

No.	Marking Scheme	Marks	Comments
1.	$\sqrt{\frac{0.0961}{4.0836 - 3.7112}} = \sqrt{0.2581}$ $= 0.5080$ Standard form = 5.080×10^{-1}	M1 A1 B1 3	for 0.2581 any no of sig fig - 0.5081 when logs are used. Do not accept 5.08×10^{-1}
2.	$189 = 3 \times 3 \times 3 \times 7$ $= 3^3 \times 7$ $\therefore p^3 \times q = 3^3 \times 7$ $p = 3, q = 7$	B1 B1 B1 3	for equating.
3.	Let the number of kg of maize be m and number of kg of beans be b Buying price = $20m + 60b$ Selling price = $48(m+b)$ $\frac{60}{100} = \frac{48(m+b) - (20m + 60b)}{20m + 60b} \quad \text{--- \% profit}$ $0.6 = \frac{28m - 12b}{20m + 60b}$ $\Rightarrow 12m + 36b = 28m - 12b$ $16m = 48b$ $\frac{m}{b} = \frac{3}{1}$ $\therefore$ Ratio m:b = 3:1	B1 M1 M1 A1 4	or equivalent for removal of denominator & simplifying $\begin{array}{cc} 20 & 60 \\ & \times \\ & 30 \\ & \times \\ 30 & 10 \end{array}$ Ratio m:b = 3:1 3:1 A1 10 B1 M1 M1

121/1 MS

for 1 kg of mixture
let maize be x
bean = 1-x

$$20x + 60(1-x) = 30 \quad \text{B1 M1}$$

$$20x + 60 - 60x = 30 \quad \text{M1}$$

$$-40x = -30$$

$$x = \frac{3}{4}$$

$$x : 1-x = \frac{3}{4} : \frac{1}{4}$$

$$= 3 : 1 \quad \text{A1}$$

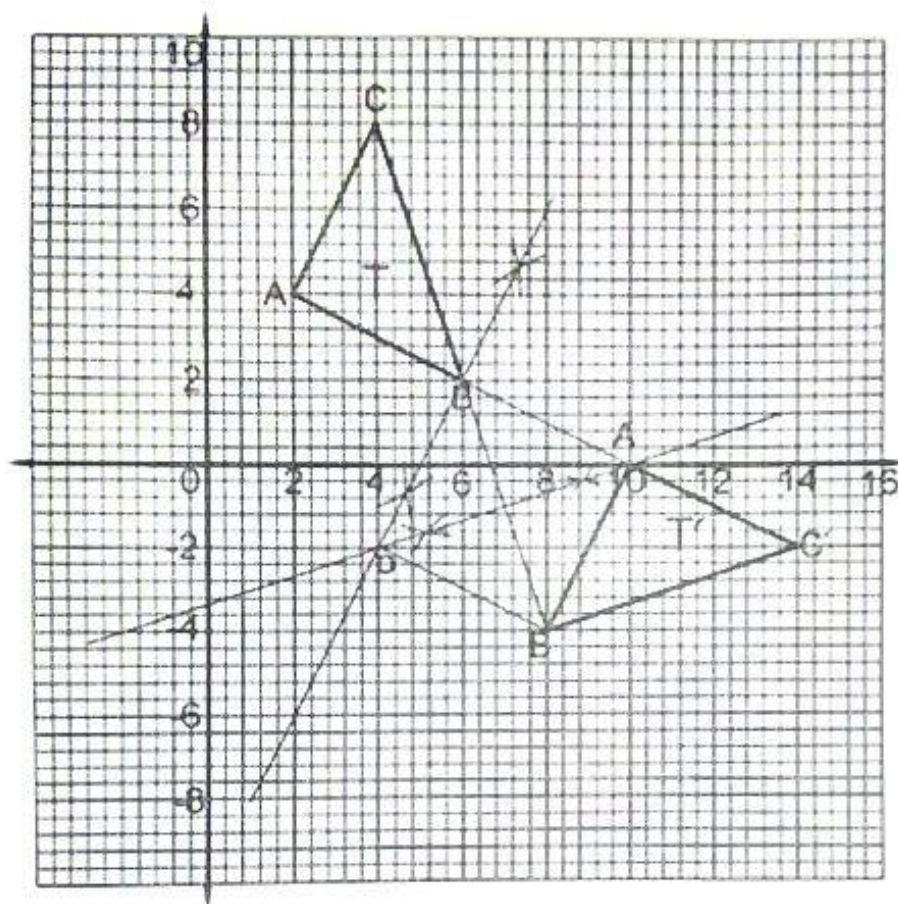
4.	$\angle BAC = 180^\circ - (80^\circ + 30^\circ) = 70^\circ$ $\frac{AC}{\sin 80^\circ} = \frac{12}{\sin 70^\circ}$ $AC = 12.58 \text{ cm}$ Area of $\triangle ABC = \frac{1}{2} \times 12 \times 12.58 \sin 30^\circ$ $= 6 \times 12.58 \times 0.5$ $= 37.74 \text{ cm}^2$	M1	or equivalent $\rightarrow \frac{AB}{\sin 30^\circ} = \frac{12}{\sin 70^\circ}$ M1
		M1	$AB = 6.385 \text{ cm}$
		A1	$A = \frac{1}{2} \times 12 \times 6.385 \sin 80^\circ$ M1
		3	$= 37.73 \text{ cm}^2$ A1
5.	No. of sides of a hexagon = 6 Each exterior angle, $x = \frac{360}{6}$ $= 60^\circ$ Size of each ^{interior} exterior angle $= 180^\circ - 60^\circ$ $= 120^\circ$	B1	Size of interior $\angle = \frac{(2 \times 6 - 4) \times 90^\circ}{6}$
		B1	$= 120^\circ$ B1 B1
		2	
6.	No. Log $(1.654)^2$ 0.2185 $\times 2$ 45.73 0.4370 0.56 1.6602 1.7482 or (-0.2518) 1.4084 1.0286 or $(-0.9714) \times \frac{1}{3}$ 1.6762 or -0.3238 = 0.4745	M1	All logs correct 0.2185, 1.6602, 1.7482
		M1	Correct squaring and multiplication for 0.4370 and 1.4084
		M1	Correct cube root and division for 1.6762 or -0.3238
		A1	accept 0.4744 if anti-log tables are used.
		4	

