NAME	______________________	**INDEX NO.**	__________
SCHOOL	______________________	**SIGNATURE**	__________
		DATE	__________

121/2
MATHEMATICS ALT A
PAPER 2
TIME: 2½ HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the space provided above.
3. This paper consists of **TWO** sections. **Section I** and **Section II**.
4. Answer **ALL** the questions in **section I** and only **FIVE** questions from **Section II.**
5. All answers and working must be written on the question paper in the space provided below each question.
6. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
7. Marks may be given for correct working even if the answer is wrong.
8. Non-programmable silent calculators and KNEC mathematical tables may be used except where stated otherwise.
9. This paper consists of **16** printed papers.
10. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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	TOTAL

GRAND TOTAL	

SECTION A (50 MARKS)

Answer ALL questions in this section in the spaces provided

1. Use logarithm tables to evaluate the following to four significant figures. (4 marks)

$$\sqrt{\frac{4.562^2 \times 0.038}{6.82 \times 0.35}}$$

2. The fifth term of an arithmetic progression is 11 and twenty fifth terms is 51. Find the first term and common difference. (2 marks)

3. Find the quartile deviation of the following data. 8,10,2,7,5,9,6,12,4,6,3,7 (3 marks)

4. A man deposits Sh. 500,000 in an investment which pays 12% per annum interest compounded quarterly. Find how many years it takes for the money to double. (3 marks)

5. A triangle ABC whose area is $4cm^2$ is mapped onto triangle $A^1B^1C^1$ whose area is $64cm^2$ under a transformation matrix $\begin{pmatrix} n & 6 \\ -1 & n+3 \end{pmatrix}$

a) Calculate the possible values of n (2 marks)

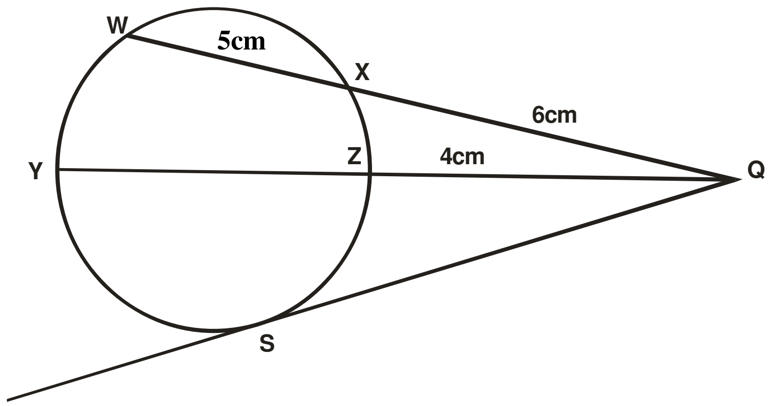
b) Find the image of A(3,4) under the above matrix transformation where $n<0$ (2 marks)

6. a) Expand and simplify $(2 - x)^5$ in ascending powers of x upto and including the term in x^3 (2 marks)

b) Hence approximate the values of $(1.98)^5$ to four significant figures. (2 marks)

7. The velocity (V) of a roller-scatter on a straight road is given by $V = 3t^2 + 5t - 8$ m/s where t is time in seconds. Find his acceleration at time t=2 second. (2 marks)

8. Chord QX and YZ intersect externally at Q. The secant WQ =11cm and QX =6cm while ZQ=4cm



a) Calculate the length of chord YZ (2 marks)

b) Use the answer in i) above to find the length of the tangent SQ (2 marks)

9. Solve for θ in the domain $0° \leq \theta \leq 360°$ (3 marks)

$2\cos 2\theta = -0.7071$

10. Simplify $\frac{3}{\sqrt{5}-2} + \frac{1}{\sqrt{5}}$, leaving the answer in the form. a, $b\sqrt{c}$ where a, b, and c are constants. State their values. (3 marks)

11. Three athletes, James David and Geoffrey are in a race. James is twice as likely to win as David while David is thrice as likely to win as Geoffrey. Find the probability that.

