

Name: ..... Class: ..... Adm.No.....

School: ..... Date: .....

Sign:.....

121/2  
MATHEMATICS  
PAPER 2  
TIME: 2 ½ HOURS

**SUKELLEMO PRE-MOCK EXAMINATION - JUNE 2022**  
**Kenya Certificate to Secondary Education**  
**MATHEMATICS (PAPER 2)**  
**TIME: 2 ½ HOURS**

**Instructions**

- Write your name, class, admission number, school, date and signature in spaces provided above.
- The paper contains **two** sections **I** and **II**.
- Answer **all** questions in section **I** and **any five** questions from section **II** in the spaces provided below each question.
- Show all the steps in your calculations giving your answers at each stage in the spaces below each question.
- Non-programmable silent electronic calculator and mathematical tables may be used except where stated otherwise.

**For Examiner's Use Only**

**SECTION A**

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

**SECTION B**

17	18	19	20	21	22	23	24	<b>TOTAL</b>

**PERCENTAGE**

**SCORE**

**SECTION I (50 MARKS)**

Answer all the questions from this section

1. The expression  $(1 + \frac{x}{2})$  is taken as an approximation for  $\sqrt{1+x}$ . Find the percentage error in doing so if  $x = 0.44$ . (Give answer correct to 2 d.p) (3 Marks)

$\frac{1 + 0.44}{2}$ $1 + 0.22 = 1.22$ $\sqrt{1 + 0.44}$ $= 1.2$	$\text{Error} = 1.22 - 1.2 \quad \text{M1}$ $= 0.02$ $\frac{0.02}{1.2} \times 100$ $= 1.67\% \quad \text{A1}$
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2. Express the following in surd form and simplify by rationalizing the denominator.

$\frac{1}{\cos 60^\circ - \sin 45^\circ}$ $\frac{1}{\frac{1}{2} - \frac{1}{\sqrt{2}}}$ $\frac{1}{\frac{1}{\sqrt{2}} - \frac{2}{2\sqrt{2}}} = \frac{2\sqrt{2}}{\sqrt{2} - 2}$	$\frac{2\sqrt{2}}{\sqrt{2} - 2} \times \frac{\sqrt{2} + 2}{\sqrt{2} + 2} \quad \text{M1}$ $\frac{4 + 4\sqrt{2}}{-2}$ $= -2 - 2\sqrt{2} \quad \text{A1}$
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3. Make  $q$  the subject of the formula

$P = \sqrt[3]{\frac{nq - m}{q}}$ $P^3 = \frac{nq - m}{q} \quad \text{M1}$	$P^3 q = nq - m$ $P^3 q - nq = -m \quad \text{M1}$ $q \left( \frac{P^3 - n}{P^3 - m} \right) = -m$ $q = \frac{-m}{P^3 - n} \quad \text{A1}$
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4. The data below shows the age of 10 pupils picked at random in a primary school 6, 11, 13, 14, 8, 7, 12, 20, P and 9 if  $\sum fx^2 = 1360$ . Determine the value of P hence, find the standard Deviation to 3d.p (4 Marks)

$$36 + 49 + 64 + 81 + 100 + 21 + 144 + 169 + 196 + 100 + P^2$$

$$1260 + P^2 = 1360 \quad M1$$

$$P^2 = 100$$

$$P = 10 \quad M1$$

$$s.d = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

$$= \sqrt{\frac{1360}{10} - \left(\frac{110}{10}\right)^2} \quad M1$$

$$= \sqrt{136 - 121}$$

$$= \sqrt{15}$$

$$= 3.873 \quad Af$$

5. The volume, V of a cylinder varies jointly as its height, (h) and the square of its radius, (r), Calculate the percentage increase in its volume (V), when radius increases by 5% and height, h increases by 10%.

$$V \propto \pi r^2 h$$

$$V = \pi r^2 h$$

$$V_1 = \pi r_1^2 h_1$$

$$V = \pi (1.05)^2 \times 1.1 r^2 h \quad M1$$

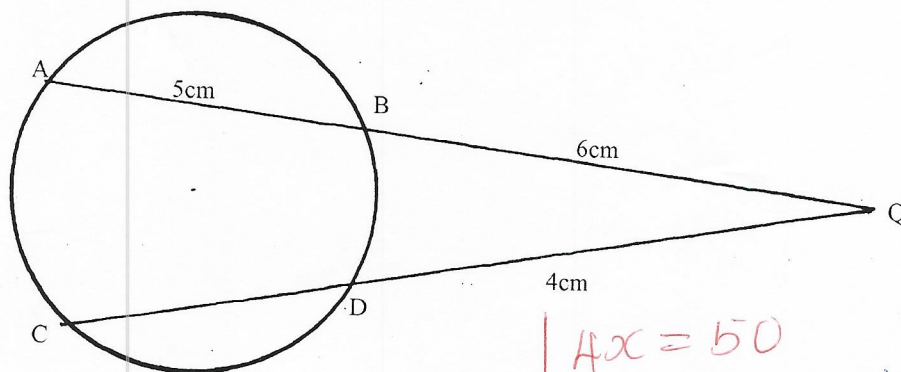
$$V_1 = 1.1025 \times 1.1 \pi r^2 h \quad (3 \text{ Marks})$$

