

Name .....Adm. No. ....

Class .....

121/2

MATHEMATICS ALT A

PAPER 2

2½ HRS

### Instructions

- (a) Write your name, class and admission number.
- (b) Answer all the questions in section A and ONLY Five in section B.
- (c) Show all the calculations in the spaces provided
- (d) KNEC mathematical tables and non-programmable calculators may be used.

For Examiners Use

### Section 1

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

### Section 11

| 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | total |
|----|----|----|----|----|----|----|----|-------|
|    |    |    |    |    |    |    |    |       |

| Grand total |
|-------------|
|             |

SECTION A

1. Use logarithm tables to evaluate; [4 Marks]

$$\sqrt[3]{\frac{146.34^2 \times 0.0063}{\cos 54}}$$

2. A number  $n$  is such that when it is divided by 3, 7, 11 or 13, the remainder is always 1. Find the number. [2 Marks]

3. A square has an area of  $144\text{m}^2$ . Calculate its perimeter. [2 Marks]

4. Factorise  $2x^2 - x - 6$  hence solve the quadratic equation  
 $2x^2 - x - 6 = 0$  [3 Marks]

5. List all integral values of  $x$  that satisfy the combined inequality; Represent the solutions on a single number line. [4 Marks]
6. A body accelerates at  $5\text{m/s}^2$  to reach a velocity of  $60\text{m/s}$  in 5 seconds. Calculate the initial velocity. [2 Marks]
7. Draw a triangle STR and put arrows on its side to show that  $\vec{TS} + \vec{SR} = \vec{TR}$  [ 2 Marks]
8. A point P(2,5) is translated to P'(1,6)  
a) Find the translation vector [2 Marks]

b) The image of  $X(3,0)$  under the same translation. [2 Marks]

9. Solve for  $x$  in [3 Marks]

$$9^x + 3^{2x} = 54$$

10. The sum of interior angles of a regular polygon is  $3240^\circ$ . Find the size of each exterior angle.  
[3 Marks]

11. Write 1936 and 1728 in terms of its prime factors hence evaluate;

$$\frac{\sqrt[3]{1728}}{\sqrt{1936}}$$

12. Use reciprocal tables to evaluate; [4 Marks]

$$\frac{16}{2.674} + \frac{24}{0.1396}$$

13. Evaluate; [3 Marks]

$$\frac{\frac{1}{2} \text{ of } 3\frac{1}{2} + 1\frac{1}{2} \left(2\frac{1}{2} - \frac{2}{3}\right)}{\frac{3}{4} \text{ of } 2\frac{1}{2} \div \frac{1}{2}}$$

14. Use substitution method to solve; (3 Marks)

$$2x + 3y = 1$$

$$3x - 2y = 8$$

15. The straight line joining the points  $P(a,7)$  and  $Q(13,a)$  is parallel to the line whose equation is  $3y + 2x = 9$ . Find the value of  $a$ . [3 Marks]

16. The ratio of the areas of two circles is 16:25

a) What is the ratio of their radii. [2 Marks]

b) If the smaller circle has a diameter of 28cm, find the radius of the larger circle. [2 Marks]

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## **SECTION B**

Answer any 5 Questions

17. The marks of 30 girls in a class were recorded as follows.

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 220 | 250 | 204 | 230 | 210 | 227 | 221 | 252 |
| 200 | 228 | 208 | 225 | 200 | 202 | 240 | 228 |
| 212 | 225 | 252 | 216 | 212 | 226 | 227 |     |
| 240 | 248 | 203 | 201 | 251 | 242 | 216 |     |

a) Construct a frequency table with a class width of 5 Marks beginning with 199 marks. [3 Marks]

b) What is the modal class? [1 Mark]

c) Estimate the mean [3 Marks]

d) Estimate the median [3 Marks]

18. The initial velocity of a body is 30m/s. the body accelerates uniformly to a velocity of 60m/s in 6 seconds. It moves at this constant velocity for 5 seconds before decelerating in 3 seconds.

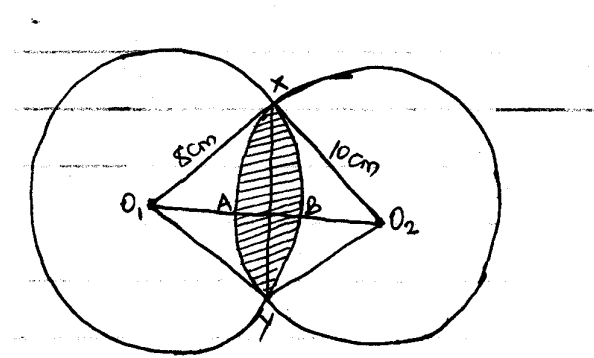
- a) Using the graph paper provided, draw a velocity time graph to illustrate the information above.  
[4 Marks]

- b) Calculate the initial acceleration [2 Marks]

- c) Calculate the total distance covered. [4 Marks]

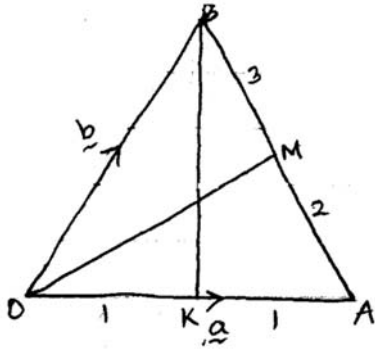


19. The diagram below shows two circles that share a common chord  $XY$  which is 13cm long. Calculate;



- a)  $\angle XO_1Y$  [1 Mark]
- b)  $\angle XO_2Y$  [1 Mark]
- c) The area of the sector  $O_1XBY$  [2 Marks]
- d) The area of the sector  $O_2YAX$  [2 Marks]
- e) The area of the shaded part [4 Marks]

20. a. The diagram below shows a triangle OAB



Points M and K are on AB and OA respectively such that;  
 $AM:MB=2:3$  and K is the mid point of OA.

