.

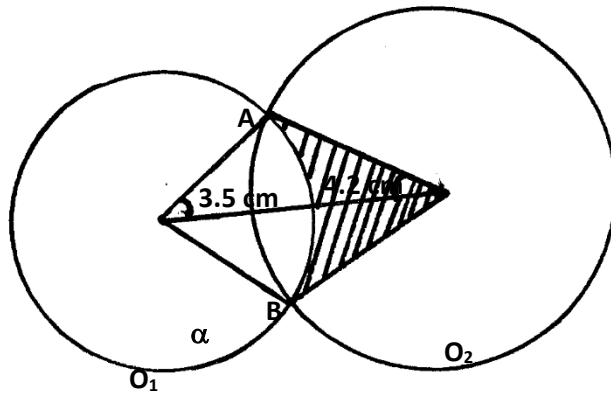
a) Calculate the perpendicular height of the stool to 2 d.p. **(3mks)**

b) Calculate the total surface area of the stool in terms of π . **(2mks)**

c) Calculate the volume of wood used to make the stool in terms of π to 2 d.p. **(3mks)**

d) Given that the density of the wood used to make the stool is 0.8g/cm^3 , calculate the mass of the stool to 2 d.p. using π as $\frac{22}{7}$. **(2mks)**

20. Two circles of radii 3.5 and 4.2 cm with centres O_1 and O_2 respectively intersect at points A and B as shown in the figure below. The distance between the two centres is 6 cm.



Calculate

- (a) The size of $\angle AO_1B$ (to the nearest degree) (3mks)
- (b) The size of $\angle AO_2B$ (to the nearest degree) (3mks)
- (c) The area of quadrilateral O_1AO_2B , correct to 2 decimal places. (2mks)
- (d) The shaded area correct to 2 significant figures. (take $\pi^{22/7}$) (2mks)

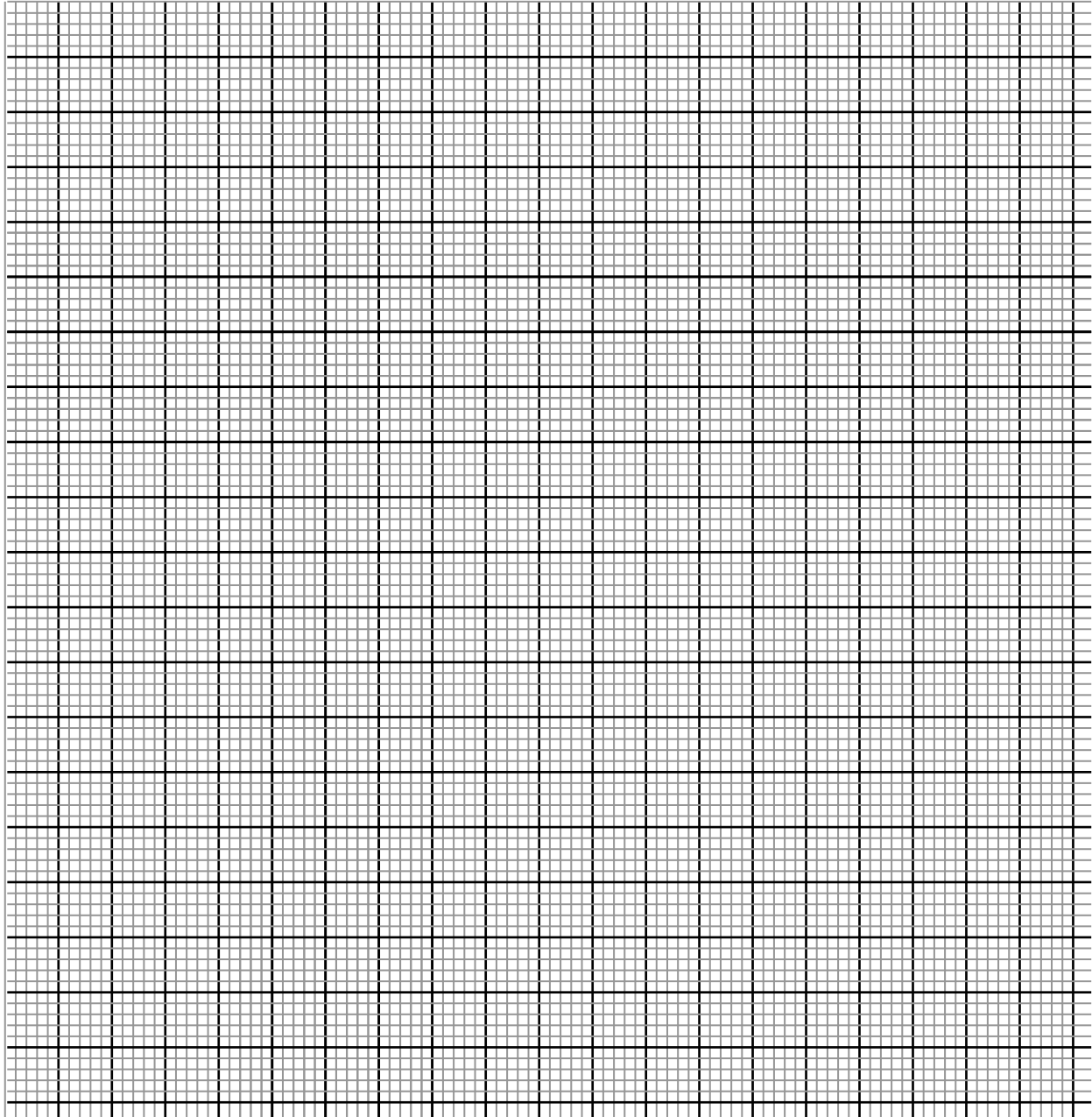
21 (a) Complete the table below for the function $y = 2x^2 + 4x - 3$