$$= 1.21275 V$$

$$= 21.275\% \quad Af$$

$$= \frac{1.21275V - V}{V} \quad M1$$

6. Chords AB and CD in the figure below intersect externally at Q. if AB = 5cm BQ = 6cm and DQ = 4cm, calculate the length of chord CD. (2 Marks)



$$AQ \cdot QB = CQ \cdot QD$$

$$11 \times 6 = (x+4) \cdot 4 \quad M1$$

$$66 = 4x + 16$$

$$4x = 50$$

$$x = 12.5 \quad Af$$

7. Jane can do a piece of job in 4 days while Mary can do the same piece of work in 7 days. Mary and Jane did the job together for two days before Jane fell sick. Mary was left to complete the job. How long did it take to do the job? (3 Marks)

$$\left(\frac{1}{4} + \frac{1}{7}\right) \times 2$$

$$\frac{11}{28} \times 2$$

$$= \frac{11}{14} \text{ work done M1}$$

$$\text{Rem} = \frac{3}{14}$$

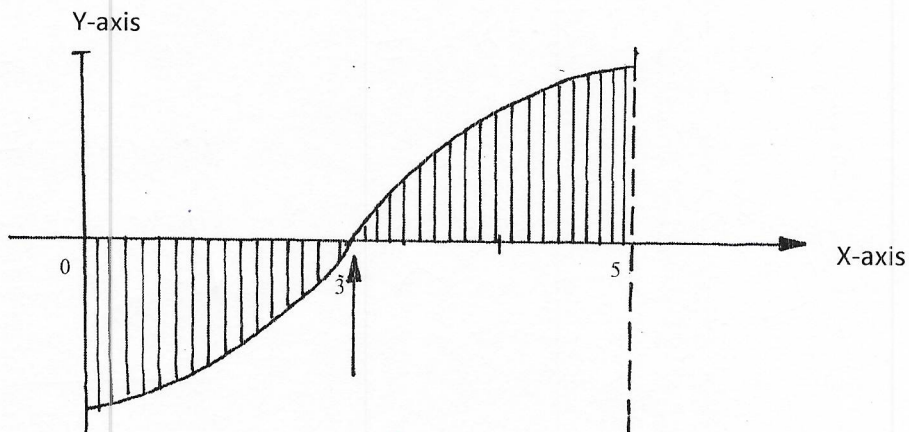
$$1 \text{ day} \Rightarrow \frac{1}{7}$$

$$\frac{3/14}{1/7} = \frac{3}{14} \times \frac{7}{1} = 1\frac{1}{2} \text{ M1}$$

$$1\frac{1}{2} + 2$$

$$= 3\frac{1}{2} \text{ days. A1}$$

8. The sketch below represents the graph of  $y=x^2-x-6$ . Find the area bounded by the curve, x-axis, y-axis and the line  $x=5$ . (3 Marks)



$$A = \int_0^3 (x^2 - x - 6) dx + \int_3^5 (x^2 - x - 6) dx$$

$$= \left[ \frac{x^3}{3} - \frac{x^2}{2} - 6x \right]_0^3 + \left[ \frac{x^3}{3} - \frac{x^2}{2} - 6x \right]_3^5 \text{ M1}$$

$$\left( \frac{27}{3} - \frac{9}{2} - 18 \right) - (0) + \left( \frac{125}{3} - \frac{25}{2} - 30 \right) - \left( \frac{27}{3} - \frac{9}{2} - 18 \right) \text{ M1}$$

$$(-13.5) + \frac{-57}{4} + 13\frac{1}{2}$$

$$= 13\frac{1}{2} + 12\frac{2}{3}$$

$$= 26\frac{1}{6} \text{ sq units A1}$$

9. Use matrix method to determine the co-ordinates of the point of intersection of the two lines.  $3x-2y=13$ ,  $2y+x+1=0$

(3 Marks)

$$\begin{aligned} 3x-2y &= 13 \\ x+2y &= -1 \end{aligned}$$

$$\begin{pmatrix} 3 & -2 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 13 \\ -1 \end{pmatrix}$$

$$\Delta f = 8$$

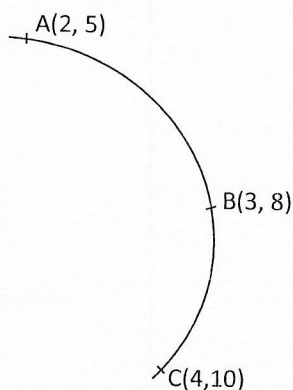
$$\begin{pmatrix} \frac{1}{4} & \frac{1}{4} \\ -\frac{1}{8} & \frac{3}{8} \end{pmatrix} \begin{pmatrix} 3 & -2 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{1}{4} & \frac{1}{4} \\ -\frac{1}{8} & \frac{3}{8} \end{pmatrix} \begin{pmatrix} 13 \\ -1 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{13}{4} - \frac{1}{4} \\ -\frac{13}{8} - \frac{3}{8} \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

$$\begin{aligned} x &= 3 \\ y &= -2 \end{aligned}$$

10. The figure below shows an arc of a circle through three points A, B and C.



Calculate the co-ordinates of the centre of the circle.