a) Geoffrey wins the race (1 mark)

b) James does not win the race. (2 marks)

12. Given the equation. $M = \left(\frac{2-2t}{t+1}\right)^{\frac{1}{3}}$

Express t in terms of m

13. Identify the stationery points of the curve $y = x^3 - 6x^2 + 9x - 4$ and state their nature (4 marks)

14. Find the radius and centre of a circle whose equation is

$2x^2 + 2y^2 - 16x + 8y + 8 = 0$ (3 marks)

15. Solve for x in the equation.

Log 5+ 2 + log (2x + 10) = log (x-4) (3 marks)

16. The major arc of a circle subtends on an angle of 240° at the centre of circle. Given that the, length of the arc is 88cm calculate the diameter of the circle, (Take $\pi = \frac{22}{7}$) (2 marks)

SECTION B (50 MARKS)

Answer only five questions from in this section in the spaces provided

17. The table below shows the ages in years of 60 candidates who vied on a political party for parliamentary elections in a certain country as recorded in a computer program.

Age in years	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69
No. of candidates	8	13	19	17	3

Calculate;

a) The mean (2 marks)

b) The interquartile range of the data (3 marks)

c) The percentage of candidates whose ages were 54.5 years and below (2 marks)

d) The variance and standard deviation of the distribution using 44.5 as the working mean. (4 marks)

18. An aircraft leaves town P(30°S,14°W) and moves directly east to town Q at a speed of 270 knots for 12 hours. Determine;

a) The distance moved in nautical miles

b) The distance moved in km (take 1nm = 1.853km)

c) The position of town Q

d) The local time at Q if the local time at P is 9.13pm. Give the answer to the nearest minute.

19. a) Complete the table below for the curves y =3cos2x and y = 2sin(2x + 30)° (2 marks)

x	0	15	30	45	60	75	90	105	120	135	150	165	180
3cos2x	3	2.598	1.5	0	-1.5		-3	-2.598	-1.5	0		2.598	3
2sin(2x+30)°	1		2						-2	-1.732	-1		1

b) On a graph paper, draw on the same axes the graph of y=3cos2x and y=2sin(2x+30)° for $0° \leq x \leq 180°$ (4 marks)

(Take the scale 1cm for 15° on the x axis and two cm for 1 unit on the y - axis)

c) State the amplitude period and phase angle of each curve (2 marks)

d) Use your graph to:-

i) Estimate the value of x for which $3\cos 2x - 2\sin(2x+30)^\circ = 0$ (1 mark)

ii) Estimate the range of values of x for which $3\cos 2x < 2\sin(2x+30)^\circ$ (1 mark)

20. a) Two blends of tea costing Ksh. 140 and Ksh.160 per kg respectively are mixed in the ratio 2:3 by mass. The mixture is sold at sh.240 per kg.

i) Find the percentage profit (2 marks)

ii) In what ratio should the two blends be mixed to get a mixture that costs sh.148 per kg (2 marks)

b) A quantity P is partly constant and partly varies as the cube of Q. when Q = 2, P = 50 and when Q =4, P =330. Find the value of Q when P= 16885 (6 marks)

21. The table below shows the income tax rates for a certain year.

Taxable pay per month Ksh	Tax rate
1 -9680	10%
9681 – 18800	15%
18801 – 27920	20%
27921 – 37040	25%
37040 – and above	30%

That year Mary paid net tax of Ksh.5,512 p.m. Her total monthly taxable allowances amounted to Ksh.15220 and he was entitled to a monthly relief of Ksh. 162. Every month the following deductions were made.