Express the following vectors in terms of a and b.

i.  $\vec{AB}$  [1 Mark]

ii.  $\vec{OM}$  [2 Marks]

iii.  $\vec{BK}$  [2 Marks]

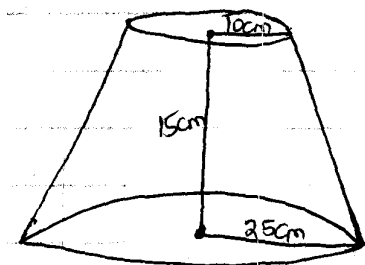
b. The co-ordinates of P and Q are (6,10) and (8,14) respectively. Calculate;

i.  $\vec{PQ}$  [1 Mark]

ii. The mid-point of line PQ [2 Marks]

c. Given that  $a = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ ,  $b = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$  and  $c = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$ . Another vector P is such that  $p = 2a - b + 4c$ .  
 Evaluate  $|p|$  correct to 2 decimal places. [2 Marks]

21. The diagram below shows a frustrum that was cut from a right cone.



Calculate;

i. The highest of the cone [2 Marks]

ii. The volume of the frustrum [4 Marks]

iii. The surface area of the frustrum [4 Marks]

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22. A line  $L_1$  has the equation  $3x + 4y = 12$

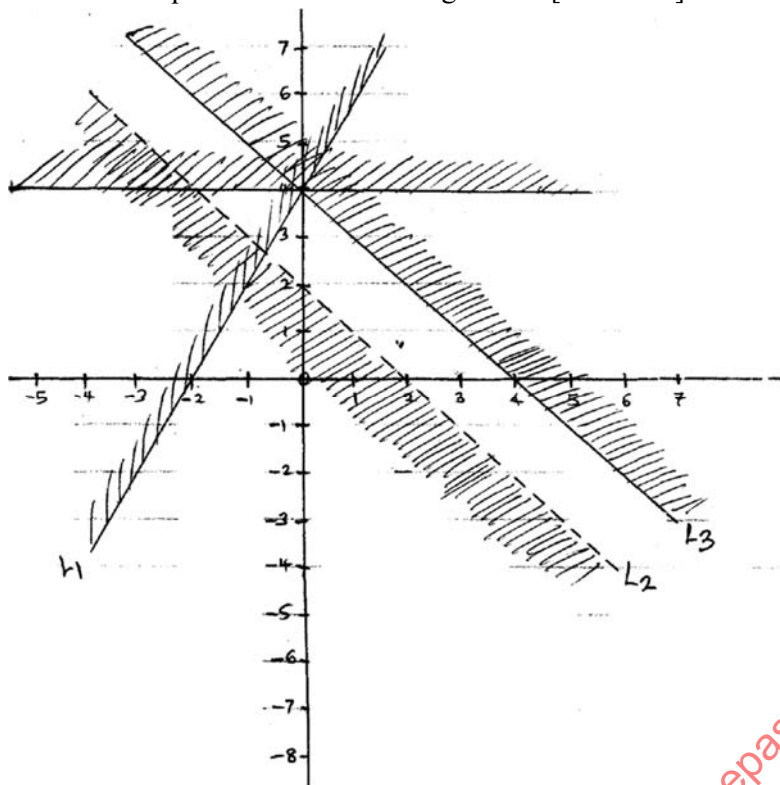
a. Calculate

i. The gradient of line  $L_1$  [2 Marks]

ii. The coordinates of P and Q where the line cuts the x-axis and y-axis respectively [4 Marks]

iii. Another line  $L_2$  is perpendicular to  $L_1$  and passes through  $(-4, 5)$ . Determine the equation of line  $L_2$  in the form  $y = mx + c$  [4 Marks]

23. Form all inequalities that define Region R [10 Marks]



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24. a. Two trains T1 and T2 travelling in opposite directions on parallel tracks are just beginning to pass each other. Train T1 is 72m long and is travelling at 108km/hr and T2 is 78m long travelling at 72km/hr. Find the time in seconds it takes the two trains take to completely pass one another. [3 Marks]

- b. A rally car travelled for 2 hours 40 minutes at an average speed of 120km/hr. the car consumes an average of 1 litre of fuel for every 4 kilometres.

A litre of fuel costs sh. 64. Calculate the amount of money spent on the fuel. [4 Marks]

- c. Mwangi and Otieno live 40km apart. Mwangi starts from his home at 7.30am and travels towards Otieno at 16km/hr. Otieno starts from his home at 8.00am and cycles at 8km/hr towards mwangi. At what time do they meet? [3 Marks]