(4 Marks)

$$\left( \frac{2+3}{2}, \frac{5+8}{2} \right) = (2.5, 6.5)$$

$$\left( \frac{3+4}{2}, \frac{8+10}{2} \right) = (3.5, 9)$$

$$\text{gradient } AB = \frac{8-5}{3-2} = 3$$

$$\frac{y-6.5}{x-2.5} = 3$$

$$3y-19.5 = -x+2.5$$

$$3y+x=22$$

$$\text{gradient } BC = \frac{10-8}{4-3} = 2$$

1

$$\frac{y-9}{x-3.5} = -\frac{1}{2}$$

$$2y-18 = -x+3.5$$

$$2y+x=21.5$$

$$\begin{aligned} 3y+x &= 22 \\ 2y+x &= 21.5 \end{aligned}$$

$$y = 0.5$$

$$2(0.5) + x = 21.5$$

$$\begin{aligned} 1+x &= 21.5 \\ x &= 20.5 \end{aligned}$$

$$C(20.5, 0.5)$$

Ans

11. A bag contains 4 white balls and 5 Red balls of similar shape and size. Two balls are picked at random without replacement. Find the probability that both balls are:

a) White

(1 Mark)

$$\frac{4}{9} \times \frac{3}{8} = \frac{1}{6}$$

B1

b) Of different colour

(2 Marks)

$$\left(\frac{4}{9} \times \frac{5}{8}\right) + \left(\frac{5}{9} \times \frac{4}{8}\right) \quad \text{M1} \quad = \frac{5}{9} \quad \text{A1}$$

$$= \frac{5}{18} + \frac{5}{18}$$

12. A point P(2,-3) undergoes transformation represented by the matrix  $\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$ . Find the

Co-ordinate of the image of P

(2 Marks)

$$\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 2 \\ -3 \end{pmatrix} \quad \text{M1} \quad = \begin{pmatrix} 6 \\ -3 \end{pmatrix} \quad \text{P1}$$

$$P' (6, -3) \quad \text{A1}$$

13. Expand  $(2+x)^6$  up to the fourth term.

(2 Marks)

$$2^6 + 6(2^5)x + 15(2^4)x^2 + 20(2^3)x^3$$

$$= 64 + 192x + 240x^2 + 160x^3$$

B1

B1

Hence use the above expansion to evaluate  $(1.96)^6$  correct to 4 d.p.

(2 Marks)

$$(2+x)^6 = (2-0.04)^6$$

$$x = -0.04$$

$$64 + 192(-0.04) + 240(-0.04)^2 + 160(-0.04)^3 \quad \text{M1}$$

$$64 - 7.68 + 0.384 - 0.01024$$

$$= 56.6938$$

A1

14. Find the value of  $x$  in the equation  $10\sin^2 x - 7\cos x + 2 = 0$  for the range  $270^\circ \leq x \leq 360^\circ$

$$10(1 - \cos^2 x) - 7\cos x + 2 = 0$$

$$10 - 10\cos^2 x - 7\cos x + 2 = 0$$

$$10\cos^2 x + 7\cos x - 12 = 0 \quad M1$$

$$10y^2 + 7y - 12 = 0$$

$$10y^2 + 15y - 8y - 12 = 0$$

(3 Marks)

$$5y(2y+3) - 4(2y+3) = 0$$

$$(5y-4)(2y+3) = 0 \quad M1$$

$$y = \frac{4}{5} \text{ or } 2y = -3$$

$$y = 0.8 \text{ or } y = -1.5$$

$$\cos x = 0.8 \quad A1$$

$$x = 36.87$$

$$360 - 36.87 = 323.13 \quad A1$$

15. Find the value of  $x$  in

$$\log(x-2) + \log(x+1) = 1 + \log 4$$

$$\log(x-2) + \log(x+1) = \log 10 + \log 4 \quad M1$$

$$\log((x-2)(x+1)) = \log(10 \times 4)$$

$$(x-2)(x+1) = 40$$

$$x^2 - x - 42 = 0 \quad M1$$

$$x(x-7) + 6(x-7) = 0$$

$$x = -6 \text{ or } 7 \quad A1$$

ignore

Alternatively

$$\log(x-2) + \log(x+1) - \log 4 = 1$$

$$\log\left(\frac{(x-2)(x+1)}{4}\right) = 1 \quad M1$$

$$\frac{(x-2)(x+1)}{4} = 10$$

$$(x-2)(x+1) = 40 \quad M1$$

$$x^2 - x - 42 = 0$$

$$x = -6 \text{ or } x = 7 \quad A1$$

ignore

16. The sum of two numbers is 9. The sum of the square of the number is 41. Find the numbers

(4 Marks)

$$\left. \begin{aligned} x+y &= 9 \\ x^2+y^2 &= 41 \end{aligned} \right\} M1$$

$$y = 9 - x$$

$$x^2 + (9-x)^2 = 41$$

$$x^2 - 9x + 20 = 0 \quad M1$$

$$x(x-5) - 4(x-5) = 0$$

$$(x-4)(x-5) = 0$$

$$x = 4 \text{ or } x = 5 \quad A1$$

$$\left. \begin{aligned} \text{when } x &= 4 \\ y &= 5 \end{aligned} \right\} B1$$

$$\left. \begin{aligned} \text{when } x &= 5 \\ y &= 4 \end{aligned} \right\}$$

**SECTION II (50 MARKS)**

*Answer FIVE questions ONLY from this section*

17. The table below shows the taxation rates for income earned.

Income in ksh pm	Tax rates (%)
1 – 9680	10
9681 – 18800	15
18801 – 27920	20
27921 – 37040	25
Excess over 37041	30