- NHIF – Ksh.320
- Union dues – Ksh.200
- Co-operative shares – Ksh.7500

a) Calculate Mary's monthly basic salary in Ksh. (7 marks)

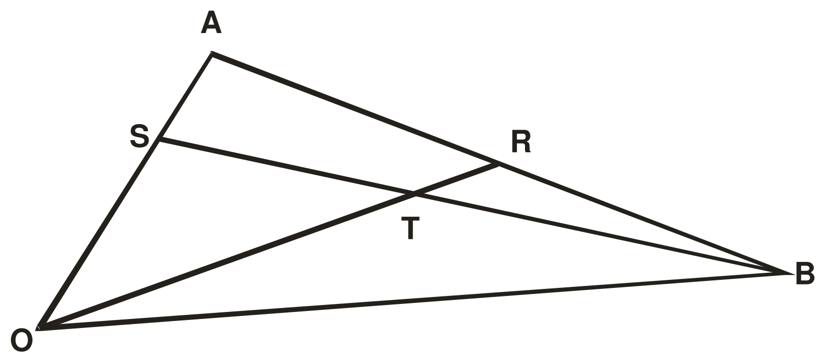
b) Calculate her monthly net salary. (3 marks)

22. Three quantities P, Q and R are such that P varies directly as the square of Q and inversely as the square root of R.

a) Given that P = 20 when Q = 5 and R = 9. Find P when Q = 7 and R = 25 (4 marks)

b) If Q increased by 20% and R decreased by 36%, find the percentage change in P (6 marks)

23. In the figure below OAB is a triangle in which OS $= {}^{3}/_{4}$ OA and AR:RB = 2:1 Lines OR and SB meet at T.



a) Given that OA =a and OB =b, express in terms of a and b

i) AB (1mark)

ii) OR (2 marks)

iii) SB (1 mark)

b) Given that ST=mSB and OT=nOR, determine the values of the scalars m and n (6marks)

24. A particle moves a long a straight line such that its displacement S meters from a given point is $S= t^3 – 5t^2 +3t +4$, where t is time in seconds.

Find,

a) The displacement of the particle at $t = 5$ (2 marks)

b) The velocity of the particle when $t=5$ (2 marks)

c) The values of t when the particle is momentarily at rest. (3 marks)

d) The acceleration of the particle when $t =2$ (3 marks)

MARKING SCHEME

1.	No / Std form / log 4.562 / 4.562×10^{0} / 0.6592 $\times 2$ 1.3184 0.038 / 3.8×10^{-2} / $\bar{2}.5798$ + $\bar{1}.8982$ 6.82 / 6.82×10^{0} / 0.8338 0.35 / 3.5 / $\bar{1}.5441$ + 0.3779 $\bar{1}.8982$ $\underline{0.3779}$ − $\bar{1}.5203 \times ½$ $\frac{\bar{2}+1.5203}{2}$ $\bar{1}.7602$ 5.757×10^{-1} 0.5757	M1 M1 M1 A1	✓multiplication and addition ✓ subtraction and division by 2 ✓ antilog ✓ answer
		04	
2	$a + (n - 1)d = Tn$ $a + 4d = 11$ $\underline{a + 24d = 51}$ $-20d = -40$ $d = 2$ $a = 11 - 8 = 3$ $a = 3$ $d = 2$	M1 A1	Forming & solving equation ✓ values of a and d
		02	
3	2, 3, 4, 5, 6, 6, 7, 7, 8, 9, 10, 12 $Q1 = \frac{2+3+4+5+6}{5} = 4$ $Q3 = \frac{7+8+9+10+12}{5} = 8.8$ $\frac{8.8-4}{2} = \frac{4.8}{2}$ $= 2.4$	M1 M1 A1	✓both Q1 and Q3 ✓subtraction and division by 2
		04	
4	$A = P\left(1 + \frac{r}{100}\right)^{n}$ $1000000 = 500000\left(1 + \frac{3}{100}\right)^{4n}$ $\left(1 + \frac{3}{100}\right)^{4n} = 2$ $(1.03)^{4n} = 2$ $4n \log 1.03 = \log 2$ $4n = \frac{\log 2}{\log 1.03}$ $\frac{4n}{4} = \frac{23.4498}{4} =$ $n = 5.862$ years	M1 M1 A1	✓ substitution ✓ Introduction of log base 10 ✓ answer

