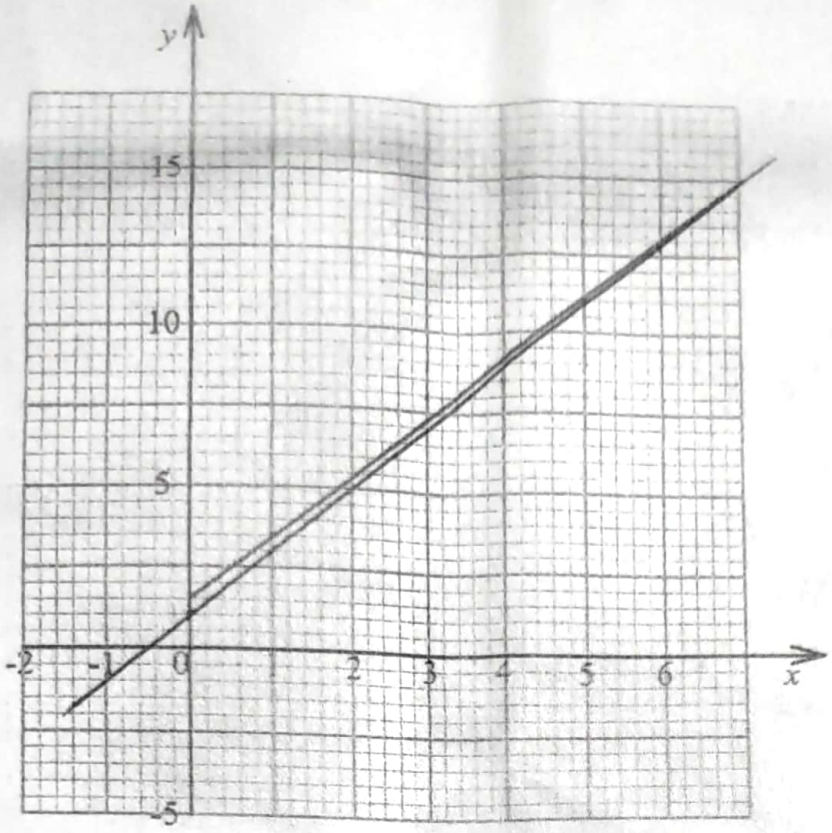
No.	Marking scheme	marks	comments
1.	$2\log x^2 + \log\sqrt{x} = k\log x$ $\log(x^4 x^{\frac{1}{2}}) = \log x^k$ ✓ $k = 4\frac{1}{2}$ ✓ or 4.5	M1 A1 2	Single logs LHS = RHS and $\sqrt{x}$ interpreted as $x^{\frac{1}{2}}$ $\frac{1}{2}$ not allowed.
2.	$P \propto \frac{t^3}{\sqrt{s}}$ $P = \frac{kt^3}{\sqrt{s}}$ $16 = \frac{k(2)^3}{\sqrt{9}}$ ✓ $\frac{16\times3}{8} = k$ $k = 6$ ✓ $\therefore P = \frac{6t^3}{\sqrt{s}}$ ✓ When $t = 3$ and $s = 36$ $P = \frac{6\times3^3}{\sqrt{36}} = \frac{6\times27}{6}$ $= 27$ ✓	M1 A1 B1 4	M1 A0 B0 B1 only if M1 was earned
3.	$P_2(1.07) = 170130$ $P_2 = \frac{170130}{1.07}$ ✓ $= 159000$ $P_1 = \frac{159000}{1.06}$ ✓ $= Ksh\ 150000$ ✓	M1 M1 A1 3	$P(1.06)(1.07) = 170130$ M1 $P = \frac{170130}{(1.06)(1.07)}$ M1 $= 150000$ A1 or $170130 = 1.06P(1+\frac{7}{100})$ M1 $170130 = 1.06P(1.07)$ $150000 = P$.