In that year, Mr. Hamisi paid a net tax of KSh. 5,512 per month. He gets a house allowance of KShs. 10,000, medical allowance of KShs. 2400 and acting allowance of KShs. 2820 per month. He was entitled to a monthly personal relief of KShs. 162. He has a life insurance policy for which he pays a monthly premium of KSh. 1,500 and claims a relief at a rate of 10% of the premium paid per month. The following deductions also made every month.

- (i) N.H.I.F. KSh. 320
- (ii) Co-operative society shares KSh. 6000
- (iii) Union dues KSh. 200

(a) Calculate Mr. Hamisi's monthly basic salary in KSh.

(7 Marks)

$$\begin{aligned} \text{Gross tax} &= 5512 + 162 + 1500 \\ &= 5824 \end{aligned}$$

$$9680 \times 0.1 = 968 \text{ M1}$$

$$9120 \times 0.15 = 1368$$

$$9120 \times 0.2 = 1824 \text{ M1}$$

$$y \times 0.25 = 1664$$

$$y = 6656 \text{ M1}$$

$$\begin{aligned} 27920 + 6656 & \text{ M1} \\ &= 34576 \end{aligned}$$

$$\begin{aligned} 34576 - (10000 + 2400 + 2820) & \text{ M1} \\ &= 19356 \text{ A1} \end{aligned}$$

(b) Calculate his net monthly salary.

(3 Marks)

$$\begin{aligned} 34576 - (5512 + 320 + 6000 + 200 + 1500) & \text{ M1} \\ &= 34576 - 8352 \\ &= 26224 \text{ A1} \end{aligned}$$



18. A jet leaves town P(30°S, 26°W) at 2.00 p.m on Monday and flew due north to town Q(50°N, 26°W).

a) Calculate the distance covered by the jet in Km. (take  $\pi = \frac{22}{7}$  and R=6370) (3 Marks)

$$\text{Angle diff} = 30 + 50 = 80^\circ \quad B_1$$

$$PQ = \frac{80}{360} \times 2 \times \frac{22}{7} \times 6370 \quad M_1$$

$$= 8898 \text{ km} \quad A_1$$

b) After 35 min stoppage at town Q the jet flew due East to town R a distance of 2500 nautical miles from town Q.

Find i) the position of town R

$$\alpha \times 60 \cos 50 = 2500 \quad M_1$$

$$\alpha = \frac{2500}{60 \cos 50}$$

$$= 64.82^\circ \quad A_1$$

$$64.82^\circ - 26^\circ = 38.82^\circ$$

(3 Marks)

$$R (50^\circ N, 38.82^\circ E) \quad B_1$$

ii) The local time the jet landed at R if its average speed for the whole journey is 1000 km/h.

(Take 1nm=1.853km)

(4 Marks)