5	a) A.S.F = $\frac{64}{4} = \frac{16}{1}$ n(n + 3) - -6 = 16 $n^2 + 3n + 6 = 16$ $n^2 + 3n - 10 = 0$ n(n + 5) – 2(n + 5) = 0 (n + 5) (n – 2) = 0 n = 2 or -5 b) $\begin{pmatrix}-5 & 6\\-1 & -2\end{pmatrix}\overset{A}{\begin{pmatrix}3\\4\end{pmatrix}} = \overset{A^1}{\begin{pmatrix}9\\-11\end{pmatrix}}$ A^1 (9, -11)	 M1 A1 M1 A1	
		04	
6	a) $2^5(-x)^o, 2^4(-x)^1, 2^3(-x)^2, 2^2(-x)^3$ $32, -16x, 8x^2, -4x^3$ $32 - 80x + 80x^2 - 40x^3 + \ldots\ldots\ldots$ b) $(2 - 0.02)^5 = (2 - x)^5$ -x = 0.02 x = 0.02 32 – 1.6 + 0.032 – 0.00032 = 30.43 4s.f	 M1 A1 M1 A1	
		03	
7	$\frac{ds}{dt}$ = V = 3t2 + 5t – 8 $\frac{dv}{dt}$ = a = 6t + 5 t = 2 a = 6(2) + 5 = 17 m/s^2	 M1 A1	
		02	
8	a) $\frac{QX}{QZ} = \frac{QY}{QW}$ $\frac{6}{4} = \frac{4+x}{11}$ 16 + 4x = 66 4x = 50 X = YZ = 12.5 cm b) $\frac{QZ}{QS} = \frac{QS}{QY}$ QZ.QY = QS^2 4 x 16.5 = x^2 $\sqrt{x^2} = \sqrt{66}$ X = QS = 8.124 cm	 M1 A1 M1 A1	
		04	
9	2 cos 2θ = -0.7071 Cos 2 θ = -0.35355		

	$\cos^{-1}(0.3555) = 69.30^o$ $2\theta = 69.30^o$ 1st quadrant Cos is –ve in 2nd and 3rd quadrants $2\theta = 110.7^o, 249.3^o, 470.7^o, 609.3^o$ $\theta = 55.35^o, 124.65^o, 235.35^o, 304.65^o$	M1 M1 A1	✓ acute ∠
		03	
10	$\frac{3\sqrt{5}+\sqrt{5}-2}{\sqrt{5}(\sqrt{5}-2)}$ $\frac{4\sqrt{5}-2}{5-2\sqrt{5}} = \frac{-2+4\sqrt{5}}{5-2\sqrt{5}}$ $\frac{-2+4\sqrt{5}}{5-2\sqrt{5}} \times \frac{5+2\sqrt{5}}{5+2\sqrt{5}}$ $\frac{5(-2+4\sqrt{5})+2\sqrt{5}(-2+4\sqrt{5})}{5^2-(2\sqrt{5})^2}$ $\frac{-10+20\sqrt{5}+40-4\sqrt{5}}{25-20}$ $= \frac{30+16\sqrt{5}}{5}$ $= 6 + \frac{16}{5}\sqrt{5}$ a = 6 $b = \frac{16}{5}$ c = 5	M1 A1 B1	✓ conjugate ✓ values of a, b and c
11	Let the probability of Geoffrey winning be x. David winning is 3x and that of James is 2(3x) = 6x a) P(Geoffrey wins) = $\frac{x}{10x} = \frac{1}{10}$ b) P(James losing 1 – P(James winning) $1 - \frac{6}{10}$ $\frac{4}{10} = \frac{2}{5}$	B1 M1 A1	
		03	
12	$(m)^3 = \left(\left(\frac{2-2t}{t+1}\right)^{\frac{1}{3}}\right)^3$ $\frac{m^3}{1} = \frac{2-2t}{t+1}$ $m^3t + m^3 = 2 - 2t$ $m^3t + 2t = 2 - m^3$ $\frac{t(m^3+2)}{(m^3+2)} = \frac{2-m^3}{m^3+2}$ $t = \frac{2-m^3}{m^3+2}$	M1 M1 A1	Cubing both sides
		03	
13	$\frac{\partial y}{\partial x} = 3x^2 - 12x + 9 = 0$ $(3x-9)(x-1) = 0$	M1	✓ derivative

