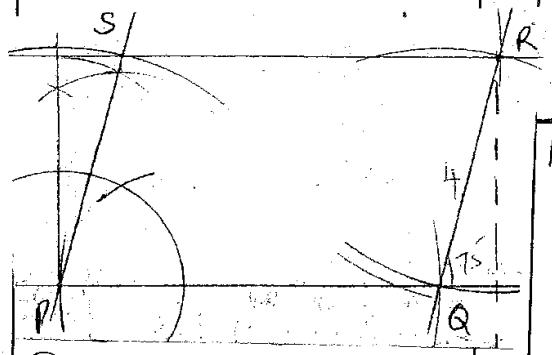
121/1 MARKING SCHEME 2011

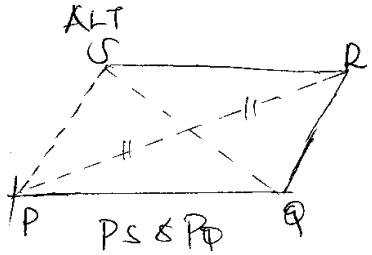
			ALTERNATIVE.
1.	$\frac{2\frac{1}{5}+\left(\frac{2}{3}\times\frac{15}{4}\right)-4\frac{1}{6}}{1\frac{1}{4}-\frac{12}{5}\times\frac{3}{4}+3\frac{3}{4}}=\frac{8}{15}\div 3\frac{1}{5}$ $\frac{8}{15}\times\frac{5}{16}=\frac{1}{6}$	M_1 M_1 A_1 3	Numerator for some operations Denominator
2.	$\sqrt{11.25^2-6.75^2}=9.$ Perimeter $=2(9+6.75)$ $=31.5$	B_1 B_1 2	Accompanied by some Working.
3.	Let d be distance covered. $\frac{3d}{5}-\frac{d}{2}=\frac{d}{10}$ % Change $=\frac{\frac{d}{10}}{\frac{d}{2}}\times 100\%$ $\frac{d}{10}\times\frac{2}{d}\times 100$ $=20\%$ Alternative.	m_1 m_1 A_1 3	difference of speeds. allow. $\frac{d}{2}-\frac{3d}{5}=-\frac{d}{10}$ 6 : 5 1 : $1\frac{2}{3}$ 5 : 6 $\frac{1}{5}\times 100=20\%$ if -20% A0. Allow 20 even Without %.
	$S_1=\frac{x}{2}$ $S_2=\frac{x}{1\frac{2}{3}}$ $\frac{x}{2}=100\%$ $\frac{\frac{x}{1\frac{2}{3}}\times 100}{\frac{x}{2}}=120$ $120-100=20\%$		Are
4.	Area of a Slabs $60\times 42=2520$ No. of Slab $=x$. Total area $L^2=2520x$ $2520=2^3\times 3^2\times 5\times 7$. To make the power divisible by 2 $2\times 5\times 7$ $x=70$.		Area $70\times 2520=17.64\ m^2$.

	$60 = 2^2 \times 3 \times 5$ $42 = 2 \times 3 \times 7$ Side of pavement LCM $= 2^2 \times 3 \times 5 \times 7 = 420\text{cm}$ A1 least Area $= 4.2 \times 4.2\text{m} = 17.64\text{m}^2$.	M1 A1 B1 3	
5.	$\sin(x+60^\circ) = \cos 2x$ $x + 60 + 2x = 90^\circ \longrightarrow$ $3x = 30^\circ$ $x = 10^\circ$ $\tan(x+60)^\circ = \tan 70^\circ \longrightarrow$ $= 2.748$ from 4s.f tables or 2.7475	M1 M1 A1 3	
6.	$\frac{4x - 9x^3}{3x^2 - 4x - 4} = \frac{x(2-3x)(2+3x)}{(3x+2)(x-2)}$ $= \frac{x(2-3x)}{x-2}$.	M1 M1 A1 3	Complete factorizing numerator Complete factorizing denominator $\frac{2x-3x^2}{x-2} \mid \frac{(3x-3x^2)}{(3x+2)} \frac{(2+3x)}{(x-2)}$ $= \frac{2x-3x^2}{x-2}$
7.	Internal Dimensions: 40, 20 & 15 Volume unoccupied $= 40 \times 20 \times 15 - 8000$ $= 4000$ Height of unoccupied $= \frac{4000}{40 \times 20}$ $= 5\text{cm}$.	B1 M1 M1 A1 4	OR. EQUIVALENTS Vol. occupied $40 \times 20 \times h = 8000$ $V = \frac{8000}{40 \times 20} = 10\text{cm}$ height. M1. $15 - 10 = 5\text{cm}$ or $H = 15.5 - (10 + 0.5)$ B1M1 $= 5\text{cm}$ A1

8. $2x^2y^2 - 5xy - 12$
$= 2x^2y^2 - 8xy + 3xy - 12$ M1
$= 2xy(xy-4) + 3(xy-4)$
$= (2xy+3)(xy-4)$ A1
2

9.