$$\text{Total distance} = (8898 + (2500 \times 1.853)) \quad M_1$$

$$= 13530.5 \text{ km}$$

$$\text{Time taken} = \frac{13530.5}{1000} \quad M_1$$

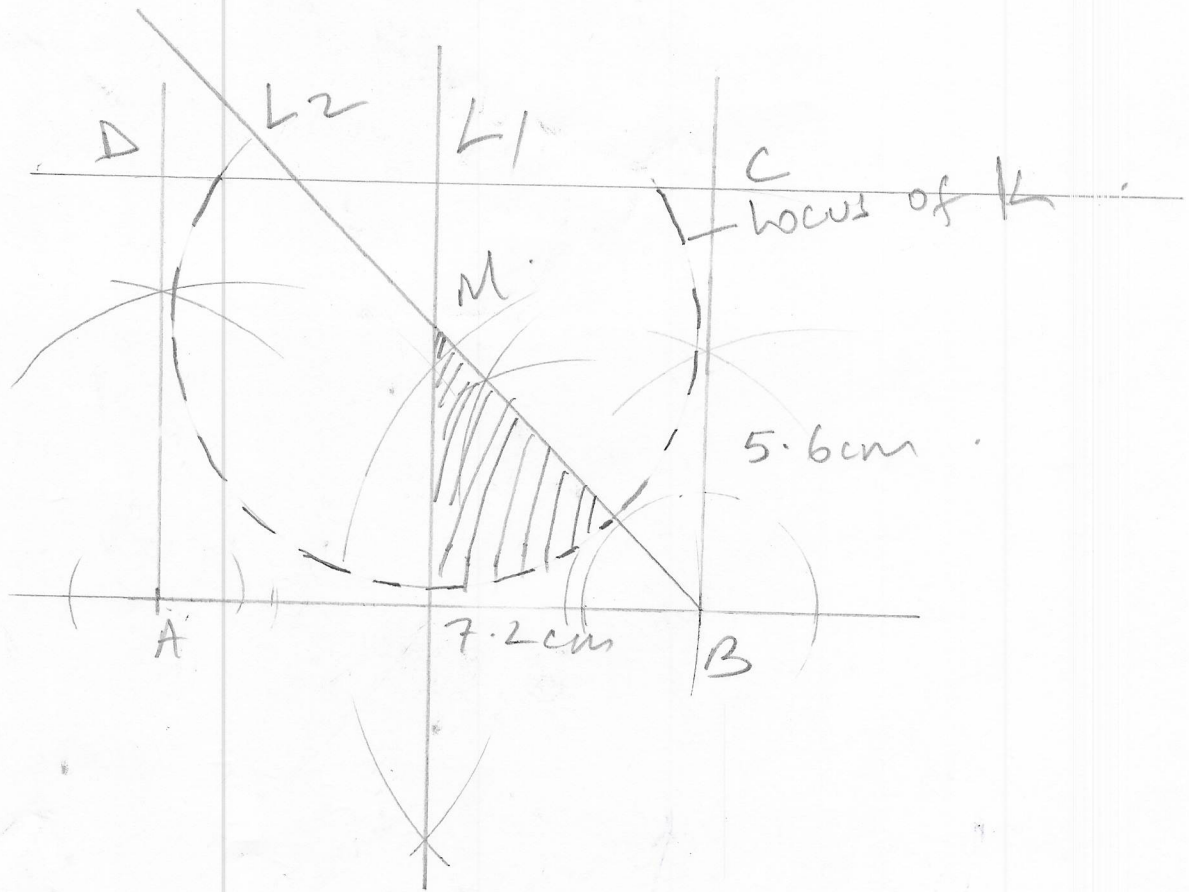
$$= 13.5305 \text{ hrs}$$

$$\text{Local time at R} = 2:00 + 13.5305 \text{ hrs} + 35 \text{ min} + 9 \left( \frac{4 \times 64.82}{60} \right) \quad M_1$$

8.26  
Monday - Tuesday  
A1

19. Use a ruler and a pair of compasses only all constructions in this question.

(a) Construct the rectangle ABCD such that  $AB = 7.2\text{cm}$  and  $BC = 5.6\text{cm}$ . (3 Marks)



b) Construct on the same diagram the locus  $L_1$  of points equidistant from A and B to meet with another locus  $L_2$  of points equidistant from AB and BC at M. Measure the acute angle formed at M by  $L_1$  and  $L_2$ .  $45^\circ$  (3 Marks)

c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region. Correct to one decimal place. (4 marks)

$$\frac{45}{360} \times \frac{22}{7} \times 3.5^2 = 4.8125 \text{ cm}^2$$

20. (a) The first term of a geometric progression is 36. the sum of the first three terms is 27.

Calculate the common ratio and the value of the second term

(4 Marks)

$$\begin{aligned}
 a + ar + ar^2 &= 27 \\
 36 + 36r + 36r^2 &= 27 \quad M1 \\
 36r^2 + 36r + 9 &= 0 \quad M1 \\
 4r^2 + 4r + 1 &= 0 \\
 2r + 1 &= 0 \\
 r &= -\frac{1}{2} \quad A1
 \end{aligned}$$

$$\begin{aligned}
 \text{2nd term} &= -\frac{1}{2} \times 36 \\
 &= -18 \quad B1
 \end{aligned}$$

(b) The first term of an AP is 2. the first term of a geometric sequence is also 2 and its common ratio equals the common difference of the arithmetic sequence. The square of the fifth term of arithmetic sequence exceeds the third term of the geometric sequence by 2. Find the common difference and the sum of the first 50 terms of an AP.