<table>
<tr><td></td><td>x = 3 or x = 1
At x = 1
$y = (1)^3 - 6(1)^2 + 9(1) - 4 = 0$
(11, 0)
At x = 3
$y = (3)^3 - 6(3)^2 + 9(3) - 4 = -4$
the point (3, -4)
for x = 1
<table><tr><td>0</td><td>1</td><td>2</td></tr><tr><td>+ve</td><td>0</td><td>-ve</td></tr></table>
(1, 0) is a point of maximum
<table><tr><td>2</td><td>3</td><td>4</td></tr><tr><td>-ve</td><td>0</td><td>+ve</td></tr></table>
(3, -4) is a point of minimum</td><td>M1

A1

B1</td><td>✓ values of x

✓ stationary points

✓ classification of points</td></tr>
<tr><td></td><td></td><td>04</td><td></td></tr>
<tr><td>14</td><td>Dividing through by 2
$x^2 + y^2 - 8x + 4y + 4 = 0$
$x^2 - 8x + y^2 + 4y = -4$
completing the square on x and y parts
$(x - 4)^2 + (y + 2)^2 = -4 + 16 + 4$
$(x - 4)^2 + (y + 2)^2 = 16$
Centre (4, -2)
Radius = 4 units</td><td>
M1

M1
M1

A1</td><td>

✓ centre and radius</td></tr>
<tr><td></td><td></td><td>04</td><td></td></tr>
<tr><td>15</td><td>$\text{Log}\left(\frac{5}{100}\right) = \log\left(\frac{x-4}{2x+10}\right)$
5(2x + 10) = 100(x – 4)
18x = 90
$x = \frac{90}{18}$
= 5</td><td>M1
M1

A1</td><td></td></tr>
<tr><td></td><td></td><td>03</td><td></td></tr>
<tr><td>16</td><td>$\frac{240}{360} \times 2 \times \frac{22}{7} \times r = 88$
$\frac{\cancel{4.190}r}{\cancel{4.190}} = \frac{88}{4.190}$
r = 21.002 ≅ 21
D = 2r = 42.</td><td>M1

A1</td><td></td></tr>
<tr><td></td><td></td><td>02</td><td></td></tr>
</table>

17.

Age (years)	x	d = x – 44.5	d^2	f	fd	fd^2	cf
20 – 29	24.5	-20	400	8	-160	3200	8
30 – 39	34.5	-10	100	13	-130	1300	21
40 – 49	44.5	0	0	19	0	0	40
50 – 59	54.5	10	100	17	170	1700	57
60 – 69	64.5	20	400	3	60	1200	60
				$\sum f = 60$	$\sum fd = -60$	$\sum fd^2 = 7400$	

