PAVEMENT FORM 4 TRIAL 1 EXAMINATION 2021/2022

Kenya Certificate of Secondary Education (K.C.S.E)

121/1
MATHEMATICS PAPER 1

MARKING SCHEME

1.	$\sqrt{\frac{625 \times 256}{25 \times 8 \times 5} \times \frac{100000}{100000}}$ $= \sqrt{\frac{5 \times 32}{10}} = \sqrt{16}$ $= 4$	M1 M1 A1	
			3 Marks
2	$\frac{(x+4)(x+4)-5(x+4)}{(x-4)(x+4)}$ $= \frac{(x+4)(x+4-5)}{(x-4)(x+4)}$ $= \frac{(x+4)(x-1)}{(x-4)(x+4)}$ $= \frac{x-1}{x-4}$ *Alternative* $\frac{(x+4)(x+4)-5(x+4)}{x^2-16}$ $= \frac{x^2+8x+16-5x-20}{(x-4)(x+4)}$ $= \frac{x^2+3x-4}{(x-4)(x+4)}$ $= \frac{x^2+4x-x-4}{(x-4)(x+4)}$ $= \frac{(x+4)(x-1)}{(x-4)(x+4)} = \frac{x-1}{x-4}$	M1 M1 A1	
			3 Marks
3	$\frac{\log_{10} 7^3 - \log_{10} 5^3}{\log_{10}\left(\frac{7}{5}\right)}$ $= \frac{3\log_{10} 7 - 3\log_{10} 5}{\log_{10}\left(\frac{7}{5}\right)} = \frac{3\log_{10}\left(\frac{7}{5}\right)}{\log_{10}\left(\frac{7}{5}\right)}$	M1 M1	

	$= 3$	A1	
			3 Marks
4	$-2x < 2$ $x > -1$ $8 - 3x \geq -16$ $-3x \geq -24$ $x \leq 8$ $-1 < x \leq 8$ -1 0 +1 +2 +3 +4 +5 +6 +7 +8	B1 B1 B1	
			3 Marks
5	L.s.f. $= \frac{1}{200}$ A.s.f. $= \frac{1}{40000}$ Area of triangular field, $S = (6+8+10)\,{}^1/_2 = 12$ $= \sqrt{12(12-6)(12-8)(12-10)}$ $= \sqrt{576} = 24$ Actual area of the triangular field $= 24cm^2 \times 40000$ $= 960{,}000cm^2$	M1 M1 M1 A1	
			4 Marks
6	Men Hours Days 24 10 4 15 8 ? 1 man working 1 hr takes $24 \times 10 \times 4 = 960\ days$ $\therefore$ 15 men 8 hrs will take $\frac{960\ days}{15 \times 8}$ $= 8\ days$ $\therefore 8 - 4 = 4\ more\ days$	M1 M1 A1	
			3 Marks
7	$(2^{-1})^x \times (2^{-3})^{1-x} = 2^5$ $2^{-x-3+3x} = 2^5$ $2^{2x-3} = 2^5$	M1	

	$2x - 3 = 5$ $x = 4$	M1 A1	
			3 Marks
8	a) $\angle OCD = \frac{180-42}{2} = 69°$ $\angle CAD = 69°$ b) $\angle AOC = 180° - (90 + 69) = 21°$ $\angle BOC = 180° - 42° = 138°$ $\angle OCB = 138° - 90° = 48°$ $\angle BCA = \frac{180°-48°}{2} = 66°$ $660° - 21° = 45°$	B1 B1 B1 B1	
			4 Marks
9	$m = \sqrt{3^2 - 2^2} = \sqrt{5}$ 2 3 m $\tan x = \frac{2}{\sqrt{5}} = \frac{2}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$ $= \frac{2\sqrt{5}}{5}$	B1 M1 A1	
			2 Marks
10	Let the number be $x\ y\ z$ $2x = y + 2 \ldots\ldots\ldots\ldots (i)$ $Z = 3x \ldots\ldots\ldots\ldots\ldots (ii)$ $100z + 10y + x - 594 = 100 + 10y + z \ldots (iii)$ $99z - 99x = 594$ $z - x = 6 \ldots\ldots\ldots\ldots (iv)$ $z - x = 6$ $\underline{z - 3x = 0}$ $2x = 6$	M1 M1	