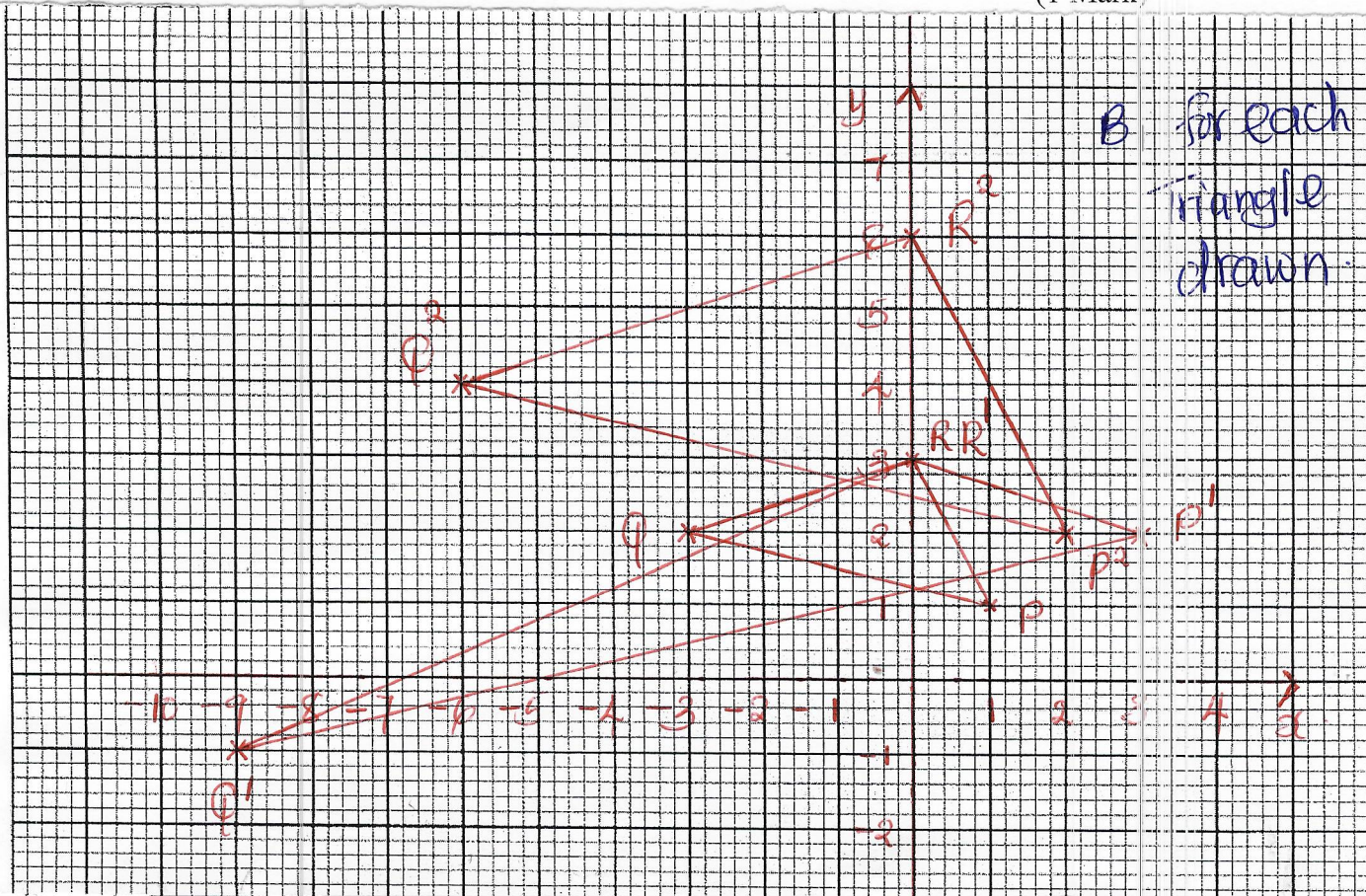
(6 Marks)

$$\begin{aligned}
 a &= 2 \quad r = d \\
 (a + 4d)^2 &= 2r^2 + 2 \\
 (2 + 4d)^2 &= 2d^2 + 2 \quad M1 \\
 4 + 16d + 16d^2 &= 2d^2 + 2 \quad M1 \\
 14d^2 + 16d + 2 &= 0 \\
 7d^2 + 8d + 1 &= 0 \quad M1 \\
 7d^2 + 7d + d + 1 &= 0 \\
 7d(d+1) + 1(d+1) &= 0
 \end{aligned}$$

$$\begin{aligned}
 (7d+1)(d+1) &= 0 \\
 d &= -\frac{1}{7} \text{ or } d = -1 \quad A1 \\
 &= -1 \quad B1 \\
 S_{50} &= \frac{50}{2} \{ 4 + (50-1)(-1) \} \\
 &= 25(4 - 49) \\
 &= -1125 \quad B1 \\
 \text{or} \\
 \frac{50}{2} \{ 4 + (50-1)(-\frac{1}{7}) \}
 \end{aligned}$$

21. a) Draw triangle PQR whose vertices are P(1,1) Q(-3,2) and R(0,3) on the grid provided.

(1 Mark)



b) Find the coordinates of triangle  $P_1Q_1R_1$  the image of triangle PQR under the transformation whose matrix is  $\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$ . Draw triangle  $P_1Q_1R_1$ . (3 Marks)

$$\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} P & Q & R \\ 1 & -3 & 0 \\ 1 & 2 & 3 \end{pmatrix} = \begin{pmatrix} P' & Q' & R' \\ 3 & -9 & 0 \\ 2 & -1 & 3 \end{pmatrix}$$

$$P' (-3, 2)$$

$$Q' (-9, -1) \quad A_1$$

$$R' (0, 3)$$

c)  $P_1Q_1R_1$  is then transformed onto  $P_2Q_2R_2$  by the transformation with matrix  $\begin{pmatrix} 2 & 0 \\ 3 & 2 \\ -2 & 2 \\ 3 & 2 \end{pmatrix}$

Find the coordinates of  $P_2Q_2R_2$  and draw triangle  $P_2Q_2R_2$

(3 Marks)

$$\begin{pmatrix} 2 & 0 \\ 3 & 2 \\ -2 & 2 \end{pmatrix} \begin{pmatrix} P & Q & R \\ 3 & -9 & 0 \\ 2 & -1 & 3 \end{pmatrix} \stackrel{M1}{=} \begin{pmatrix} P^2 & Q^2 & R^2 \\ 2 & -6 & 0 \\ 2 & 4 & 6 \end{pmatrix}$$

$$P^2(2, 2) \quad Q^2(-6, 4) \quad R^2(0, 6) \quad A1$$

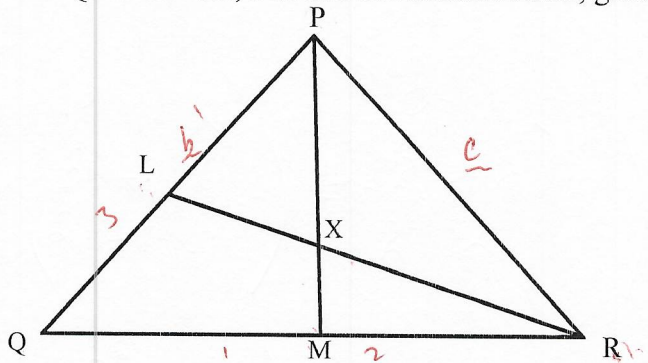
d) Describe fully a single transformation which maps  $PQR$  onto  $P_2Q_2R_2$ . Find the matrix of this transformation

