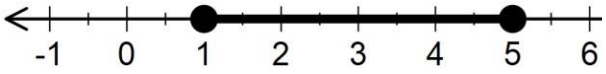
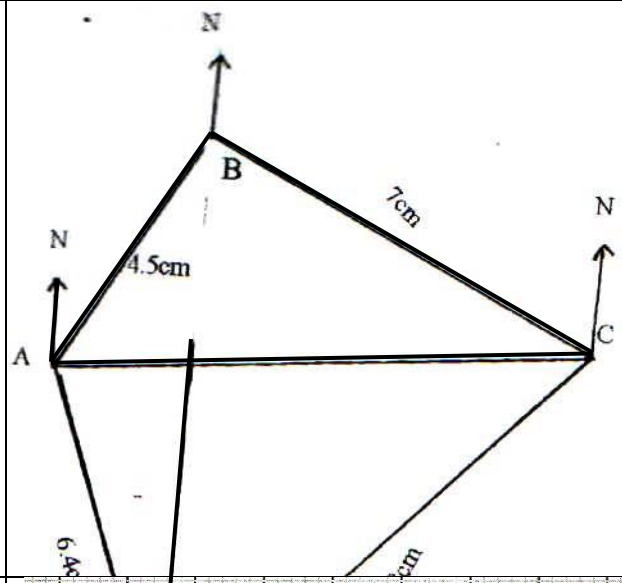
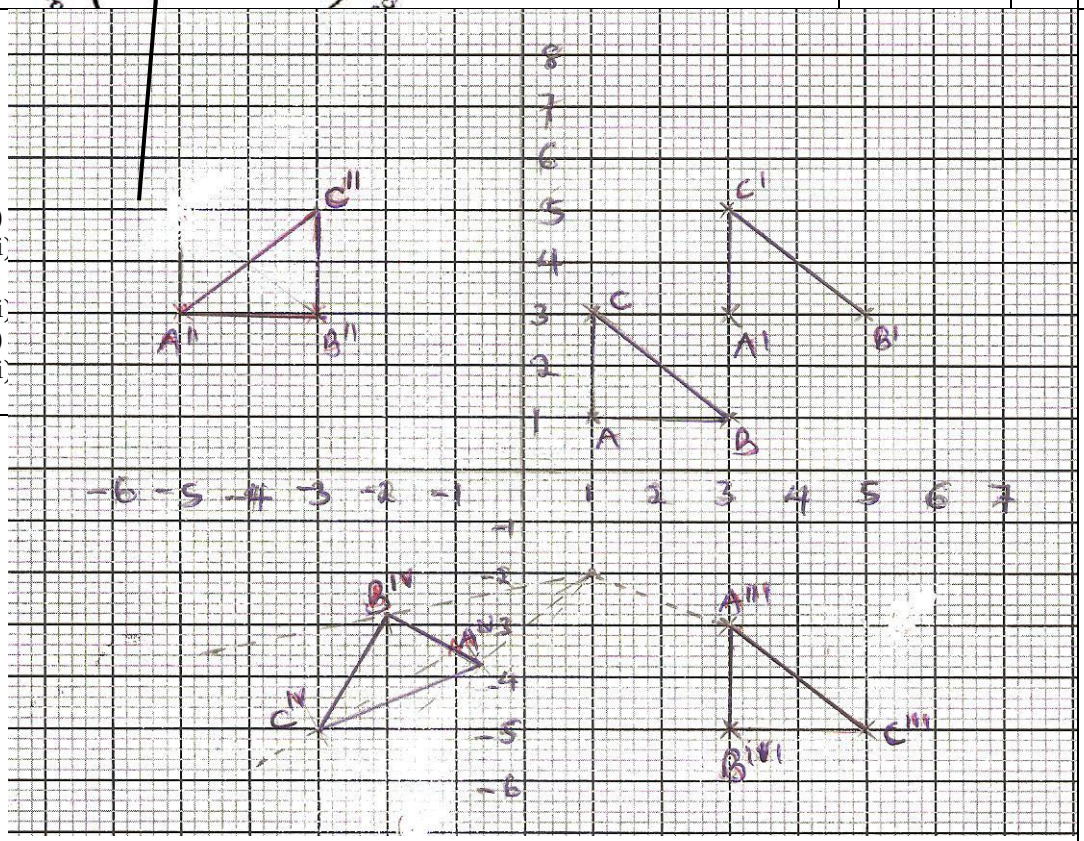
1	$\frac{3/2 \times 11/3 \times 5/11}{10/6 \times 4/5}$ $= \frac{5/2}{4/3} = 5/2 \times 3/4$ $= 15/8 = 1\,7/8$	M1 M1 A1 **03**
2	$\sqrt{6.458 \times 10^{-2}} + (2\left(\frac{1}{0.4327}\right))^2$ $0.2541 + (4.622)^2$ $= 0.2541 + 21.36$ = 21.61	M1 M1 M1 A1 **04**
3	$3\chi + 5y = 129250$ $2\chi - 4y = 22000$ $6\chi + 10y = 258500 -$ $6\chi - 12y = 66000$ $22y = 192500$ $y = 8750$ $\chi = 28{,}500$	M1 both equations M1eliminatio A1 both values **03**
4	$\frac{a^4 - b^4}{a^3 - ab^2}$ $\frac{(a^2 - b^2)(a^2 + b^2)}{a(a^2 - b^2)}$ $= \frac{a^2 + b^2}{a}$	M1 evaluating – ve index M1 cancellation A1 **03**
5	$9^{(x-1)} \times 3^{(2x+1)} = 243$ Change to base 3 $3^{2(2x-1)} \times 3^{(2x+1)} = 3^5$ 2 (2x – 1) + 2x + 1 = 5 4x – 2 +2x + 1 = 5 6x – 1 = 5 6x = 6 x = 1	M1 use of common index M1form eq. A1 03
6	(x + 2) (x – 5) = 60 $x^2 – 3x – 10 = 60$ (x – 10) (x +7) = 0 x = 10 x = -7 Length 10 + 2 = 12m	M1 form eq. M1 factorisation A1