	$x = 3$ $z - 3(3) = 0$ $z = 9$ $2(3) = y + 2, y = 4$ $\therefore$ The number is 349	M1 A1	
			4 Marks
11	$\frac{2m + 3n}{5m - n} = {}^{3}/_{2}$ $2(2m + 3n) = 3(5m - n)$ $4m + 6n = 15m - 3n$ $-11m = -9n$ $\frac{m}{n} = \frac{-9}{-11} = \frac{9}{11}$ $m : n = 9 : 11$	M1 M1 A1	
			3 Marks
12	a) $\frac{108}{100}x = 4800$ $x = \frac{4800 \times 100}{108}$ $x = Sh.4444.40$ Customers buying price = Sh.4444.40 b) Dealers buying price $\frac{122}{100}x = Sh.444.40$ $x = \frac{Sh.4444.40 \times 100}{122}$ $x = Sh.3643.0$	M1 M1 A1	
			3 Marks
13	$PQ = kRS$ $\begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix} = k \begin{pmatrix} 6 \\ a - 1 \\ 15 \end{pmatrix}$ $6k = 2, k = 3$ $3(a - 1) = 3$ $a - 1 = 1$ $a = 2$	M1	

	$\left\lvert \underset{\sim}{RS} \right\rvert = \sqrt{6^2 + 1^2 + 15^2}$ $= \sqrt{262}$ $= 16.19\ (2\ dp)$	A1 A1	
			3 Marks
14	Greatest common factor is xy^2 $x^3y^2 - 4xy^4 = xy^2(x^2 - 4y^4)$ $= xy^2(x - 2y)(x + 2y)$	M1 M1 A1	
			3 Marks
15	$Let\ r = 2.4545 \ldots\ldots\ldots\ldots (i)$ $100r = 245.4545 \ldots\ldots\ldots (ii)$ $(ii) - (i), 99r = 243$ $r = \frac{243}{99} = \frac{27}{11}$	M1 M1 A1	
			3 Marks
16	$2.45 \leq a \leq 2.55$ $6.145 \leq b \leq 6.155$ Limits b – a, Maximum difference $6.155 - 2.45 = 3.705$ $6.145 - 2.55 = 3.595$ $Working\ difference = 6.15 - 2.5 = 3.65$ $Absolute\ error = 3.65 - 2.595 = 0.055$ $\%\ error = \frac{0.055}{3.65} \times 100\% = 1.51\%$	 M1 M1 A1	
			3 Marks

SECTION II: 50 Marks

17	$^3/_2 \times 90 = 135km$ $580 - 135 = \frac{445km}{210}$ =2.119048 hrs 9.00 + 2.07 = 11.07 a.m.	 M1 A1	

	ii) $2.119048 \times 120 = 254.29Km$ from B	M1 A1
	b) $^{580}/_{90} = 6.444\ hrs$ 6hrs 27 mins 6hrs 57 mins 7.30 + 6hrs 57 mins 2.27 p.m.	M1 A1
	c) $1 \times 120 = \frac{120}{60} km$ $180 - 120$ =2hrs 10.00 + 2hrs = 12.00 noon.	M1 A1
	d) $180 \times 2 = 360km$ $580 - 360 = 220km\ from\ A$	M1 A1
		10 Marks