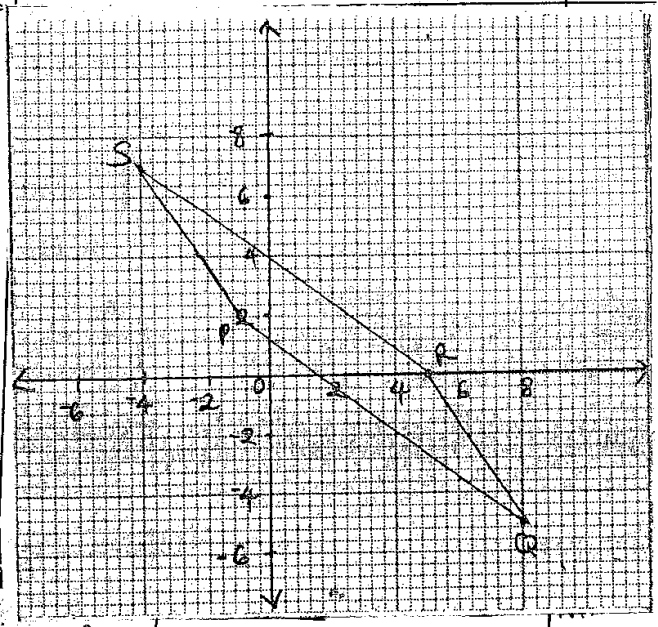
Construction of 75° at P. B1
Construction of 2 adjacent sides B1
Completion of ll gram B1
height = 3.9 ± 0.1 cm. B1
3.8, 3.9, 4.0.
4



PS & PQ
PS & PQ we need not see the ~~point~~ arcs B1
Point R arcs must be seen B1
from a constructed ll gram with arcs. B1
If the height is calculated correct give the mark:
$4\sin 75^\circ = 3.864$ cm.
4

10. Mid points:
42, 47, 52, 57, 62, 67, 72
fx = 42, 94, 624, 570, 1124, 844, 72
$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{1660}{30} = 55.33$kg M1 A1
3

11.
Sh. $\frac{5880}{98} \times 100$ ⟶ M1
$= 6,000$
Sh. $\frac{6000}{120} \times 100$ ⟶ M1
$= Sh - 5000$ A1
3.

12.


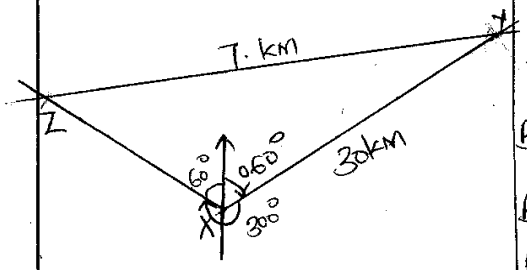
$QS = \sqrt{12^2 + 12^2}$ A1
$= 16.97$ units.
3

13. $\frac{1}{6}x + \frac{1}{5}y = 14,820$ } M1
$\frac{1}{8}x + \frac{1}{12}y = 8675$ }
$5x + 6y = 444,600$ M1
$3x + 2y = 208,200$
$5x + 6y = 444,600$
$9x + 6y = 624600$ } M1
$4x = 180000$ M1
$x = 45,000$ A1
4

14. a) $10,500 = 2^2 \times 3 \times 5^3 \times 7$ B1
b) $P \times 10,500 = 2^3 \times 3^3 \times 5^3 \times 7^3$
Smallest value of $P = 2 \times 3^2 \times 7^2$ M1
$= 882$. A1

SECTION II

15. Scale of 1:20cm



B1 B1 B1 B1

distance XZ = 3×10
= 30km ± 1km 4

16. a) L.S.F = 8:24 = 1:3 B1
V.S.F = 1:27 ----
Volume of frustum
= 160×27 − 160 M1
= 4160 cm³ A1 3

b) $\frac{1}{3}\pi h(R^2 + Rr + r^2)$

$\frac{\sqrt[3]{160}}{\sqrt[3]{\text{volume}}} = \frac{8}{24} = \frac{1}{3}$ B1

V = 4320 − 160
= 4160

ALT

$V = \frac{1}{3}\pi r^2 h$

$r^2 = \frac{3\times160}{\pi h}$

r = 4.370

$\frac{r}{8} = \frac{R}{24}$

R = 13.11 B1

$V = \frac{1}{3}\times\frac{22}{7}\times 13.11^2$

= 4320.177 if 3.142 is used M1

Vf = 4320.177 − 160 A1
= 4160.177

17. a) (i) Surface area of solid
$\pi\times6\times10 + \frac{4}{2}\times\pi\times6^2$ M1 M1
= 414.69 A1