7.	$(a) \frac{2x}{3} + \frac{5y}{7} = 1$ $14x + 15y = 21$ $y = \frac{-14}{15}x + \frac{21}{15}$ gradient of L = $\frac{15}{14}$ (b) Equation of L $\frac{y-11}{x-4} = \frac{15}{14}$ $y = \frac{15}{14}x + \frac{47}{7}$	BI MI AI 3	accept decimal to about 4 sf. eg 1.071 $y = mx + c$ $-m!$ $11 = \frac{15}{14}(4) + c \Rightarrow c = \frac{47}{7}$ $y = \frac{15}{14}x + \frac{47}{7}$ A1
8.	$\pi^\circ = 180^\circ$ $\frac{2\pi^\circ}{9} = \frac{180 \times \frac{2\pi}{9}}{\pi}$ $= 40^\circ$	$\frac{2\pi}{9} > 3.14 \times \frac{2}{9} = 0.698$ $\therefore 69.8^\circ$ (but we) $= 40.000072^\circ$ (that way) MI AI 2	$\frac{2\pi}{9} = 3.14 \times \frac{2}{9} = 0.6982$ 40.007° M1 A1 (from table)
9.	Area = $\frac{1}{2} \times b \times h$ Let h be the other shorter side $346.8 = \frac{1}{2} \times 17 \times h$ $h = 40.8$ longest side = $\sqrt{17^2 + 40.8^2}$ $= \sqrt{1953.64}$ $= 44.2m$	M1 M1 M1 AI 3	

10.	$L_1: y - x \leq 1$	B1	or equivalent $y \leq x + 1$
	$L_2: x < 4$	B1	or equivalent $x - 4 < 0$
	$L_3: x + 2y \geq 6$	B1	or equivalent $y \geq -\frac{1}{2}x + 3$
		3	
11.	$\frac{840}{x} - \frac{840}{x+1} = 4$	M1	
	$4x^2 + 4x - 840 = 0$		
	$x^2 + x - 210 = 0$	M1	
	$(x+15)(x-14) = 0$		
	$x = 14$	A1	
	No of seedling planted by Murimi per row = $\frac{840}{14}$		
	$= 60$	B1	
		4	
12.	£500 000 to Ksh = $50\,000 \times 130.10$		
	= Ksh 6 505 000	B1	
	Balance after expenditure		
	$= \frac{20}{100} \times 6\,505\,000$		
	= Ksh 1 301 000		
	Amount in Rands	B1	
	$= \frac{1\,301\,000}{9.58}$		
	= R 155 804 135 804	B1	
		3	