4.	BF = 10 ✓ $\text{Cos } 20^\circ = \frac{BC}{10}$ $BC = 10\text{Cos } 20^\circ$ ✓ BC = 10cos 20° $= 9.4 \text{ cm}$ ✓	B1 M1 A1 3	Isosceles triangle ; BF = 10 B1 BF = BC = 10 M1 BC = 10 A1 BF = BC must be (two-) (can be implied) on Diagram.
5.	$\frac{\sqrt{54}+3\sqrt{3}}{\sqrt{3}} = \left(\frac{\sqrt{54}+3\sqrt{3}}{\sqrt{3}}\right)\times\frac{\sqrt{3}}{\sqrt{3}}$ $= \frac{\sqrt{162}+9}{3}$ ✓ $= \frac{9\sqrt{2}+9}{3}$ $= 3\sqrt{2}+3$ ✓	M1 A1 2	Denominator must be rationalized or Or equivalent eliminated.
6.	AB = 6 tan 60° ✓ ~~cos 60 =~~ ~~= 10.4 cm~~ Area of triangle OAB $= \frac{1}{2}\times 6\times 6\tan 60^\circ$ ✓ ~~= 31.2cm²~~ Area of sector OAC $= \frac{60}{360}\times\pi\times 6^2$ ✓ ~~= 18.8 cm²~~ (6) 31.18 − 18.85 Area of shaded part = ~~31.2 − 18.8~~ = ~~12.4 cm²~~ ✓ 12.3 cm	M1 M1 A1 4	OB = $\frac{6}{\cos 60^\circ}$ = $\frac{6}{\sin 30}$ $\frac{1}{2}\left(\frac{6}{\cos 60}\times 6\right)\sin 60^\circ$ no qualifier Follow through and APP Where necessary.

Cos 60 = 6/OB

7.	$3x^2 + 8x = 6$ $x^2 + \frac{8}{3}x + \left(\frac{4}{3}\right)^2 = \frac{6}{3} + \left(\frac{4}{3}\right)^2$ ✓ $\left(x+\frac{4}{3}\right)^2 = \frac{34}{9}$ $x+\frac{4}{3} = \pm\sqrt{\frac{34}{9}}$ $x = \frac{-4 \pm \sqrt{34}}{3}$ (x is made the subject) $x = -3.28$ *or* $x = 0.610$ (1)	M1 M1 A1 3	$\sqrt{34} = 5.831$ — or discriminate $-5.831-4/3$ a.f. (For both). $+5.831-4/3$.
8.	W : H : D 3 : 5 : 8 5 : 6 : x No. of days $= 5\times\frac{8}{6}\times\frac{3}{5}$ ✓ ~~= 4 days~~ Cost = $5\times6\times4\times40$ ✓ = Ksh 4800 ✓	M1 ~~A1~~ M1 ~~B1~~ 3	Follow through fwang other cases that lead to 4800,

9. (a)		S1 P1 L1	(0,1)(5,11)(6,13) $y = 1 \pm 0.25$
(b)	When $x = 0$, $y = 1.5 \pm 0.25$ (1 small square).	B1	
		4	
10.	Amplitude = 2 Phase angle = 30°	B1 B1	
		2	
11.	8, 11, 13, 14, 15, 16, 17, 19, 20 $Q_1 = \frac{11+13}{2} = 12$ $Q_3 = \frac{17+19}{2} = 18$ Quartile deviation $= \frac{1}{2}(18-12)$ $= 3$	B1 M1 A1	allow if one of the quartiles is wrong
		3	