(ii) height of cone
$= \sqrt{100-36} = 8$ B1

∴ Volume of solid
$\frac{1}{3}\times\pi\times6^2\times8 + \frac{1}{2}\times\frac{4}{3}\times\pi\times6^3$ M1
= 753.98 cm³ M1 A1

b) Mass of solid in kg
$= \frac{1.3\times753.98}{1000}$ M1 M1
Accept 0.98kg A1 10

18. a)(i) Let distance covered by bus be b km.

∴ time by train = $\frac{700-b}{50}$
time by bus = $\frac{b}{75}$ → M1

∴ $\frac{700-b}{50} + \frac{b}{75} = 11\frac{1}{2} - \frac{1}{2}$ M1

$\frac{2100-3b+2b}{150} = 11$ M1

2100 − b = 11×150
b = 2100 − 1650
= 450 A1

(ii) time taken by train
$= \frac{700-450}{50} = 5h$ M1

total time before departure of bus
= 5hr 30min M1

∴ departure time for bus
= 8.00 + 5h:30 min
= 1.30 pm A1
or 1330 hrs
No mark for 1330 or 13:30

19. a) $\begin{pmatrix} 0 & 1 \\ 2 & p \end{pmatrix}\begin{pmatrix} -1.5 & -0.5 \\ p & p-2 \end{pmatrix}$

$= \begin{bmatrix} p & p-2 \\ -3+p^2 & +p^2-2p \end{bmatrix}$ B_1

$-p+p^2-2p^2 = p^2-2p^2-3p+6$ M_1

$-p = -3p+6$

$2p = 6$

$p = 3$ A_1

b) (i) $x+30y = 50{,}000$

$x+40y = 56{,}000$ B_1

(ii) $\begin{pmatrix} 1 & 30 \\ 1 & 40 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{matrix} 50{,}000 \\ 56{,}000 \end{matrix}$

$\frac{1}{10}\begin{pmatrix} 40 & -30 \\ -1 & 1 \end{pmatrix}\begin{pmatrix} 1 & 30 \\ 1 & 40 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{10}\begin{pmatrix} 40 & -30 \\ -1 & 1 \end{pmatrix}\begin{matrix} 50{,}000 \\ 56{,}000 \end{matrix}$ M_1

$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{10}\begin{pmatrix} 320{,}000 \\ 6000 \end{pmatrix}$ → M_1

$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{matrix} 32000 \\ 600 \end{matrix}$

$x = 32{,}000$

$y = 600$ → A_1

(iii) $32000+6000 = 68000$ → M_1

$\frac{68{,}000-32{,}000}{600}$ M_1

$= 60$ A_1 10

20. a) $12^2 = x^2+8^2-2\times 8\times x\cos 120^\circ$ M_1

$x^2+8x-80 = 0$ M_1

$x = \frac{-8 \pm \sqrt{64-4\times 1\times -80}}{2\times 1}$ M_1

$= 5.8$ or -13.8 A_1

$\therefore x = 5.8$.

b) (i) $h = 5.8\sin 60$

$= 5.0$ cm. M_1 A_1

(ii) area of ΔABC

$= \frac{1}{2}\times 8\times 5.0$ M_1

$= 20\text{ cm}^2$. A_1

(iii) Size of $\angle ACB$

$\frac{\sin C}{5.8} = \frac{\sin 120}{12}$ → M_1

$\angle C = \sin^{-1}\frac{5.8\times 0.866}{12}$

$\angle C = 24.7^\circ$ A_1 10

21. a). Ordinates

$x=0$	$y_1=1$
$x=1$	$y_2=6$
$x=2$	$y_3=9$
$x=3$	$y_4=10$
$x=4$	$y_5=9$
$x=5$	$y_6=6$
$x=6$	$y_7=1$

B_3

Area $= \frac{1}{2}\times 1\times\{1+1+2(6+9+10+9+6)\}$ M_1

$= \frac{1}{2}\{2+2(40)\}$

$= \frac{1}{2}(82) = 41$ A_1

b) (i) $\int_0^6 -x^2+6x+1 = \left[-\frac{1}{3}x^3+\frac{6}{2}x^2+x\right]_0^6$ M_1

$= -72+108+6$

$= 144-72 = 42$

(ii) $\frac{42-41}{42}\times 100\%$ M_1

$= 2.38\%$ A_1

10.