7	i) at P y= o :. 3(0) + 4(x) = 12 x = 3 P(3,0) ii) $y= -\frac{4}{3}x + 3$ $m_1 = -\frac{4}{3}$ $m_2 = \frac{3}{4}$ $\frac{y-0}{x-3} = \frac{3}{4}$ $4y = 3x - 9$:. $y= \frac{3}{4}x - 2\frac{1}{4}$	B1 M1 Grad of perp. A1
8	From the graph, $x = -3$ or $x = 2$ $(x + 3)(x - 2) = 0$ $x^2 + x - 6 = 0$ Hence $a = 1, b = 1$ and $k = -6$	M1 factors A1 quad eq. B1
9	P: Q = 2: 3 ... × 4 = 8: 12 R: Q = 5: 4 ... × 3 = 15: 12 Hence P: Q: R = 8: 12: 15 $\frac{12}{8+12+15}$ X 875 = 300	B1 M1 A1
10	$4x - x \leq 6+9$ $3x \leq 15$ $x \leq 5$ $x + 3x \geq 8 - 4$ $4x \geq 4$ $x \geq 1$ $1 \leq x \leq 5$  	B1 For $x \leq 5$ and $x \geq 1$ B1 Compound inequality shown B1Number line drawn

11	Frequency distribution table Marks | f 10 – 14 | 2 15 – 19 | 5 20 – 24 | 7 25 – 29 | 12 30 – 34 | 4 $\Sigma f = 2 + 5 + 7 + 12 + 4 = 30$	B1 All classes/class boundaries ✓ B1All frequencies ✓ B1Total frequency30 seen
12.	Commission $\rightarrow 20\,000 - 12\,400 = 7\,600$ $\frac{}{100} \times 80\,000 = 1\,600$ $7\,600 - 1\,600 = 6\,000$ $6\,000 = \frac{3}{100} \times A$ $2A = 6\,000 \times \frac{100}{3} = 200\,000$ Total value $200\,000 + 80\,000$ $= 280\,000$	M1 Amount from commission M1 Expression for excess of 80 000 A1
13.	Let BC $= x$ $\tan 40^0 = \frac{\text{AB}}{x} \rightarrow \text{AB} = x \tan 40^0$ Also $\tan 32^0 = \frac{\text{AB}}{x+50} \rightarrow \text{AB} = (x+50)\tan 32^0$ $x \tan 40^0 = (x+50)\tan 32^0$ $0.8391x = (x+50)0.6249$ $0.8391x - 0.6249x = 31.245$ $0.2142x = 31.245$	M1 Expressing AB in terms of tan 32^0 M1expressing AB interms of tan 40^0

	$x = \frac{31.245}{0.2142} = 145.9$ m ALT $\frac{AC}{\sin 32} = \frac{50}{sin8}$ AC=190.38 BC=190.38cos40 = 145.8	M1Equating AB to AB A1 145.9 seen
14 .	L. S. F= 12 : 8= 3 : 2 V.S. F = 27 : 8 27 = 2litres 8 = ? $^{8}/_{27}\ x\ 2 = \frac{16\ litres}{27}$ $\left(\frac{16}{27}\ x\ 1000\right)\ cm3$ = 592.592593$cm^3 = 592.59$	B1 M1 A1