	a) Mean $(\bar{x}) = A + \frac{\Sigma fd}{\Sigma f}$		
	$44.5 + \frac{-60}{60}$	M1	
	$44.5 - 1$		
	$= 43.5$	A1	
	b) Q1 = 29.5 + $\left(\frac{15-8}{13}\right)$ x 10 = 34.8846		
	Q3 = 49.5 + $\left(\frac{45-40}{17}\right)$10 = 52.4412	M1	✓ Q1 and Q3
	Interquartile range		
	52.4412 = 34.8846 = 17.5566		
	≈ 17.56	A1	
	c) Let P be the number of candidates in the class 50 – 59 where the age of 54.5 years lie		
	$49.5 + \frac{P}{17}$ x 10= 54.5	M1	
	$\frac{P}{17}$ x 10 = 5		
	$P = \frac{5 \times 17}{10}$		
	$= 8.5$		
	$= 9$		
	% of candidates below 54.5		
	$\frac{21+9}{60}$ x 100		
	$= 50\%$	A1	
	d) Variance $(S)^2 = \frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f}\right)^2$		
	$\frac{7400}{60} - \left(\frac{-60}{60}\right)^2$	M1	
	123.333 – 1		
	122.333	A1	
	Standard deviation		
	$\sqrt{S^2} = \sqrt{122.333}$	M1	
	S = 11.06 years	A1	
		10	
18	a) Distance PQ = S x T		
	= 270 x 12 nm	M1	
	= 3240nm	A1	
	b) Distance in km		
	3240 x 1.853 km	M1	
	6003.72	A1	
	c) Let the angle difference in longitude of P and Q be y		
	Distance (in nm) of Q from P		
	= 60y cos 30 = 3240nm	M1	
	$y^o = \frac{3240}{60 \cos 30}$		

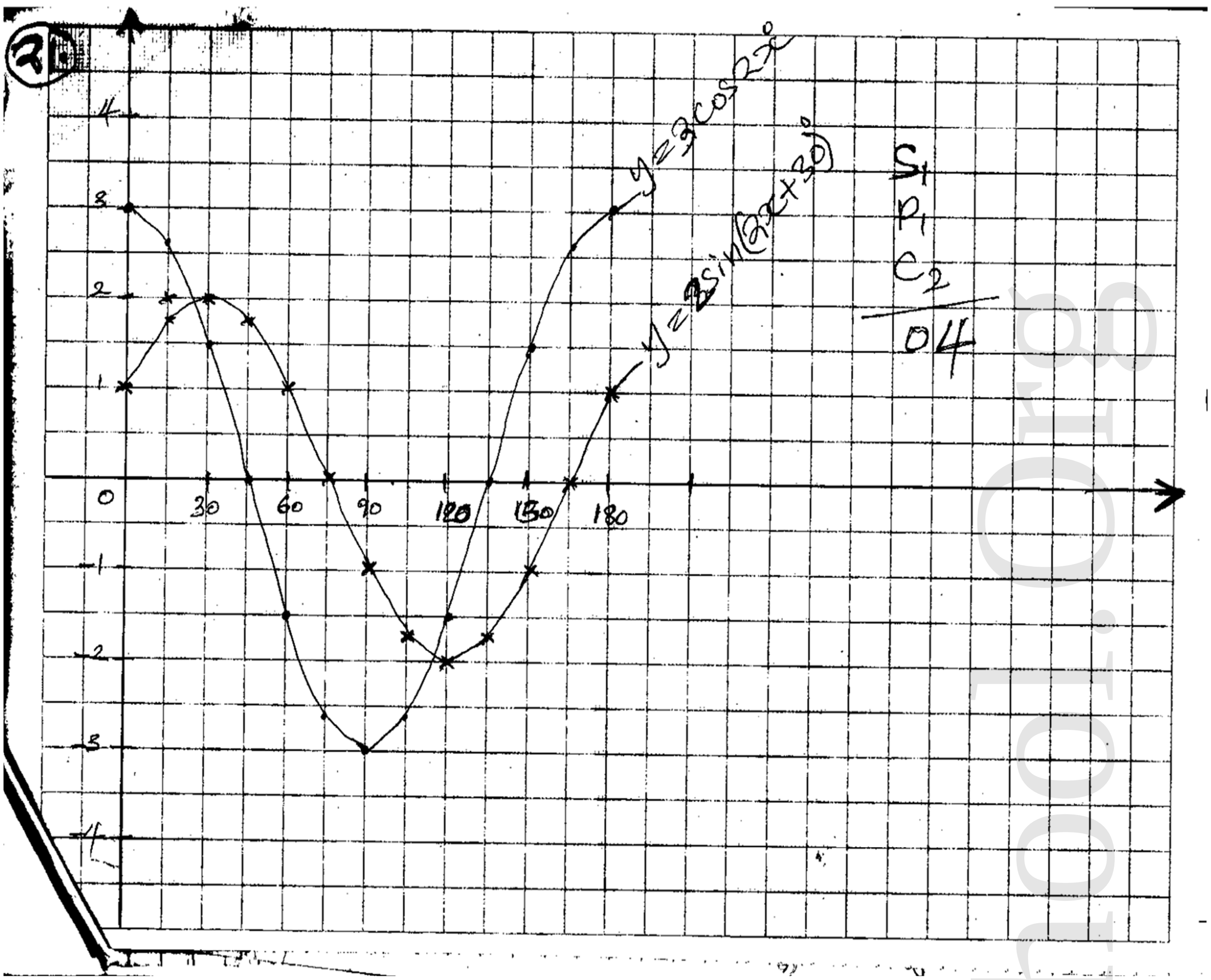
	$= 62.35^o$ Longitude of Q is given by $62.35^o - 14^o$ $= 48.35^o$ Position of Q is $Q(30^oS, 48.35^o)$ d) Angle difference in the longitude of P and Q is 62.35^o Time difference between P and Q $\frac{62.35}{15}$ 4 hours and 9 minutes Local time at Q = 9.13 p.m 9.13pm + 4 hours 9 minutes = 1.22 am	 M1 A1 M1 M1 A1	
		10	