23. a)(i)

$\underset{\sim}{BC} = \underset{\sim}{BD} + \underset{\sim}{DC}$

$= -\underset{\sim}{d} - \underset{\sim}{a} + 2\underset{\sim}{a}$ M1

$= \underset{\sim}{a} - \underset{\sim}{d}$ A1

(ii) $\underset{\sim}{AX} = k\underset{\sim}{AC} \Rightarrow AX = k(2\underset{\sim}{a} - \underset{\sim}{d})$ M1 A1

(iii) $\underset{\sim}{DX} = h\underset{\sim}{DB} \Rightarrow DX = h(\underset{\sim}{d} + \underset{\sim}{a})$ B1

b) $\underset{\sim}{AX} = -\underset{\sim}{d} + h\underset{\sim}{d} + h\underset{\sim}{a}$

$\Rightarrow \underset{\sim}{AX} = \underset{\sim}{d}(h-1) + h\underset{\sim}{a}$ → M1

Also $\underset{\sim}{AX} = 2k\underset{\sim}{a} - k\underset{\sim}{d}$

$\therefore h = 2k$ and $h - 1 = -k$

$h = -k + 1 \Rightarrow 2k = -k + 1$ M1

$3k = 1$

$k = 1/3$ A1

$h = 2k \Rightarrow h = 2 \times 1/3$

$= 2/3$ B1

10

c) (a) B1 B1 B2 B1 B1

b)(i) Meridian class : 200 - 300

(ii) meridian line : (258-260)

$\alpha = \frac{220}{3.8} = 57.89$

hence $L = 200 + 57.89$

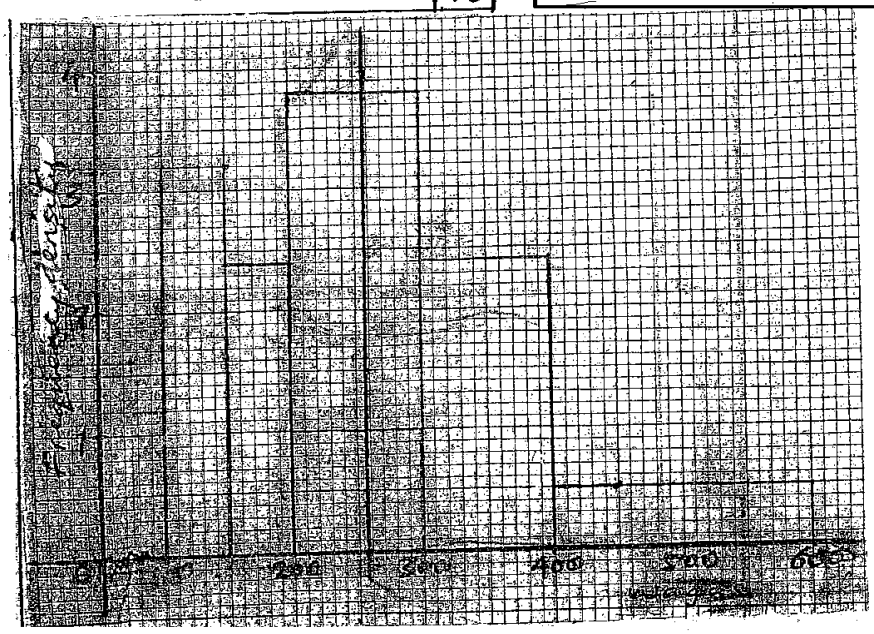
$= 257.89$

c) $900 + 50 \times 0.5$ M1

$= 925$ M1 A1

10

24.



16 (a)

+	7	8	9	10	11
4	11	12	13	14	15
5	12	13	14	15	16
6	13	14	15	16	17
7	14	15	16	17	18
8	15	16	17	18	19

B1 ✓ probability space (C.A.O)

(b) P(Sum of ages at least 17) $= \frac{6}{25}$ B1

2

17 (a) $\underset{\sim}{T} = \begin{pmatrix} 6 \\ -2 \end{pmatrix} - \begin{pmatrix} 4 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ B1

(b) $\underset{\sim}{OA'} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} + \begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

$A'(3, -1)$ B1

$\underset{\sim}{OB'} = \begin{pmatrix} 3 \\ 5 \end{pmatrix} + \begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$