12.	Longitude difference = 30 – 10 = 20° 600 nm = 20 × 60 Cos θ Cos θ = 0.5 θ = 60° Latitude = 60°N	B1 M1 A1 3	Can be implied in working
13.	$OQ = \frac{2}{3}p + \frac{1}{3}r$ $OS = p + 3(r - p)$ $= 3r - 2p$ $QS = -OQ + OS$ $= -\frac{2}{3}p - \frac{1}{3}r + 3r - 2p$ $= \frac{8}{3}r - \frac{8}{3}p$ P Q R S 1 2 6 $\frac{QS}{PR} = \frac{8}{3}$ $QS = \frac{8}{3}PR$ $= \frac{8}{3}(-p+r)$ $= -\frac{8}{3}p + \frac{8}{3}r$	B1 B1 M1 A1 4	PR or RP used or seen; Stand correct PQ or QR used or seen follow through where necessary Apply ow if vectors shown completely unsimplified
14.	P (MW or WM) $= \frac{6}{10} \times \frac{4}{9} + \frac{4}{10} \times \frac{6}{9}$ $= \frac{24}{90} + \frac{24}{90}$ $= \frac{8}{15}$	M1 M1 A1 3	Any one correct term Combine any two terms
15.	Det (T) = 18 Area of object OAB = $\frac{\text{Area of image}}{\text{Det(T)}}$ $= \frac{\frac{1}{2} \times 18 \times 6}{18}$ = 3 units^2 Incase of Heron's formula, follow through.	B1 M1 A1 3	Det = 18 Any equivalent (any rectangle and triangle areas)

16.

$$\int_0^2 (kx^3 - 3x^2)\,dx = 16$$

$$\left[\frac{kx^4}{4} - x^3\right]_0^2 = 16$$

$$\left[\frac{k(2)^4}{4} - (2)^3\right] - [0] = 16$$

$4k - 8 = 16$

$4k = 24$

$k = 6$

M1 correct integration limits shown equated to 16.

M1 zero omitted/sub of limits (allow if one term correctly integrated)

M1 Single term on both sides.

A1

4

SECTION 2

17. (a)

$a + 4d = 18$ (i)

$a + 9d = -2$ (ii)

$5d = -20$

$d = -4$

$a = 34$

B1 Both (i) and (ii) correctly obtained.

M1 Attempt to solve equations

A1 } can be implied

B1 } a or d but maintain one

(b)

$\frac{n}{2}\{2\times 34 + (n-1)(-4)\} \geq 0$

$\frac{n}{2}\{68 - 4n + 4\} \geq 0$

$4n = 72$

$n = 18$

least number of terms $= 19$

$S_{19} = \frac{19}{2}\{2\times 34 + 18(-4)\}$

$= \frac{19}{2}(68 - 72)$

$= \frac{19}{2}(-4)$

$= -38$

If inequalities are used

$n > 18$ – A1

$n = 19$ – B1

M1 Terms listed = 19 (evidence required)

M1 $\frac{n}{2}(72 - 4n) = 0$ or

A1 State that last no. of terms is 19, A1, B1 together

B1

M1 Can be implied if 19 terms are listed with evidence in addition

A1 -38.

10

34 + 30 + 26 + 22 + 18 + 14 + 10 + 6 + 2 + −2 + −6 − 10 − 14 − 18 − 22 − 26 − 30 − 34 − 38

M1 – listing

M1 – evidence

n = 19 must be stated or clearly implied.