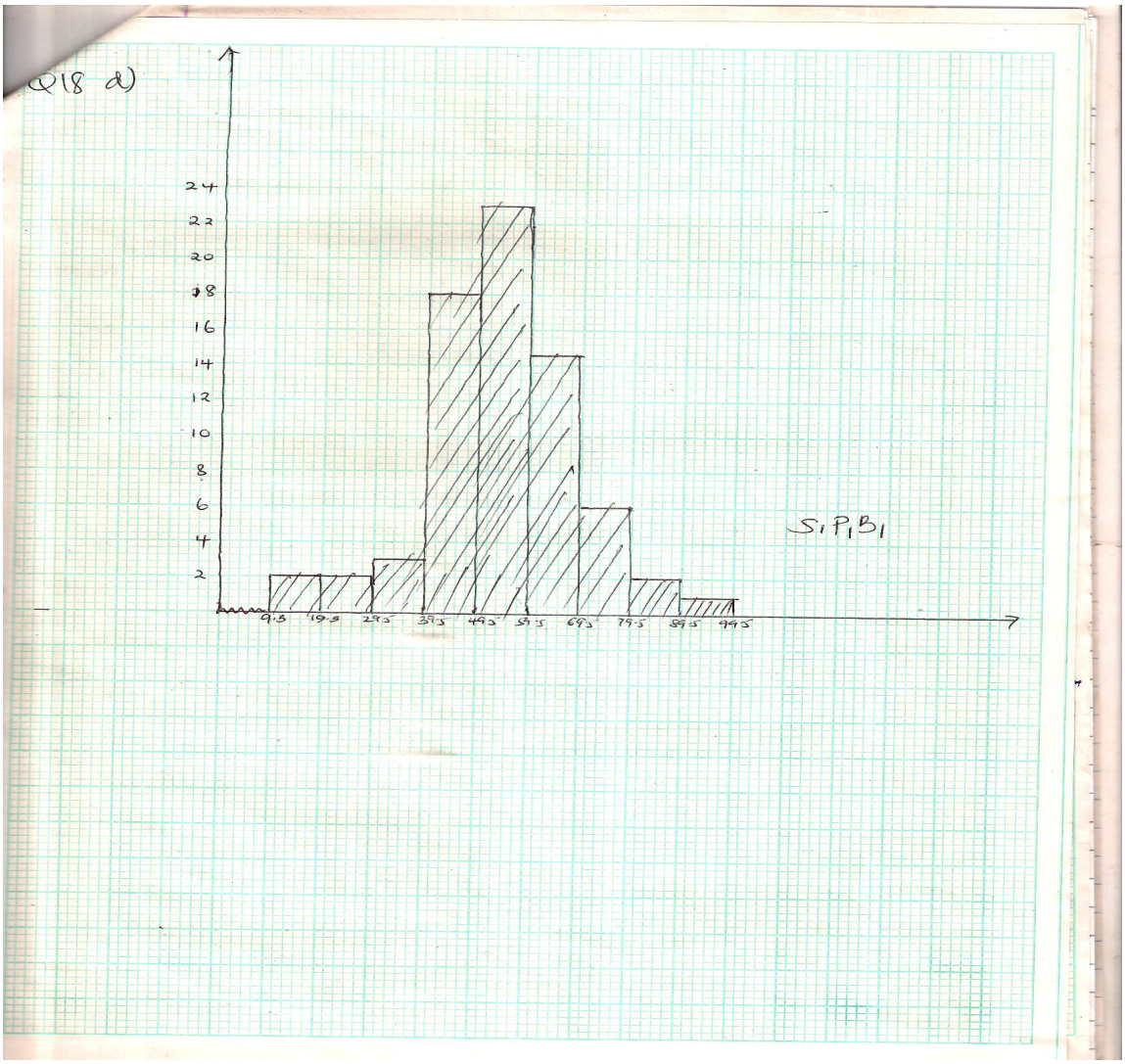
18		M1

Class	f	Cf	x	fx
10-19	2	2	14.5	29
20-29	2	4	24.5	49
30-39	3	7	34.5	103.5
40-49	8	15	44.5	356
50-59	23	38	54.5	1253.5
60-69	13	51	64.5	838.5
70-79	6	57	74.5	447
80-89	2	59	84.5	169
90-99	1	60	94.5	94.5
	60			3340