$B'(5, 2)$ B1

3

3 $\sin 45° = \frac{1}{\sqrt{2}}$ B1

$\frac{\sqrt{8}}{1 + \sin 45°} = \frac{\sqrt{8}(1 - \frac{1}{\sqrt{2}})}{(1 + \frac{1}{\sqrt{2}})(1 - \frac{1}{\sqrt{2}})}$

$= \frac{\sqrt{8} - \frac{\sqrt{8}}{\sqrt{2}}}{1 - \frac{1}{2}}$ M1 Rational denominator with the numerator expanded

$= 2\sqrt{8} - 4$ A1 accept other forms $4, 2-4, 4(\sqrt{2}-1)$

3

$Max_A = 4\pi(7.5)^2$ $Min_A = 4\pi(6.5)^2$ M1 $\frac{0.5}{7}$ ----M1--R.E.

Absolute error $= \frac{4\pi(7.5^2 - 6.5^2)}{2}$ M1 $\frac{0.5}{7} \times 2$ ----M1 Absolute Error

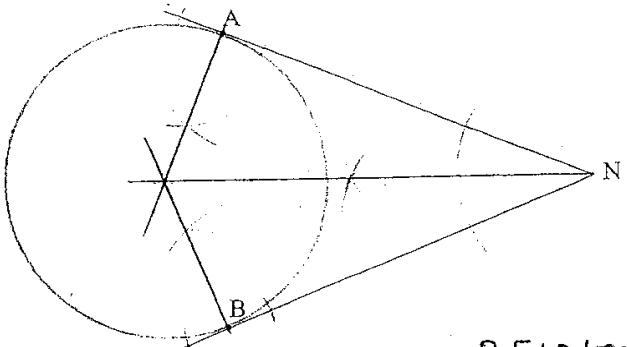
% Error $= \frac{28\pi}{4\pi \times 7^2} \times 100\%$ M1 $\frac{0.5}{7} \times 2 \times 100$--M1 allow for use of {Max − Min, Max − Actual, Actual − min}

$= 14.29\%$ A1 14.29% A1

4

Q10

(a)



(b) $r = 2.5 \pm 0.1$ cm

B1 ✓ location of centre by construction
- draw ⊥ at A or B or bisect angle ANB and one ⊥ at A or B

B1 Circle drawn

Use of frig ± Error B1

B1

3

Q11

$$\left(a+\tfrac{1}{2}\right)^4 = a^4 + 4a^3\left(\tfrac{1}{2}\right) + 6a^2\left(\tfrac{1}{2}\right)^2 + 4a\left(\tfrac{1}{2}\right)^3 + \left(\tfrac{1}{2}\right)^4$$

$$= a^4 + 2a^3 + \tfrac{3}{2}a^2 + \tfrac{1}{2}a + \tfrac{1}{16}$$

M1

$$\left(a-\tfrac{1}{2}\right)^4 = a^4 + 4a^3\left(-\tfrac{1}{2}\right) + 6a^2\left(-\tfrac{1}{2}\right)^2 + 4a\left(-\tfrac{1}{2}\right)^3 + \left(-\tfrac{1}{2}\right)^4$$

$$= a^4 - 2a^3 + \tfrac{3}{2}a^2 - \tfrac{1}{2}a + \tfrac{1}{16}$$

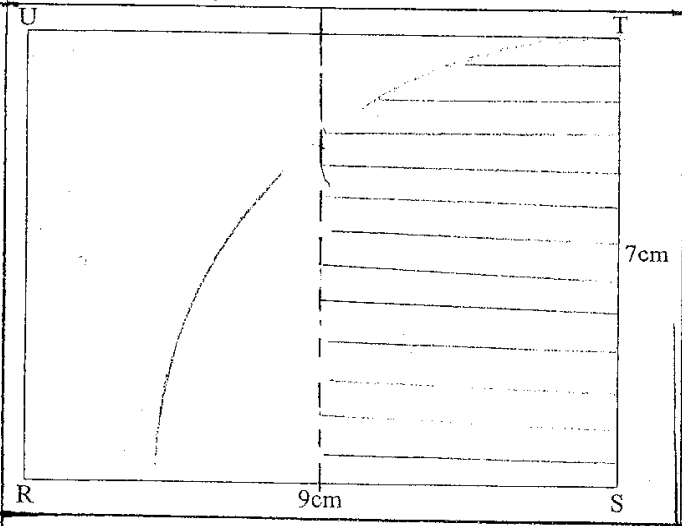
M1

$$\left(a+\tfrac{1}{2}\right)^4 + \left(a-\tfrac{1}{2}\right)^4 = 2a^4 + 3a^2 + \tfrac{1}{8}$$

A1

3

Q12



B1 ⊥ bisector of TU drawn
Continuous or dotted.