(2mks)

X	-4	-3	-2	-1	0	1	2
$2x^2$	32		8	2	0	2	
$4x-3$			-11		-3		
Y			-3			3	13

(b) Draw the graph of the function $y = 2x^2 + 4x - 3$ on the grid provided.

(3mks)



(c) Use your graph to estimate the roots of the equation $2x^2 + 4x - 3 = 0$ **(1mk)**

(d) Use your graph to obtain the roots of the equation $2x^2 + x - 5 = 0$ to 1 decimal place. **(3mks)**

(e) Draw the line of symmetry to pass through the turning point of this curve. **(1mk)**

22. A line **L** passes through $(-2, 3)$ and $(-1, 6)$ and is perpendicular to a line **P** at $(-1, 6)$.

a) Find the equation of **L** (2mks)

b) Find the equation of **P** in the form $ax + by = c$, where a , b and c are constants. (2mks)

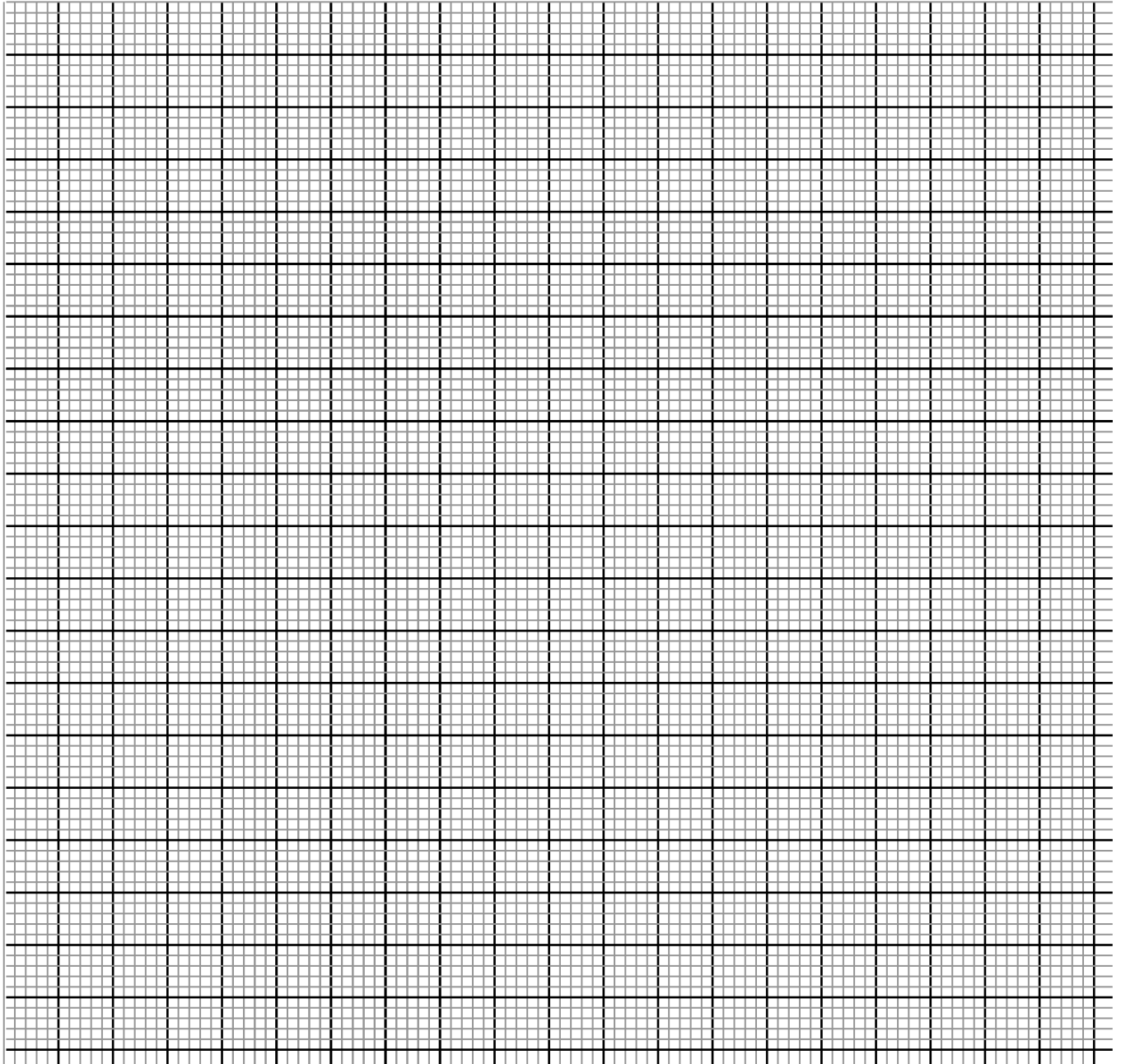
c) Given that another line **Q** is parallel to **L** and passes through point $(1, 2)$ find the x and y intercepts of **Q** (3mks)

d) Find the point of the intersection of lines **P** and **Q** (3mks)