Mid ordinates are <table border="1"> <tr> <td>x</td> <td>-3</td> <td>-1</td> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> <tr> <td>y</td> <td>10</td> <td>2</td> <td>2</td> <td>10</td> <td>26</td> <td>50</td> </tr> </table> Area = $2(10 + 2 + 2 + 10 + 26 + 50)$ = 200	x	-3	-1	1	3	5	7	y	10	2	2	10	26	50	B1 M1 A1 3	Delay marks if all values of y are given from -4 to 8 with next loc
x	-3	-1	1	3	5	7										
y	10	2	2	10	26	50										
$3\begin{pmatrix} 4 \\ 3 \end{pmatrix} - 2\begin{pmatrix} x \\ y \end{pmatrix} + 4\begin{pmatrix} -2 \\ -5 \end{pmatrix} = \begin{pmatrix} 10 \\ -19 \end{pmatrix}$ $\begin{pmatrix} 4 - 2x \\ -11 - 2y \end{pmatrix} = \begin{pmatrix} 10 \\ -19 \end{pmatrix}$ $4 - 2x = 10$ $-2x = 6$ $x = -3$ $-11 - 2y = -19$ $-2y = -8$ $y = 4$ $b = \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ $\text{or } 2b = \begin{pmatrix} -6 \\ 8 \end{pmatrix}$ $\text{or } -2b = \begin{pmatrix} 6 \\ -8 \end{pmatrix}$	M1 M1 A1 3	Attempt to solve for ^{and} x or y Do not apply O/W -1 for vector sign.														

5. (a)



Vertical scale and horizontal scale must be equal.

B1

for T ($\triangle ABC$)

B1

for T' ($\triangle A'B'C'$)

B1

stated or centre can be shown

B1

negative quarter turn (if mark for centre is wrong then that is < 0/10)

4

(b)

Centre of rotation (4, -2)

Angle of rotation -90°

6.

$$3t + 2a = 9000$$

$$4t + a = 9500$$

$$a = 9500 - 4t$$

$$3t + 2(9500 - 4t) = 9000$$

$$-5t = -10000$$

$$t = 2000$$

$$\Rightarrow a = 9500 - 8000 = 1500$$

Cost of hiring 2 technicians 5 artisans

$$= 2 \times 2000 + 5 \times 1500 = \text{Ksh } 11500$$

M1

Attempt to solve

Remove 2 / Unknown

A1

For both values of a and t

B1

3

17.	(a) $\begin{array}{r} 2y - 3x = 6 \\ 3y + x = 20 \\ \hline 2y - 3x = 6 \\ 9y + 3x = 60 \\ \hline 11y = 66 \\ y = 6 \end{array}$ $x = 20 - 18 = 2$ Coordinates of A are (2, 6)	M1	-Attempt to solve removal of 1 unknown
	(b) $L_2 : 3y = -x + 20$ $y = -\frac{1}{3}x + \frac{20}{3}$ Gradient of perpendicular = 3 $\frac{y-6}{x-2} = 3$ $y = 3x - 6 + 6$ $y = 3x$	A1 B1 M1 A1	for $x = 2$ $y = 6$ for grad. = 3 $6 = 3(2) + c$ $c = 0$ $y = 3x$ A1
	(c) Gradient of L_4 = gradient of L_1 $= \frac{3}{2}$ $\frac{y-3}{x+1} = \frac{3}{2}$ $2y - 6 = 3x + 3$ $2y - 3x = 9$ When $x = 0$ $y = 4.5$ When $y = 0$ $x = -3$	M1 A1 B1 B1	$3 = \frac{3}{2}(-1) + c$ M1 or equivalent for $y = 4.5$ for $x = -3$
		10	(Must not be given in final form)

(a)

Mass Kg	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Freq. (f)	2	4	8	9	11	7	5	3	1

B1 correct classes

B1 correct frequencies

(b) (i) Mean =

$$2 \times 37 + 4 \times 42 + 8 \times 47 + 9 \times 52 + 11 \times 57 + 7 \times 62 + 5 \times 67 + 3 \times 72 + 1 \times 77$$