15	Angle 105 Triangle ABC completed Perpendicular to P	B1 B1 B1
16	Total vol. πx2.5x2.5x14 No. of washers = $\frac{\pi x2.5x2.5x14}{\pi(2x2-0.75x0.75)x0.3}$ =84	M1 M1 A1

17.		B1 A located B1 B located B1 C located B1 D located
18. (b) (i) (ii) (c) (i) (ii) (d) (i) (ii)		B1 B1B1 B1B1

	$A^1 = \begin{pmatrix}1\\1\end{pmatrix} + \begin{pmatrix}2\\2\end{pmatrix} = \begin{pmatrix}3\\3\end{pmatrix}$ B1 ABC drawn correctly $B^1 = \begin{pmatrix}3\\1\end{pmatrix} + \begin{pmatrix}2\\2\end{pmatrix} = \begin{pmatrix}5\\3\end{pmatrix}$ B1 coordinates of A^1 B^1 C^1stated $C^1 = \begin{pmatrix}1\\3\end{pmatrix} + \begin{pmatrix}2\\2\end{pmatrix} = \begin{pmatrix}3\\5\end{pmatrix}$ B1 A^1 B^1 C^1drawn $A^{11} = (-5,3)$ $B^{11} = (-3,3)$ $C^{11} = (-3,5)$ B1 coordinates of $A^{1\,1}$ B^{11} C^{11}stated $A^{111} = (3,-3)$ $B^{111} = (5,-3)$ $C^{111} = (3,-5)$ B1 $A^{1\,1}$ B^{11} C^{11}drawn $A^{IV} = (-0.6,-3.8)$ $B^{IV} = (-2,-2.8)$ $C^{IV} = (-3,-5)$ B1 evidence of enlargement B1 figure drawn B1evidence of rotation B1 figure drawn Object, image 1, image 3, image 4, B1 any two identified	B1B1 B1
19	(a) Amount of water delivered in 1 minute 22	

	$V = \frac{}{7} \times 3.5 \times 3.5 \times 15 \times 100$ $V = 57\ 750$	M1
	Capacity $\frac{57\ 750}{1\ 000} = 57.75 \text{ litres}$	M1 A1
	(b) Area of base of tank Time difference 1310 hrs 0630 hrs $6 \text{ hrs } 40 \text{ minutes} \rightarrow 6 \times 60 + 40 = 400 \text{ minutes}$ $1 \text{ minute} \rightarrow 57\ 75 \text{ litres}$	M1 time
	Total vol. 57.75 x 400 =23100 litres = 23.1 m^3	M1 vol.
	Base area =23.1 /12 =1.925	M1 base A1
	Monthly water bill $1\ 000 \text{ litres} \rightarrow \text{Ksh } 100$ $23\ 100 \text{ litres} = \frac{23\ 100 \times 100}{1\ 000}$ $= \text{Ksh } 2\ 310$ Bill $2\ 310 + 1\ 950 = \text{Ksh } 4\ 260$	M1 M1A1