23. The vertices of quadrilateral OPQR are O (0, 0), P (2, 0), Q (4, 2) and R (0, 3). The vertices of its image under a rotation are O' (1, -1), P'(1, -3) Q'(3, -5) and R'(4, -1).

(a) (i) On the grid provided, draw OPQR and its image O'P'Q'R' (2mks)

(ii) By construction, determine the centre and angle of rotation. (2mks)



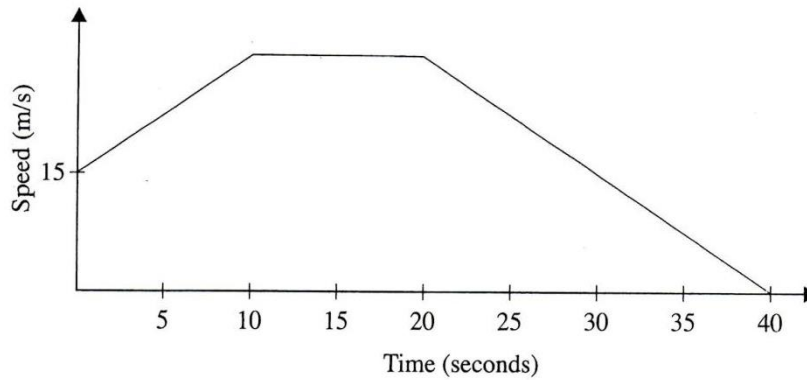
(b) On the same grid as (a) (i) above, draw $O''P''Q''R''$, the image of $O'P'Q'R'$ under a reflection in the line $y = x$ **(2mks)**

(c) From the quadrilaterals drawn, state the pairs that are:

(i) Directly congruent; **(2mks)**

(ii) Oppositely congruent **(2mks)**

24. The figure below represents a speed time graph for a cheetah which covered 825m in 40 seconds.



(a) State the speed of the cheetah when recording of its motion started **(1mk)**

(b) Calculate the maximum speed attained by the cheetah **(3mks)**

(c) Calculate the acceleration of the cheetah in:

(i) The first 10 seconds **(2mks)**

(ii) The last 20 seconds **(1mk)**

(d) Calculate the average speed of the cheetah in first 20 seconds **(3mks)**