18 – A0, B1, 19 – A1, B1

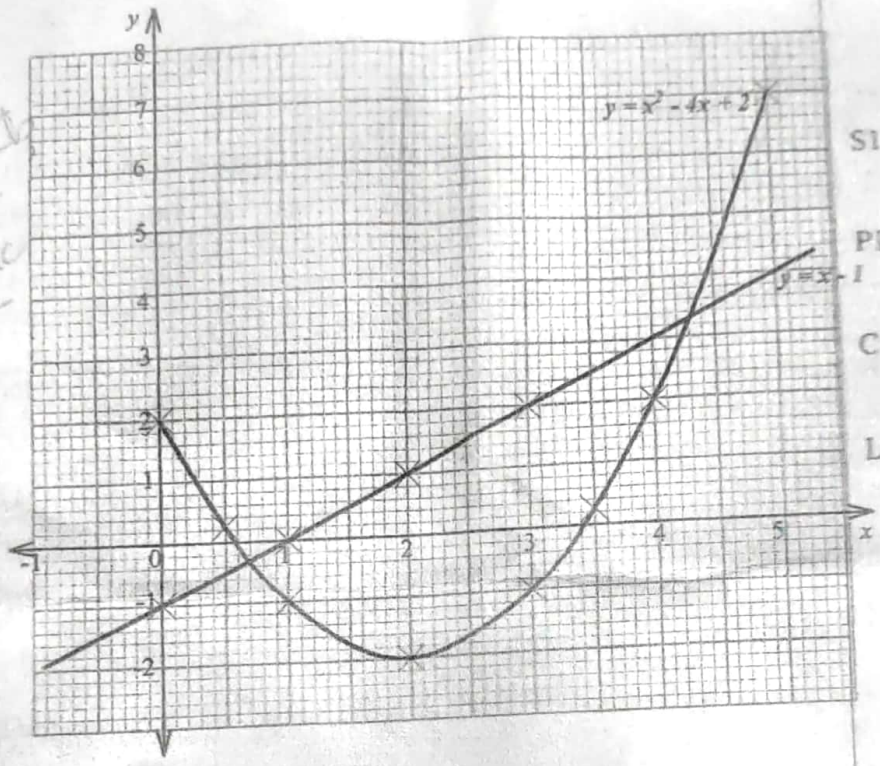
M1A1 –

18. (a)

x	0	1	2	3	4	5
$y = x^2 - 4x + 2$	2	-1	-2	-1	2	7

B2 for all correct
B1 at least 4✓

(b)



S1 ✓ scale
P1 ✓ plotting
C1 ✓ curve drawn
L1 $y = x - 1$ ✓ drawn

(c) $x = 0.6 \pm 0.1$
$x = 3.4 \pm 0.1$

B1
B1

(d) $\begin{cases} y = x^2 - 4x + 2 \\ 0 = x^2 - 5x + 3 \end{cases}$

$y = x - 1$

when $y = x - 1$, then

$x = 0.7 \pm 0.1$
$x = 4.3 \pm 0.1$

B1
B1

10

19. (a) Modal class 30 – 40 — B1 ✓

(b)

x	f	fx	x^2	fx^2
5	4	20	25	100
15	8	120	225	1800
25	10	250	625	6250
35	12	420	1225	14700
45	4	180	2025	8100
55	2	110	3025	6050
	40	**1100**		**37000**