B1 Arc radius 7 centre S drawn
Continuous or dotted.

B1 ✓ Region shaded with bisector dotted and arc full line

3

Q13

$$\underset{\sim}{PQ} = -(6i+j) + (-2i+5j)$$

$$= -8i + 4j$$

M1

$$\underset{\sim}{PN} = \tfrac{3}{4}(-8i+4j)$$

$$= -6i + 3j$$

M1

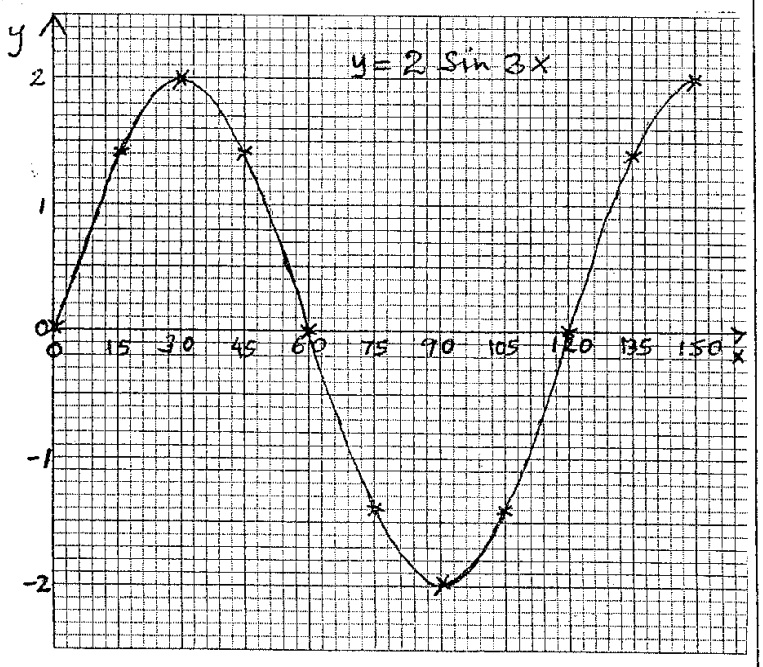
A1

3

$$\underset{\sim}{ON} = \tfrac{3}{4}(-2i+5j) + \tfrac{1}{4}(6i+j)$$

$$= 4j$$

$$\underset{\sim}{PN} = -(6i+j) + 4j$$

Q14 (a)	Let longitude difference be θ $\theta \times 60\cos 60^\circ = 630$ $\theta = \frac{630}{60\cos 60^\circ}$ $= 21^\circ$	M1 A1	Case where dist is in Km; follow through
(b)	21° East of longitude 18°E is 39°E N(60°N, 39°E)	B1 3	
Q15	$x^2 - 6x + 9 + y^2 - 10y + 25 = -30 + 9 + 25$ $\pm 2a = \pm 6$ or $(x-3)^2 = (x-a)^2$ $\pm 2b = \pm 10$ or $(y-5)^2 = (y-b)^2$ $a = 3$ and $b = 5$	B1 B1 B1 3	allow for $(x-3)^2$ seen allow for $(y-5)^2$ seen Allow if (3, 5)
Q16 (a)		P1 C1	✓ plotting Smooth Sine Curve
(b)	Period = 120°	B1 3	If curve drawn, $\frac{360}{3} = 120$: Allow

17 (a) (i) Ike cost = Ksh (7500 + 11 × 6000) M1
= Ksh 73500 A1

(ii) Ike % increase = $\frac{73500 - 60000}{60000} \times 100$ M1
= 22.5 % A1

(b) Ike amount paid = Ksh 60000 × 25 × 0.95 M1
= Ksh 1425000 A1

(c) Institution X; Ksh 73500 × 25 M1
= Ksh 1837500
Institution Y; Ksh $60000 \times 25 \times \left(1 + \frac{12}{100}\right)^2$ M1
= Ksh 1881600
Difference = Ksh (1881600 − 1837500) M1
= Ksh 44100 A1
10

18 (a) (i) $r = \frac{64+4d}{64}$, $r = \frac{64+6d}{64+4d}$ B1B1 or equivalents $64+4d = 64r$, $64+6d = 64r^2$

(ii) $\frac{64+4d}{64} = \frac{64+6d}{64+4d}$ M1 or equivalent.
$16d^2 + 128d = 0$
$16d(d+8) = 0$ M1
$d = -8$
$\therefore r = \frac{64 + 4\times -8}{64}$
$= \frac{1}{2}$. A1