20	(a) $\mathbf{A^{-1}}$ $\det A = 15 \times 8 - 9 \times 12 = 12$ $\mathbf{A^{-1}} = \frac{1}{12}\begin{pmatrix} 15 & -12 \\ -9 & 8 \end{pmatrix} = \begin{pmatrix} 1.25 & -1 \\ -.075 & \frac{2}{3} \end{pmatrix}$		B1 Accept if all elements as fractions
	(b) (i) Equations $8p + 12c = 294\,000$ $9p + 15c = 337\,500$	B1 B1	
	(ii) Cost of each item $\begin{pmatrix} 8 & 12 \\ 9 & 15 \end{pmatrix}\begin{pmatrix} p \\ c \end{pmatrix} = \begin{pmatrix} 294\,000 \\ 337\,500 \end{pmatrix}$ $\begin{pmatrix} 1.25 & -1 \\ -.075 & \frac{2}{3} \end{pmatrix}\begin{pmatrix} 8 & 12 \\ 9 & 15 \end{pmatrix}\begin{pmatrix} p \\ c \end{pmatrix} = \begin{pmatrix} 1.25 & -1 \\ -.075 & \frac{2}{3} \end{pmatrix}\begin{pmatrix} 294\,000 \\ 337\,500 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} p \\ c \end{pmatrix} = \begin{pmatrix} 30\,000 \\ 4\,500 \end{pmatrix}$ $\begin{pmatrix} p \\ c \end{pmatrix} = \begin{pmatrix} 30\,000 \\ 4\,500 \end{pmatrix}$ $p =$ Ksh 30 000 $c =$ Ksh 4 500	M1 M1 M1 M1	Matrix equation Premultiplying by $\mathbf{A^{-1}}$
	(c) Let the number be ab $a - b = 1$ $(10a + b) + (10b + a) = 165$ $11a + 11b = 165 \rightarrow a + b = 15$ $a - b = 1$ $\underline{a + b = 15}$ $2a = 16 \rightarrow a = 8$ $(8 \quad - b = 1 \rightarrow b = 8 - 1 = 7$ Hence the number is 87	A1 M1 M1 A1	Both values ✓ Forming 2 equations in a and b Solution for a and b using any method
21	(a) Time		