A1

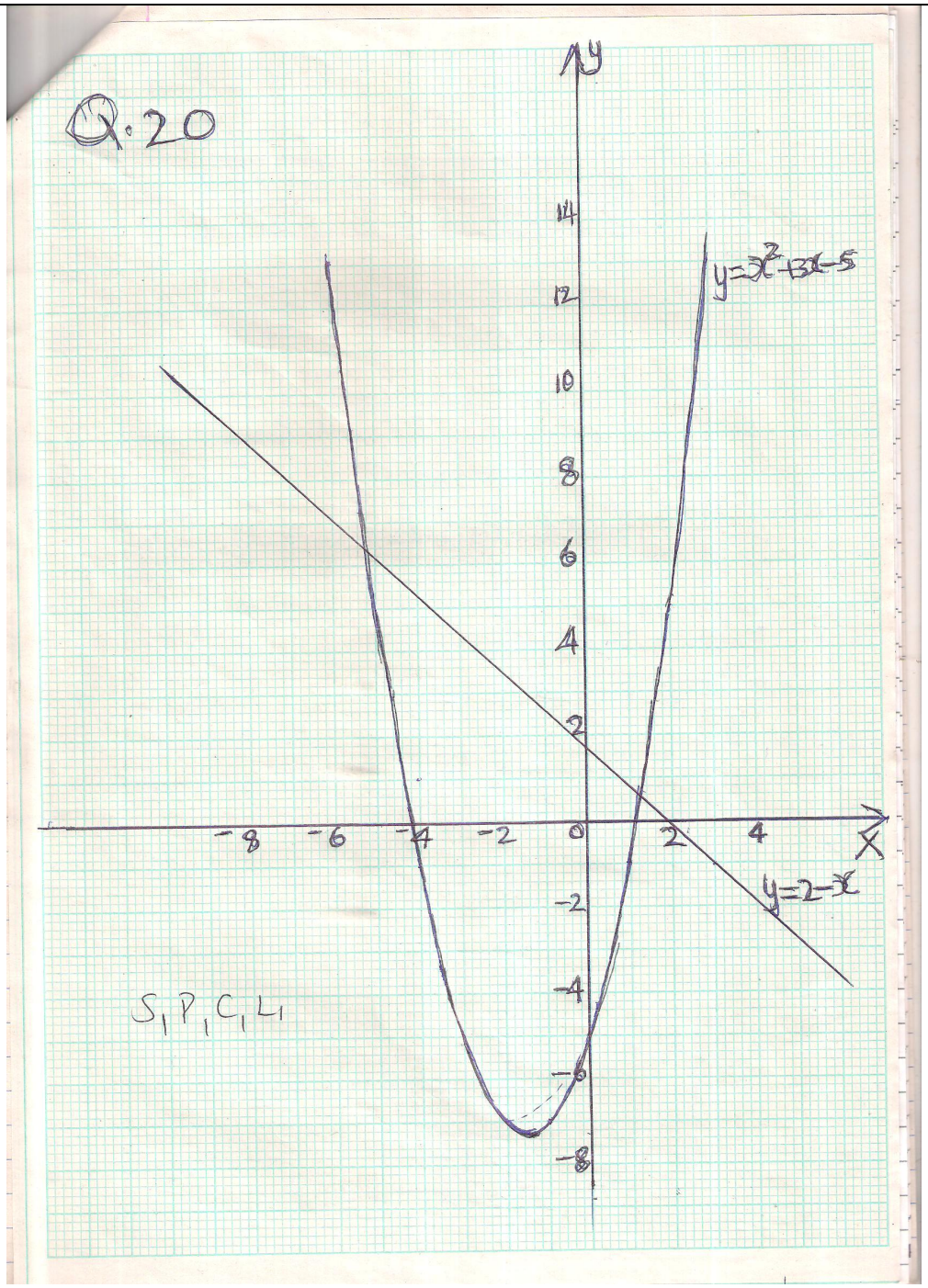
B1 (fx column)

	a) $\frac{3340}{60} = 55.67$	M1A1
	b) $\frac{30+31}{2} = 30.5$	M1
	$49.5 + \left(\frac{30.5 - 15}{23}\right) \times 10$	M1
	$49.5 + 6.739 = 56.24$	A1
	c) $50 - 59$	B1
	d) See Graph Next page	
		10 Marks



19	i) . O 60° 1.4m	

	A M B $\sin 60° = \frac{MB}{1.4}$ $MB = 1.4 \sin 60°$ $= 1.212m$ $\therefore Chord\ AB = 2.424m$	M1 A1
	ii) Area of segment ABC = $\frac{120}{360} \times \frac{22}{7} \times 1.4^2 - \frac{1}{2} \times 1.4^2 \sin 120°$ $= 2.053 - 0.849$ $=1.204m^2$	M1 M1 A1
	iii) Volume of oil = 1.204×4 $=4.816m^3$	M1 A1
	iv) Area in contact with oil $= \frac{120}{360} \times 2 \times \frac{22}{7} \times 1.4 + 2(1.204)$ $= 2.933 + 2.408$ $= 5.341m_2$	M1 M1 A1
		10 Marks