(3 Marks)

Enlargement, Centre  $(0, 0)$ , Scale factor 2. B1

$$\begin{pmatrix} 2 & 0 \\ 3 & 2 \\ -2 & 2 \end{pmatrix} \begin{pmatrix} P & Q \\ 3 & 0 \\ 1 & 1 \end{pmatrix} \stackrel{M1}{=} \begin{pmatrix} P^2 & Q^2 \\ 2 & 0 \\ 0 & 2 \end{pmatrix} \quad A1$$

22. In the triangle PQR below L and M are points on PQ and QR respectively such that PL:LQ=1:3 and QM:MR=1:2, PM and RL intersect at X, given that  $PQ = \mathbf{b}$  and  $PR = \mathbf{c}$ ,



- (a) Express the following vectors in terms of  $\mathbf{b}$  and  $\mathbf{c}$

(i)  $\mathbf{QR}$

(1mark)

$$-\frac{\mathbf{b}}{3} + \mathbf{c} \quad B1$$

(ii)  $\mathbf{PM}$

(1mark)

$$\frac{\mathbf{b}}{3} + \frac{1}{3}(-\frac{\mathbf{b}}{3} + \mathbf{c}) = \frac{2}{9}\mathbf{b} + \frac{1}{3}\mathbf{c} \quad B1$$

(iii)  $\mathbf{RL}$

(1mark)

$$\mathbf{b} - \mathbf{c} - \frac{3}{4}\mathbf{b} = \frac{1}{4}\mathbf{b} - \mathbf{c} \quad B1$$

- (b) By taking  $\mathbf{PX} = h\mathbf{PM}$  and  $\mathbf{RX} = k\mathbf{RL}$  where  $h$  and  $k$  are constants find two expressions of  $\mathbf{PX}$  in terms of  $h$ ,  $k$ ,  $\mathbf{b}$  and  $\mathbf{c}$ . Hence determine the values of the constant  $h$  and  $k$ .

(6marks)

$$\begin{aligned} \vec{PX} &= h\left(\frac{2}{9}\mathbf{b} + \frac{1}{3}\mathbf{c}\right) \\ &= \frac{2}{9}h\mathbf{b} + \frac{1}{3}h\mathbf{c} \quad M \end{aligned}$$

$$\begin{aligned} \vec{PX} &= \mathbf{c} + k\left(\frac{1}{4}\mathbf{b} - \mathbf{c}\right) \\ &= (1-k)\mathbf{c} + \frac{1}{4}k\mathbf{b} \quad M1 \end{aligned}$$

$$\frac{2}{9}h\mathbf{b} + \frac{1}{3}h\mathbf{c} = (1-k)\mathbf{c} + \frac{1}{4}k\mathbf{b} \quad M1$$

$$\frac{2}{9}h = \frac{1}{4}k \Rightarrow k = \frac{8}{9}h \quad k = \frac{8}{9}B$$

$$\frac{1}{3}h = 1 - k$$

$$\frac{1}{3}h = 1 - \frac{8}{9}h \quad M1$$

$$\frac{2}{3}h = \frac{1}{3}$$

$$h = \frac{1}{3} \quad A1$$

- (c) Determine the ratio LX:XR

(1mark)