$64r^2 = 64 + 6(16r - 16)$
$2r^2 - 3r + 1 = 0$
$(2r-1)(r-1) = 0$
$\therefore r = \frac{1}{2}$ or $r = 1$.
$\therefore r = \frac{1}{2}$

$d = \frac{32 - 64}{4} = -8$ B1

(b) (i) $S_{10} = 10/2\{2\times 64 + 9\times -8\}$ M1
$= 280$ A1

(ii) $S_{10} = \frac{64\left(1 - (1/2)^{10}\right)}{1 - 1/2}$ M1 — May substitute the value for r

$= 127.875$ A1 Accept $127\frac{7}{8}$ and when rounded off to at least 4 s.f.
10

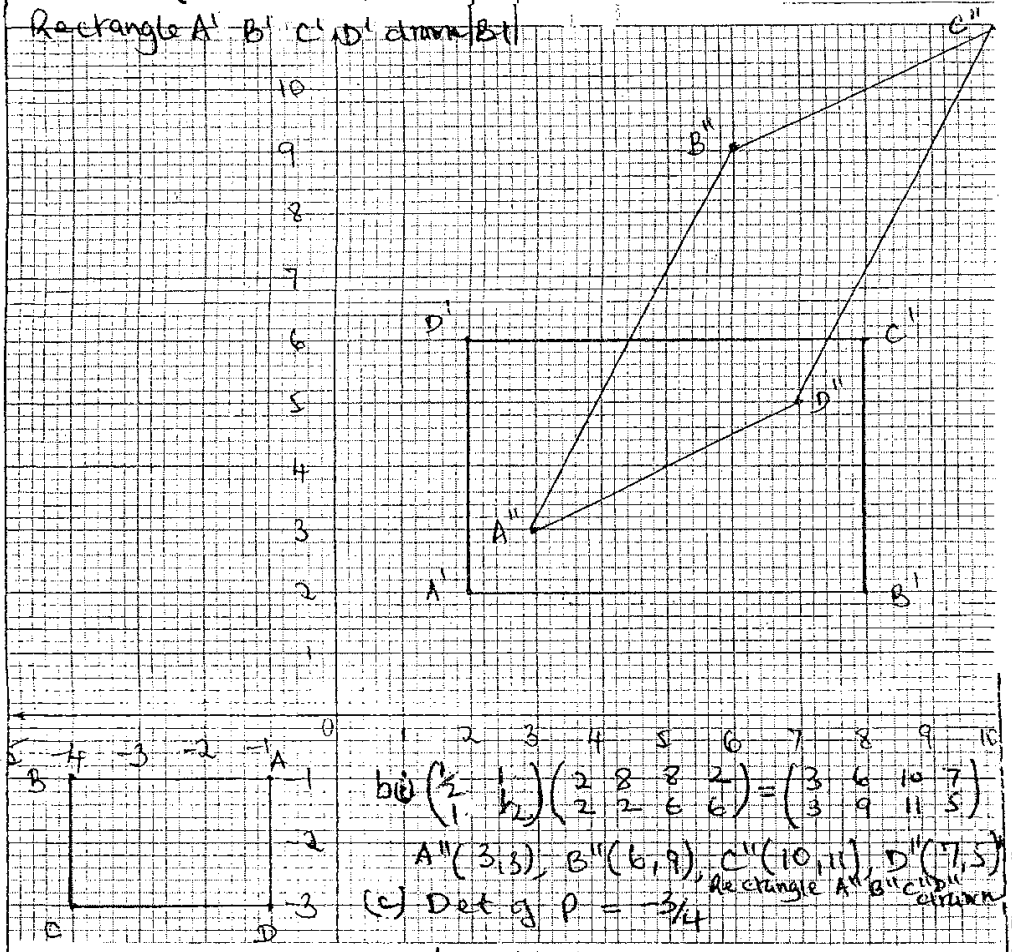
19(a) Rectangle ABCD drawn $\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}\begin{pmatrix} -1 & -4 & -4 & -1 \\ -1 & -1 & -3 & -3 \end{pmatrix}$ B1

$A'B'C'D' = \begin{pmatrix} 2 & 8 & 8 & 2 \\ 2 & 2 & 6 & 6 \end{pmatrix}$ M1 A1

At least 2 points must be ✓

May be implied in the diagram

Rectangle A'B'C'D' drawn B1



(b)(ii) $\begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ 1 & \frac{1}{2} \end{pmatrix}\begin{pmatrix} 2 & 8 & 8 & 2 \\ 2 & 2 & 6 & 6 \end{pmatrix} = \begin{pmatrix} 3 & 6 & 10 & 7 \\ 3 & 9 & 11 & 5 \end{pmatrix}$ M1 ✓ attempt to multiply