20		
		10 Marks

20	$y = x^2 + 3x - 5$ 	x	-6	-5	-4	-3	-2	-1	0	1	2	3
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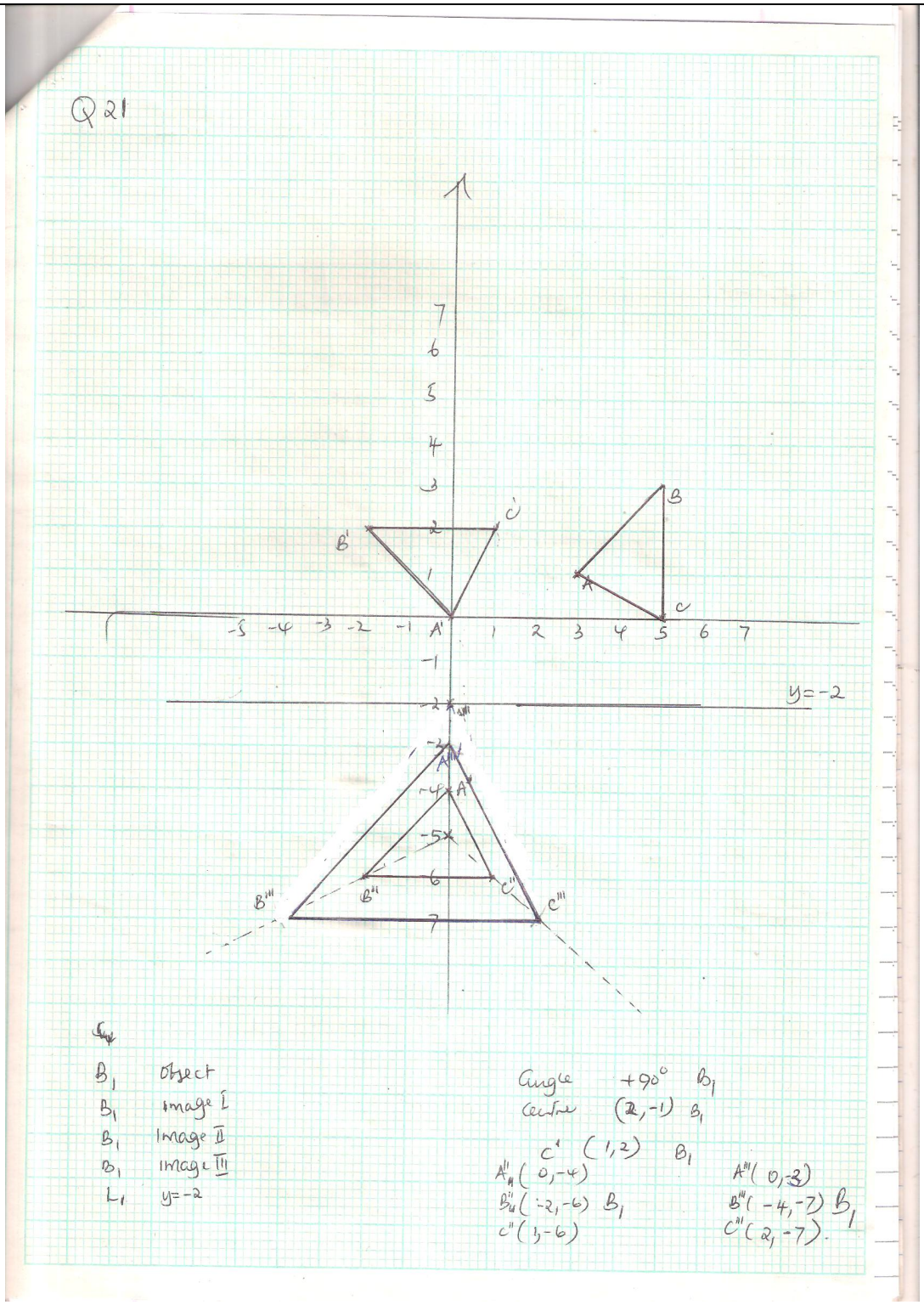
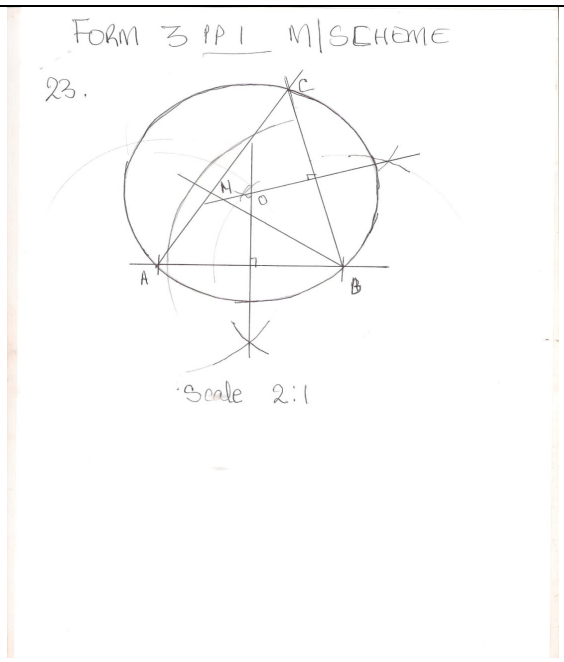
y	13	5	-1	-5	-7	-7	-5	-1	5	13 | *b*) $y = 2 - x$ | x	-6	3
y	8	-1	 c) $x = 5.2 \pm 0.1$ *or* 1.3 ± 0.1 d) -7.2 ± 0.1 e) $-4.2 \leq x \leq 1$	B2 B1 B1 B1 B1
		10 Marks