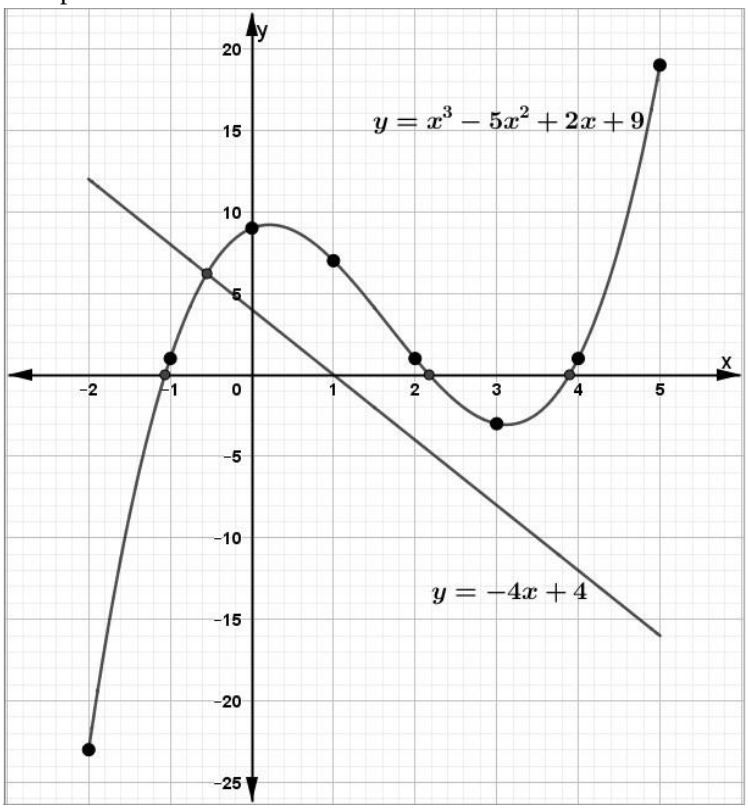
	Total length $= 40 + 100 + 160 = 300$ m Relative speed$= 60 - 40 = 20$ km/h Time $= \frac{0\,3}{20} \times 3600$ $= 54$ seconds	M1 M1 M1time A1	Total length Relative speed
	(b) (i) Value of m $180 = \frac{1}{2} \times 15(4 + m)$ $180 \times 2 = 15(4 + m)$ $\frac{180 \times 2}{15} = 4 + m$ $4 + m = 24 \rightarrow m = 20$ m/s	M1 A1 B1	Equation distance to area of trapezium Collecting like terms
	(ii) No acceleration	M1	
	(iii) Deceleration $a = \frac{0 - 20}{60 - 45}$ $a = \frac{-20}{15} = -1\frac{1}{3}$ m/s^2 Hence, a deceleration of $1\frac{1}{3}$ m/s^2	A1	

22	(a) Table		

x	-2	-1	0	1	2	3	4	5
y	-23	1	9	7	1	-3	1	19

B2 — All the y values ✓ (B1 for at least 5 y values ✓)

(b) Graph



S1 — Linear scales used on both axes – accommodates all table values

P1 — All points plotted within the graph paper

C1 — Smooth curve drawn

(c) Roots

(i) $x^3 - 5x^2 + 2x + 9 = 0$

$y = x^3 - 5x^2 + 2x + 9$

$\underline{0 = x^3 - 5x^2 + 2x + 9 -}$

$y = 0$

$x = -1.2$ or $x = 2.2$ or $x = 3.8$ – all ± 0.2

B1 — $y = 0$ shown or implied in the roots

(ii) $x^3 - 5x^2 + 6x = -5$

$y = x^3 - 5x^2 + 2x + 9$

$\underline{0 = x^3 - 5x^2 + 6x + 5 -}$

$y = -4x + 4$

B1 — All the values of x ✓

M1 — ✓ attempt to get $y = -4x + 4$

$x = -0.6 \pm 0.2$

L1

B1 — Line $y = -4x + 4$ drawn ✓

23	(a) 38^0 -the angle which the chord makes with tangent is equal to the angle subtended by the same chord in the alternate segment of the circle (b) 90^0 -Diameter subtends right angle at any point on the circumference of the circle (c) 26^0 - The base angles of isosceles triangle are equal (d) 26^0 -Angles subtended on the circumference by the same arc in the same segment are equal (e) 52^0 -The angle which an arc subtends at the centre is twice that it subtends at any point on the circumference of the circle	B1 B1 B1 B1 B1 B1 B1 B1 B1	
24.	a) $x^2 = 8^2+8^2 -2x8x8\cos 70^0$ x = 9.18 b) $\frac{y}{sin70} = \frac{9.18}{sin40}$ = 8.63 c) $\frac{70}{360} \times \pi \times 8 \times 8 - \frac{1}{2} \times 8 \times 8 sin70$ = 9.0303 d)) $\frac{40}{360} \times \pi \times 8.63 \times 8.63 - \frac{1}{2} \times 8.63 \times 8.63 sin40$ =2.0647 e) A = 9.0303 + 2.0647 =11.095	M1 A1 M1 A1 M1 A1 M1 A1 M1 A!	2dp 2dp