B1 for fx ✓

~~B1~~ ~~For ✓ fx²~~

(i) $\bar{x} = \frac{\sum xf}{N} = \frac{1100}{40}$ ✓ — M1

$= 27.5$ ✓ — A1

(ii) $s.d^2 = \frac{37000}{40} - 27.5^2$ ✓ — B1 For fx^2

$= 925 - 756.25$ — M1 Allow for use of assumed mean

$= 168.75$

$s.d = \sqrt{168.75}$ ✓ — M1 ✓ of simple term

$= 12.99$ ✓ — A1

(c) No of plants whose height > 40 = 4+2 = 6 ✓

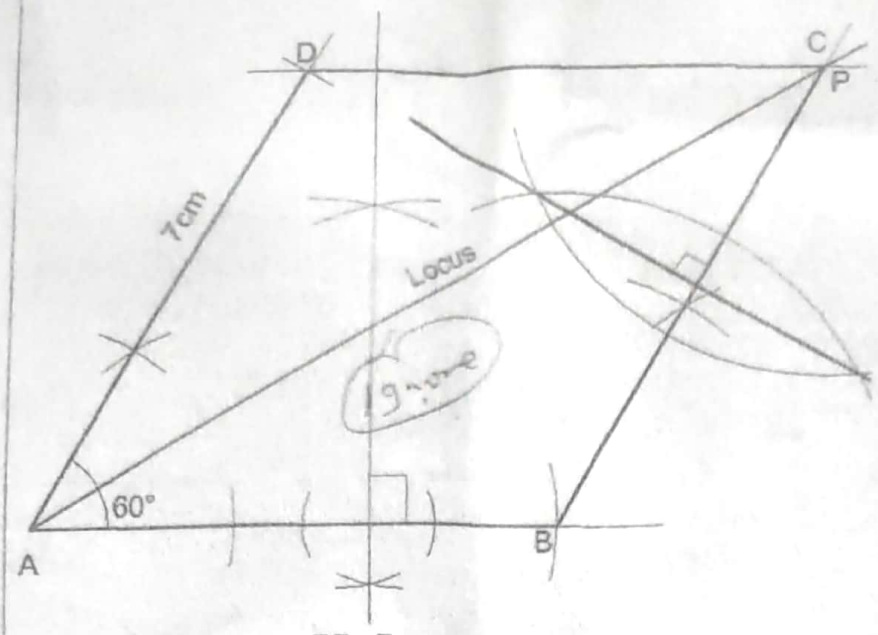
$P(\text{Height} > 40\text{cm}) = \frac{6}{40} = 0.15$ ✓ — B1 $1 - \frac{34}{40}$

B1 $\frac{6}{40}$

10

If $(fx)^2$ is used it must be followed by correct method so all method marks are lost

20.



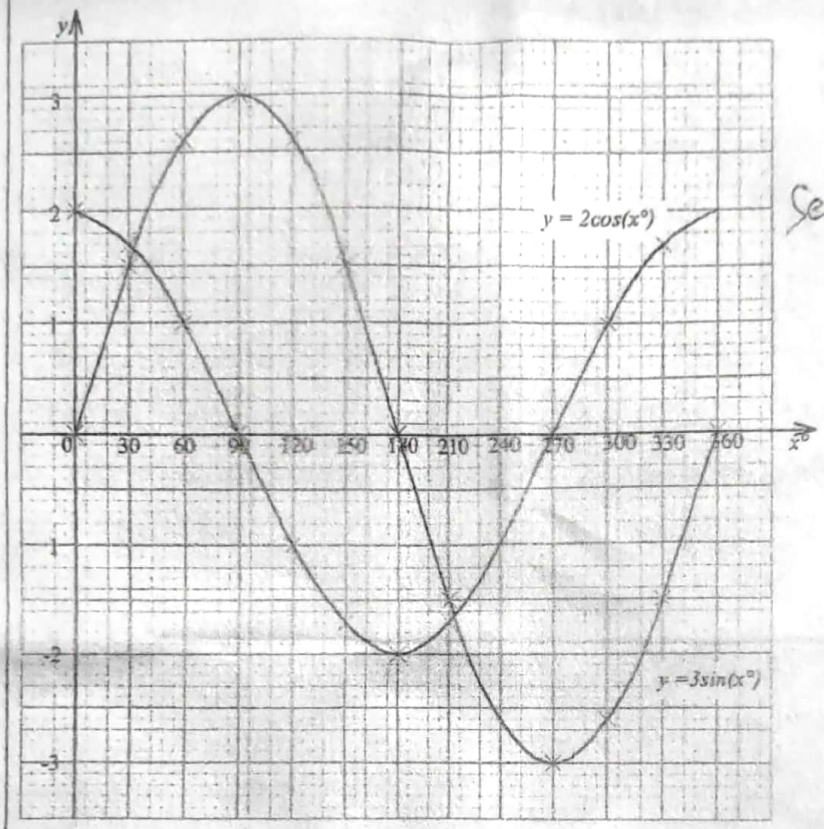
BP= 7cm

(a) (i)	$\angle BAD = 60°$ ✓	B1	✓ fly constructed.
	~~Line DC or BC correctly drawn~~ AD = 7 cm ✓	B1	✓ fly measured
	Parallelogram ABCD ✓ C correctly located ✓	B1	✓ fly located (C)
		B1	ABCD completed
(ii)	Angle bisector of $\angle BAD$ ✓	B1	✓ fly constructed $\angle BAD$
(iii)	bisector of BC ✓ drawn ✓	B1	BC ✓ fly constructed.
(b) (i)	Point P identified & ✓ marked on line DC ✓	B1	✓ fly marked on
(ii)	BP = ~~7.2~~ 7.0 ± 0.1cm ✓	B1	
(c)	Locus of points equidistant from B and C	B_2	
(d)		10	