21		
		10 Marks

22	**a)** .	

	i) (0, 5) g = 2 $\frac{y-5}{x-0} = 2$ $y - 5 = 2x$ $y = 2x + 5$ **ii)** $y = 2x + 5 = 0$ $x = -2.5$ $(-2.5, 0)$ $g_1 = 2$ $g_2 = {}^{-1}/_{2}$ $\frac{y-0}{x-{}^{-}2.5} = \frac{1}{2}$ $2y = -1(x + 2.5)$ $2y = -x - 2.5$ $y = \frac{-1}{2}x - \frac{5}{4}$ **iii)** $g_2 = {}^{-1}/_{2}$ $g_3 = {}^{-1}/_{2}$ $\frac{y-2}{x-1} = {}^{-1}/_{2}$ $2(y-2) = -(x-1)$ $2y - 4 = -x + 1$ $2y = -x -_{5}$ $y = {}^{-1}/_{2}x - {}^{5}/_{2}$ **b)** $y = 2x + 5$ $y = {}^{-1}/_{2}x - {}^{5}/_{2}$ $2x + 5 = {}^{-1}/_{2}x - {}^{5}/_{2}$ $4x + 10 = -x - 5$ $5x = -15$ $x = -3$ $y = 2(-3) + 5$ $= -1$ $(-3, -1)$	M1 A1 M1 M1 A1 M1 A1 M1 M1 A1
		10 Marks

24	**a)** .	

	 AC = 5cm **b)** BN = 3.1cm AN = 2.2 cm **c)** A = ½ × 5 × 3.1 =7.75cm² **d)** r = 2.6cm A = $\frac{22}{7} \times 2.6 \times 2.6$ 21.25cm²	B1 B1 B1 B1 B1 M1 A1 B1 M1 A1
		10 Marks

24	**a)** (i) ON = $a + \frac{1}{4}(b-a)$	
	$= \frac{3}{4}\underset{\sim}{a} + \frac{1}{4}\underset{\sim}{b}$	M1 A1
	ii) AM = $\underset{\sim}{a} + \frac{2}{3}\underset{\sim}{b}$	M1
	$\frac{2}{3}\underset{\sim}{b} - \underset{\sim}{a}$	A1
	b) i) OX = hON	
	$= h\left(\frac{3}{4}a + \frac{1}{4}b\right)$	
	$= \frac{3}{4}h\underset{\sim}{a} + \frac{h}{4}\underset{\sim}{b}$	M1
	OX = $\underset{\sim}{a} + k\left(\frac{2}{3}\underset{\sim}{b} - \underset{\sim}{a}\right)$	
	$= (1-k)\underset{\sim}{a} + \frac{2}{3}k\frac{2}{3}\underset{\sim}{b}$	M1 M1
	ii) $\frac{3}{4}h = 1-k$	
	$3h = 4 - 4k\ (i)$	
	$\frac{h}{4} = \frac{2}{3}k$	
	$h = \frac{8}{3}k\ (ii)$	
	$3\left(\frac{8}{3}k\right) = 4 - 4k$	M1
	$k = \frac{1}{3}$	
	$k = \frac{1}{3}$	M1
	$h = \frac{8}{3}\left(\frac{1}{3}\right)$	
	$= \frac{8}{9}$	M1
	$ON = \frac{8}{9}\left(\frac{3}{4}\underset{\sim}{a} + \frac{1}{4}\underset{\sim}{b}\right)$	A1
	$= \frac{2}{3}\underset{\sim}{a} + \frac{2}{9}\underset{\sim}{b}$	
		10 Marks