50

$$= \frac{2775}{50}$$

$$= 55.5 \text{ kg}$$

B1 correct midpoints

$$\text{Mean} = \frac{2805}{50} = 56.1$$

M1

A1

B1

(ii) C.f's 2,6,14,23,34,41,46,49,50

$$\text{Median} = 54.5 + \frac{2}{11} \times 5$$

$$= 55.4 \text{ kg}$$

alt

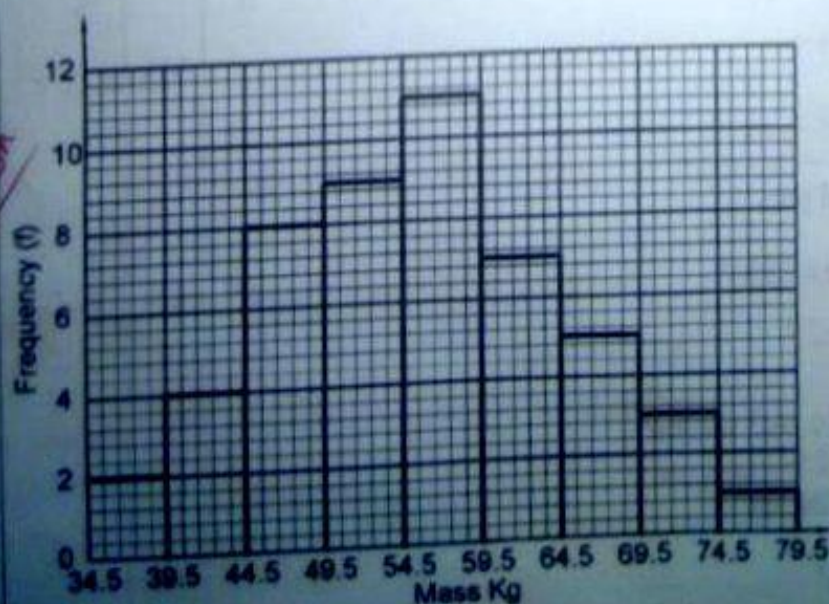
$$\frac{58+58}{2} = 58$$

(when arranged) B1 for arranging in order.

M1

A1

(c)



B1 correct boundaries

B1 correct bars (all of them)

(allow use of correct frequency densities)

10

19.	(a) Volume of Solid S		
	Volume of conical part		
	$= \frac{1}{3} \pi \times (0.9)^2 \times 1.5$	M1	
	$= 1.3\text{m}^3$		
	Volume of cylindrical part		
	$= \pi \times (0.9)^2 \times 3$	M1	
	$= 7.6\text{m}^3$		
	Volume of ^{solid} pillar = $1.3 + 7.6$ $= 8.9\text{m}^3$	M1	
		A1	
	(b) S.A. of Solid S		
	Slant length of conical part		
	$= \sqrt{(1.5)^2 + (0.9)^2} = 1.749$	M1 B1	
	S.A. of conical part		
	$= \pi \times (0.9) \times 1.749$	M1	
	$= 4.8\text{m}^2$ 4.945		
	S.A. of cylindrical part		
	$= 2\pi \times 0.9 \times 3 + \pi \times (0.9)^2$	M1	
	$= 19.5\text{m}^2$ 19.51 (19.52)		
	S.A. of Solid S = $19.5\text{m}^2 + 4.945$ 24.46m^2 $= 24.3\text{m}^2$		
	(c) $(1.6)^2 \times \frac{1}{2} = 8.9\text{m}^3$	A1	
	$h = 3.5\text{m}$	M1	
		A1	
		10	