19. a)

x^o	0	15	30	45	60	75	90	105	120	135	150	165	180
$3\cos 2x^o$	3	2.598	1.5	0	-1.5	**-2.598**	-3	-2.598	-1.5	0	**-1.5**	2.598	3
$2\sin(2x + 30)^o$	1	**1.732**	2	**1.732**	**1**	**0**	**-1**	**-1.732**	-2	-1.732	1	**0**	1

B2 for all correct values
B1 for any correct 5 values

b)



	c) y = 3 cos 2x Amplitude Period 180° Phase angle 0° y = 2sin (2x + 30)° Amplitude = 2 Period = 180° Phase angle = 30° d) i) x = 24°, 115° ii) 24° < x < 114°	B1 B1 B1 B1	✓ values ✓3 values For 2 values correct
		10	
20	a) $\frac{(140 \times 2)+(160 \times 3)}{2+3} = \frac{280+480}{5} = 152$ Profit = 240 – 152 = 88 Profit % = $\frac{88}{152} \times 100$ = 57.89% b) Let the ration be x : y	M1 A1	

	$\frac{140x+160y}{x+y} \times \frac{148}{1}$ 140x + 160y = 148x + 148y $\frac{12y}{8y} = \frac{8x}{8y}$ x : y $\cancel{12} : \cancel{8}$ 3 : 2 c) $P \infty C + Q^3$ $P = C + KQ^3$ 50 = C + 8K 330 C + 64k $\frac{280}{56} = \frac{56k}{56}$ k = 5 50 = C + 8(5) 50 = C + 40 C = 10 $16885 = 10 + 5Q^3$ $\frac{16875}{5} = \frac{5Q^3}{5}$ $3375 = Q^3$ Q = 15	M1 A1 M1 M1 A1 M1 A1	
		10	
21	a) Gross tax = 5512 + 1162 = 6672 1^{st} 9680 x $\frac{10}{100}$ = 968 2^{nd} 9120 x $\frac{15}{100}$ = 1368 3^{rd} 9120 x $\frac{20}{100}$ = 1824 4^{th} 9120 x $\frac{25}{100}$ = 2280 5^{th} 780 x $\frac{30}{100}$ = 234 37820 6674 Basic salary = 37320 – 15220 = Ksh. 22600 b) Net pay Total deductions = 320 + 200 + 7500 + 7500 = 13532 Net pay = Gross – deduction = 37820 – 13532 = 24288	M1 M1 M1 M1 M1 M1 A1 M1 M1 A1	
		10	