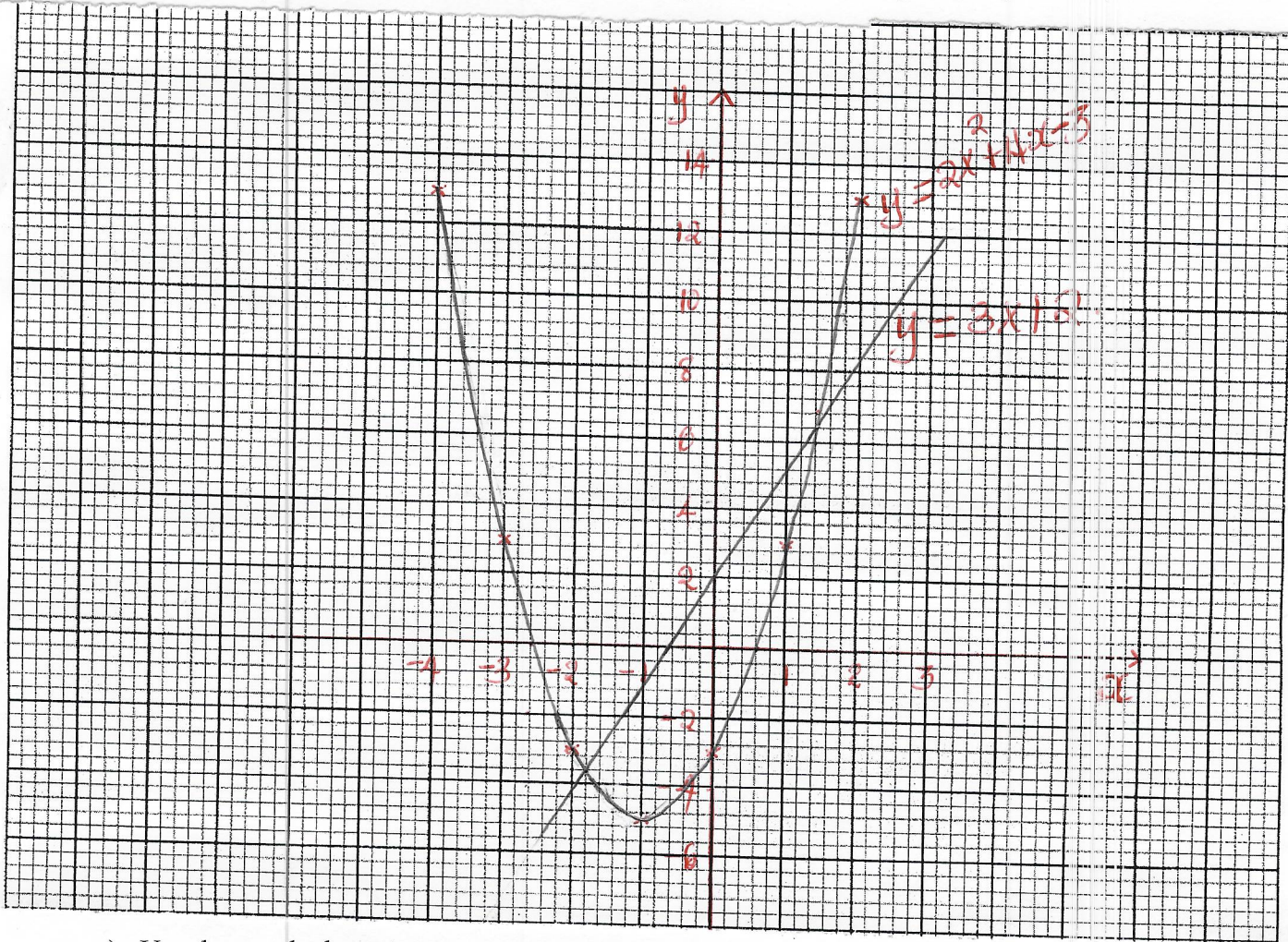
$$1:8 \quad B1_{14}$$

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

x	-4	-3	-2	-1	0	1	2
y	13	3	-3	-5	-3	3	13

$B_2$  for all values  
 $B_1$  for 4 or more correct.

b) On the grid provided, draw the graph of the function  $y=2x^2 + 4x - 3$  for  $-4 \leq x \leq 2$  using the scale of 1cm to represent 1 unit on axis and 1cm to represent 2 units on y-axis. (3 Marks)



c) Use the graph above to:

i) Determine the roots of the equation  $2x^2 + 4x - 3 = 0$

(2 Marks)

$$x = -2.6$$

$$x = 0.6$$

ii) Solve the equation  $2x^2 + x - 5 = 0$

(3 Marks)

$$y = 2x^2 + 4x - 3$$

$$0 = 2x^2 + x - 5$$


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$$y = 3x + 2$$

$$x = -1.8$$

$$x = 1.4$$

24. The acceleration of particle  $t$  seconds after passing a fixed point P is given by  $a = 3t - 3$ .

Given that the velocity of the particle when  $t = 2$  is  $5\text{m/s}$ , find;

a) Its velocity when  $t = 4$  seconds

(3 Marks)

$$a = 3t - 3$$

$$V = \frac{3t^2}{2} - 3t + C$$

$$5 = \frac{3}{2}(2)^2 - 3(2) + C$$

$$C = 5$$

$$V = \frac{3}{2}t^2 - 3t + 5$$

$$V = \frac{3}{2}(4)^2 - 3(4) + 5$$

$$= 24 - 12 + 5$$

$$= 17\text{M/S}$$

b) Its displacement at the time in (a) above

(3 Marks)

$$S = \frac{t^3}{2} - \frac{3}{2}t^2 + 5t + C$$

$$S = 0 \quad t = 0$$

$$C = 0$$

$$S = \frac{t^3}{2} - \frac{3}{2}t^2 + 5t$$

$$\frac{4^3}{2} - \frac{3}{2}(4)^2 + 5(4)$$

$$= 32 - 24 + 20$$

$$= 28\text{M}$$

c) The displacement during the third second

(4 Marks)

$$\left[ \frac{t^3}{2} - \frac{3}{2}t^2 + 5t \right]_2^3$$

$$\left( \frac{3^3}{2} - \frac{3}{2}(3)^2 + 5(3) \right) - \left( \frac{2^3}{2} - \frac{3}{2}(2)^2 + 5(2) \right)$$

$$= \left( \frac{27}{2} - \frac{27}{2} + 15 \right) - (2 - 6 + 10)$$

$$= 15 - 6$$

$$= 9\text{M}$$