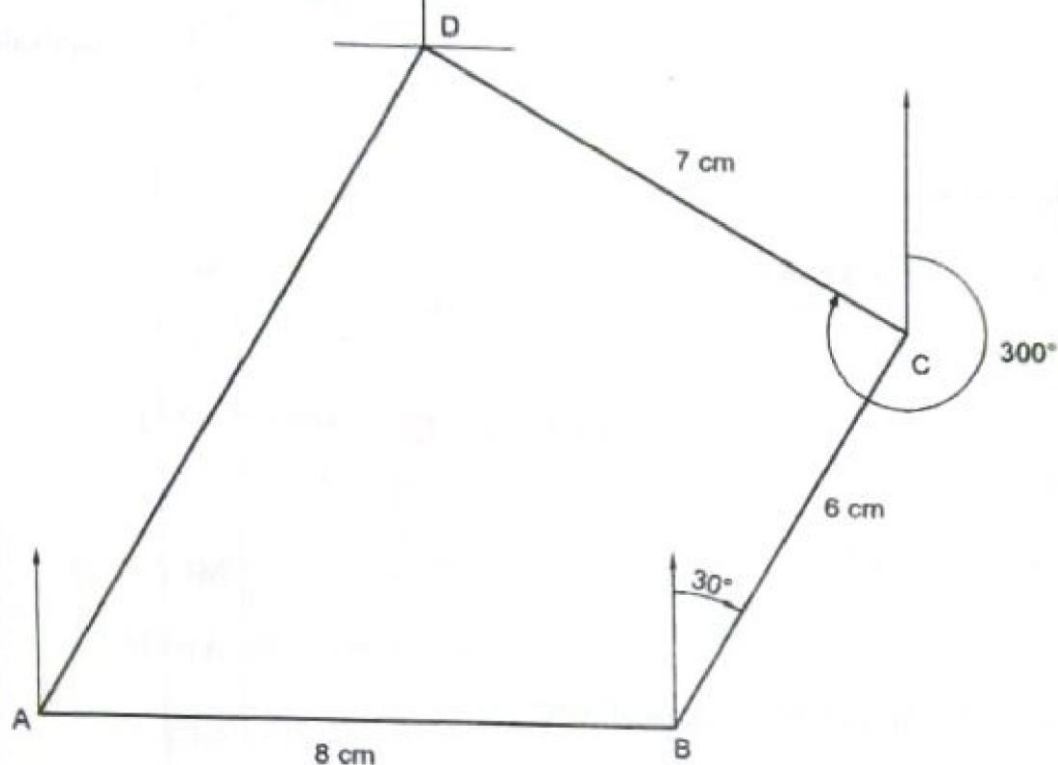
follow through.

accept 4.947 when $\pi = 3.142$
 4.946
 24.47 when 22 is used

20. (a)	Length DC = $\sqrt{3^2 + 5^2}$ $= 5.8\text{cm}$	M1 A1	
(b)	$\tan^{-1} \frac{5}{3} = 59.0^\circ$ <i>PM1 A1</i> $\sin \theta = \frac{5}{5.8} \Rightarrow \theta = 59.5^\circ$ <i>M1</i> $\cos \theta = \frac{3}{5.8} \Rightarrow \theta = 58.9^\circ$ <i>M1</i>	M1 A1	or equivalent follow thro'
(c)	Size of angle ACB $11^2 = 5^2 + 8^2 - 2 \times 5 \times 8 \cos C$ $\cos C = \frac{5^2 + 8^2 - 11^2}{2 \times 5 \times 8}$ $= -0.4$ $\angle ACB = \cos^{-1}(-0.4)$ $\angle ACB = 113.6^\circ$	M1 M1 A1	
(d)	Area of ABCD = Area of ACD + Area of ABC $= \frac{1}{2} \times 3 \times 5 + \frac{1}{2} \times 5 \times 8 \sin 113.6$ $= 25.8\text{cm}^2$	M1 M1 A1	Allow use of formula.
		10	

21.

If a different scale is used mark according but penalize for MR-2.



(a) ✓ Location of B

✓ Location of C

✓ Location of D

✗ Complete quadrilateral ABCD

(all AD shown be a complete line)

(b) Bearing of A from D = $180 + 30$

$$= 210^\circ \pm 1^\circ \quad \text{all } S 30^\circ W$$

(ii) Distance BD = $9.2 \text{ cm} \times 1 \text{ km}/1 \text{ cm}$

$$= 9.2 \text{ km} \pm 0.1$$

(d) Perimeter:

$$AD = 10.0 \pm 0.1 \text{ km}$$

B1

B1

B1

B1

penalize if AD is not complete

B1

M1

for conversion

A1

B1

	$\text{Perimeter} = 10 + 8 + 6 + 7$ $= 31 \text{ km}$	M1	
		A1	
		10	
22	(a) $\begin{pmatrix} 3 & x \\ x+1 & 2 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 0 \end{pmatrix} = \begin{pmatrix} 3+3x & 6 \\ x+7 & 2x+2 \end{pmatrix}$ $\begin{vmatrix} 3+3x & 6 \\ x+7 & 2x+2 \end{vmatrix} = 0$ $\Rightarrow (3+3x)(2x+2) - 6(x+7) = 0$ $6x + 6x^2 + 6x - 6x - 36 = 0$ $6x + 6 + 6x^2 + 6x - 6x - 42 = 0$ $6x^2 + 6x - 36 = 0$ $x^2 + x - 6 = 0$ $(x+3)(x-2) = 0$ $x = 2 \text{ or } -3$ (b) (i) $\begin{cases} 3x+5y=165 \\ 2x+4y=120 \end{cases}$ (ii) $\begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 165 \\ 120 \end{pmatrix}$ Let $A = \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix}$ $A^{-1} = \frac{1}{2} \begin{pmatrix} 4 & -5 \\ -2 & 3 \end{pmatrix}$ $\frac{1}{2} \begin{pmatrix} 4 & -5 \\ -2 & 3 \end{pmatrix} \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 4 & -5 \\ -2 & 3 \end{pmatrix} \begin{pmatrix} 165 \\ 120 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ 15 \end{pmatrix}$	M1 A1 for $\checkmark$ multiplication of AB M1 A1 for both 2 and -3 B1 for both eqns B1 M1 allow use of other letters other than x and y	

Kramer's Rule

$$x = \frac{\begin{vmatrix} 165 & 5 \\ 120 & 4 \end{vmatrix}}{\begin{vmatrix} 3 & 5 \\ 2 & 4 \end{vmatrix}}$$

$$= \frac{60}{2}$$

$$= 30$$

$$y = \frac{\begin{vmatrix} 3 & 165 \\ 2 & 120 \end{vmatrix}}{\begin{vmatrix} 3 & 5 \\ 2 & 4 \end{vmatrix}}$$

$$= \frac{30}{2} = 15$$

for $\frac{60}{2}$ and 13 $\frac{30}{2}$ M1

30, 15 M

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 30 \\ 15 \end{pmatrix}$$

Cost of an exercise book = Ksh. 30

Cost of a pen = Ksh. 15

$$\begin{aligned} \text{(iii)} \quad & 2 \times 36 \times 30 + 36 \times 15 \\ & = \text{Ksh } 2700 \end{aligned}$$

A1

for 30 and 15

M1

with Σ

A1

10

23.

$$\text{(a) (i) Original price} = \frac{16200}{x}$$

B1

$$\text{(ii) Price after discount} = \frac{16200}{x+3}$$

B1

$$\text{or } \frac{16200}{x} - 60$$

$$\text{(b) (i) } \frac{16200}{x} - 60 = \frac{16200}{x+3}$$

M1

$$\frac{16200 - 60x}{x} = \frac{16200}{x+3}$$

$$(16200 - 60x)(x+3) = 16200x$$

$$60x^2 + 180x - 48600 = 0$$

$$x^2 + 3x - 810 = 0$$

$$(x+30)(x-27) = 0$$

$$x = 27$$

M1

for quadratic eqn equated to zero

M1

factor equated to zero

A1

for 27 after discrimination

$$\text{(ii) } \frac{16200}{27+3}$$

M1

$$= \text{Ksh } 540$$

A1

$$\text{(iii) } \frac{16200}{27} \times \frac{15}{100}$$

M1

600 - 510 M1

$$= \text{Ksh } 90$$

A1

10

(i) When $x = 2$

$$y = 2(2)^3 - \frac{9}{2}(2)^2 - 15(2) + 3$$

$$= -29$$

M1

A1

(ii) $\frac{dy}{dx} = 6x^2 - 9x - 15$

B1

at $x = 2$

$$\frac{dy}{dx} = -9$$

B1

Equation of tangent;

$$\frac{y+29}{x-2} = -9$$

M1

$$y = -9x + 18 - 29$$

$$y = -9x - 11$$

A1

or equivalent.

(b) $\frac{dy}{dx} = 6x^2 - 9x - 15$

At turning point

$$6x^2 - 9x - 15 = 0$$

$$6x^2 + 6x - 15x - 15 = 0$$

$$(6x - 15)(x + 1) = 0$$

$$x = -1 \text{ or } 2.5$$

M1

Equating to zero

$$\text{at } x = -1; y = 11.5$$

$$\text{turning point} = (-1, 11.5)$$

A1

for both values of x .

$$\text{at } x = 2.5, y = -31\frac{3}{8}$$

$$\text{turning point} = \left(2.5, -31\frac{3}{8}\right) \text{ or } (2.5, -31.375)$$

B1

B1

10

Comma must be seen with brackets

with no rounding off i.e.

don't accept (2.5, -31.20)