Read with the candidate

21. (a)

x	0°	30°	60	90	120	150	180	210	240	270	300	330	360
2cos$x$		1.7			-1		-2			0			
3sin$x$			2.6			1.5		-1.5		-3	-2.6		



S1 – Correct linear scale

P1 – Correct plotting of $y = 2\cos x$

C1 – Correct curve of $y = 2\cos x$ drawn

P1 – Correct plotting of $y = 3\sin x$

~~C1 – Correct curve of $y = 2\cos x$ drawn~~

C1 – Correct curve of $y = 3\sin x$ drawn

(c) $2\cos x - 3\sin x = 0$

$\Rightarrow 2\cos x = 3\sin x$

$x = 34°$ ~~or 214°~~ B1

$x = 214°$ B1

(d) $y = 1.6$ and $y = -1.6$ B1

Range: $(1.65 \quad -1.65)$

		10	

22. (a)	Length of MP $MP^2 = 10^2 + 10^2$ $MP = \sqrt{200} = 14.14$ ✓	M1 A1	$\sqrt{200}$ 14.14
(b)	Angle between MU and plane MNPQ $\tan\theta_1 = \frac{15}{\sqrt{200}}$ ✓ $\frac{15}{14.14}$ $\theta_1 = \tan^{-1}\left(\frac{15}{\sqrt{200}}\right)$ $= 46.69^\circ$	M1 A1	or 2 equivalent Stating use $\tan\theta = \frac{15}{14.14}$
(c)	Length VO h = Height of pyramid $= \sqrt{(13^2 - 7.07^2)}$ ✓ $= 10.91$ $VO = 15 + h = 15 + 10.91$ ✓ $= 25.91$ cm ✓	M1 M1 A1	
(d)	Angle between planes VST and RSTU $\cos\theta_2 = \frac{5}{12}$ ✓ $\theta_2 = \cos^{-1}\left(\frac{5}{12}\right)$ $= 65.38^\circ$ ✓ (7).	B1 M1 A1	can be implied Identification of angle on The diagram equivalent Tan θ, Sin θ 65.39 If sin used.
		10	

23. (a) (i)	Taxable income = 52000 + 7800 + 5000 ✓ = Ksh 64800 ✓	M1 A1	
(ii) (a)	Tax payable $11180 \times 0.1 = 1118$ ✓ $10534 \times 0.15 = 1580.1$ $10534 \times 0.2 = 2106.8$ $10534 \times 0.25 = 2633.5$ $22018 \times 0.3 = 6605.4$ Total tax = 14043.8 Net tax = 14043.8 – 1280 ✓ = 12763.8 ✓	B1 M1 M1 A1 M1 A1	For 2nd, 3rd and 4th bands
(b)	Additional tax $= \frac{4}{100} \times 52000 \times 0.3$ ✓ = Ksh 624 Net salary = 64800 – 12763.8 – 624 = Ksh 51412.20 53492.20	M1 M1i A1	$\frac{30}{100} \times 2080$ $\frac{4}{100} \times 5200$ $(64800 + 2080) - (12763.8 - 624)$. equivalents.
		10	

Subtractions are method marks so can be awarded fully

$66880 - 13387.8$ — M1 (b).