22	a) $P \alpha \frac{Q^2}{\sqrt{R}}$ $P = \frac{kq^2}{\sqrt{R}}$ $K = \frac{\sqrt{R}\, P}{Q^2} = \frac{3 \times \cancel{20}\ 4}{\frac{\cancel{25}}{5}}$ $= \frac{12}{5}$ $P = \frac{\frac{12}{5} \times 49}{5}$ $= \frac{117.5}{5}$ $= 23.52$ b) $Q1 = \frac{120}{100} q = (1.2q)^2$ $= 1.44q^2$ $R1 = \frac{64}{100} R = \sqrt{0.64\, R}$ $= 0.8\sqrt{R}$ $P1 = \frac{KQ_1}{\sqrt{R_1}} = \frac{1.44\, KQ^2}{0.8\sqrt{R}}$ $P1 = 1.8P$ $\frac{0.8P - P}{P} \times 100$ $\frac{0.8P}{P} \times 100$ 0.8 x 100 $= 80\%\ Increase$	M1 A1 M1 A1 M1 M1 M1 A1 M1 A1	
		10	
23	a) i) AB = -a + b ii) $OR = OA + \frac{2}{3} AB$ $= a + \frac{2}{3}(-a + b)$ $= a - \frac{2a}{3} + \frac{2b}{3}$ $= \frac{a}{3} + \frac{2b}{3}$ $= \frac{1}{3}(a + 2b)$ iii) SB = -OS + OB $-\frac{3}{4}a + b$ b) $ST = m\left(-\frac{3}{4}a + b\right)$ $= -\frac{3m}{4}a + mb$ ………………(i) Moving from S to T via O; ST = SO + OT But OT = nOR; ST is also given by ST = SO + nOR $\frac{-3}{4}a + n\left(\frac{1}{3}a + \frac{2}{3}b\right)$	B1 M1 A1 B1 M1	

	$\frac{-3}{4}a + \frac{1}{3}na + \frac{2}{3}nb$ $= \left(\frac{1}{3}n - \frac{3}{4}\right)a + \frac{2}{3}nb$…………(ii) Equating (i) and (ii) $\frac{-3}{4}ma + mb = \left(\frac{1}{3}n - \frac{3}{4}\right)a + \frac{2}{3}nb$ Equating coefficients of a and b $= \frac{-3}{4}m = \frac{1}{3}n - \frac{3}{4}$ $-9m = 4n - 9$ $4n + 9m = 9$……………(iii) $m = \frac{2}{3}n$ $2n - 3m = 0$……………..(iv) $43n + 9m = 9$ $\underline{2n - 3m = 0}$ - $15m = 9$ $m = \frac{9}{15} = \frac{3}{5}, \quad m = \frac{3}{5}$ $\cancel{\frac{3}{2}} \times \cancel{\frac{2}{3}}n = \frac{3}{5} \times \frac{3}{2} \qquad n = \frac{9}{10}$	M1 M1 M1 M1 A1	Simultaneous eqns Attempt to solve simultaneously Both values of m and n
24	a) $S = (5)^3 - 5(5)^2 + 3(5) + 4$ $125 - 125 + 15 + 4$ $= 19m$ b) $\frac{ds}{dt} = v = 3t^2 - 10t + 3$ $V = 3(5)^2 - 10(5) + 3$ $= 75 - 50 + 3$ $= 28m/s$ c) $\frac{ds}{dt} = 0$ $3t^2 - 10t + 3 = 0$ $t(3t - 1) - 3(3t - 1) = 0$ $(t - 3)(3t - 1) = 0$ $t = 3$ or $t = \frac{1}{3}$ d) $\frac{dv}{dt} = a = 6t - 10$ $a = 6(2) - 10$ $a = 2\ m/s^2$	M1 A1 M1 A1 M1 M1 A1 M1 M1 A1	
		10	