53492.20 — A1

24. (a) $x \geq 30$; $y \geq 20$ ✓✓

$x + y \leq 100$ ✓

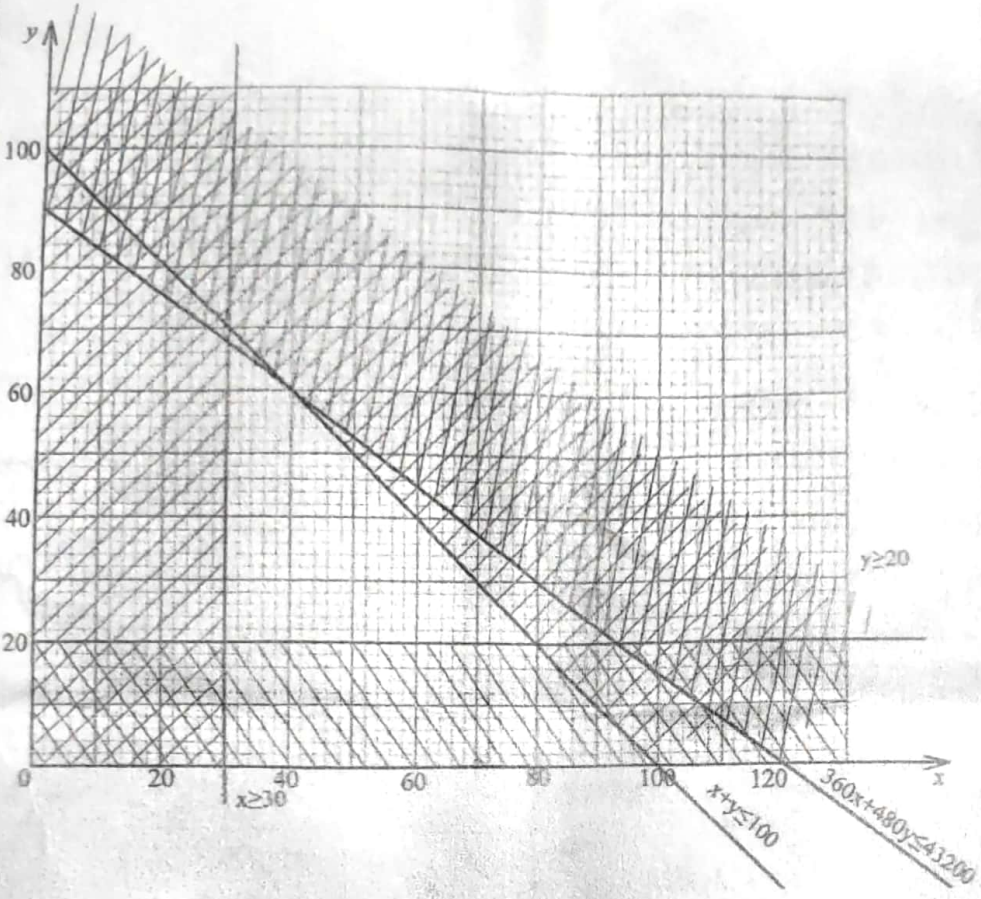
$360x + 480y \leq 43200$ *or* $3x + 4y \leq 360$

B1 Both ✓

B1

B1

(b)



If inequalities are reversed/wrong equal signs missing, ✓ by drawn & shaded

B1✓ $y \geq 20$ ✓ by drawn & shaded

B1✓ $x \geq 30$ ✓ by drawn & shaded

B1✓ $x + y \leq 100$ ✓ by drawn & shaded

B1✓ $3x + 4y \leq 360$ ✓ by drawn & shaded

(c)

Profit function = $50x + 60y$

Profit = $50 \times 40 + 60 \times 60$

$= 5600$

✓ Search line drawn or inspection using

B1 3 points with one at least (40, 60).

~~M1~~

~~A1~~

M1 (Substitution $40 \times 50 + 60 \times 60$)

A1 $= 5600$

Apply OW

10

If neither search line nor inspection used but M1, A1 ecf