$A''(3,3), B''(6,9), C''(10,11), D''(7,5)$ A1 ✓ 1 pt A correct

Rectangle A''B''C''D'' drawn B1 ✓ 3 pts correct

(c) Det of $P = -\frac{3}{4}$ B1 or equivalent

Area A''B''C''D'' $= \frac{3}{4} \times 6 \times 4$ M1

$= 18$ sq units. A1

10

20(a)(i) $x - 5$ B1

(ii) $[x + (x-5)] \times 2$ B1

$= 4x - 10$

(b)(i) $(x+20), (x+15), (4x+10)$ B1 implied

$(x+20)(x+15) = 15(4x+10)$ M1 allow when two ages are ✓

$x^2 - 25x + 150 = 0$

$(x-10)(x-15) = 0$ M1 for ✓ attempt to solve or equivalent

$x = 10$ or $x = 15$ A1

(ii) $4 \times 10 - 10$ or $4 \times 15 - 10$ M1

$= 30$ 50 A1 for both ages

(iii) $(10-5) + 20$ or $(15-5) + 20$ M1

$= 25$ 30 A1 for both ages.

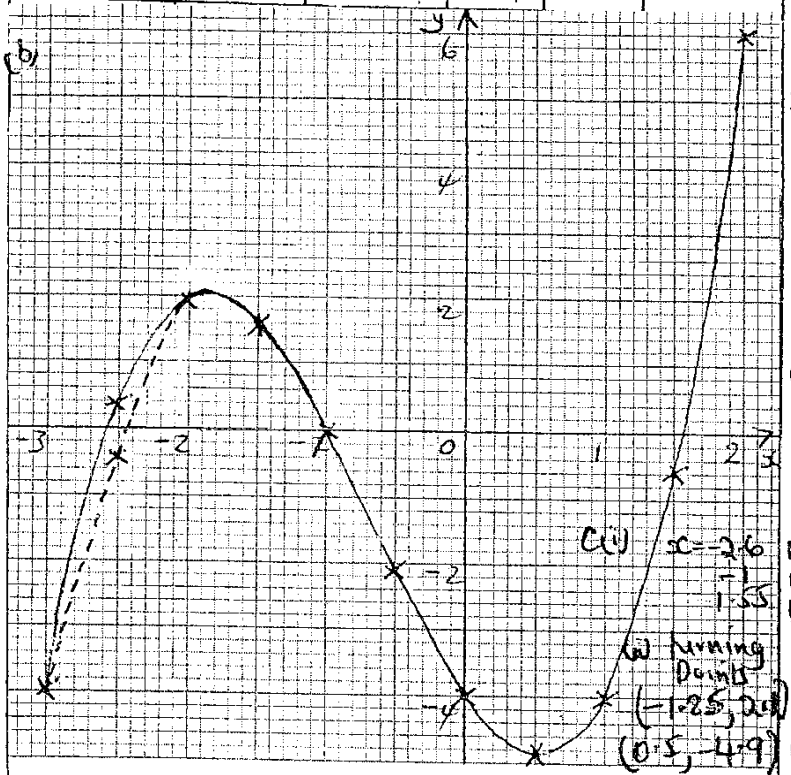
10

21 (a)

x	-2	-0.5	1	1.5
y	2	-2.1	-4	-0.6

B2 — B1 for 3 ✓

(b)



S1 — for ✓ scale

P1✓ — for ✓ plotting

C1 — for ✓ smooth curve

(c)(i) $x = -2.6$ B1 — Accept -2.45 for use of -0.4

-1 B1

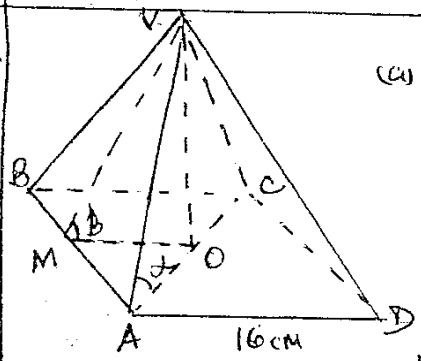
1.55 B1

(ii) Turning Points $(-1.25, 2.1)$ B1 — Allow readings within 1 small square

$(0.5, -4.9)$ B1

10

22.



(a) $AC^2 = 16^2 + 12^2 = 400$ M1 — or equivalent

$AC = \sqrt{400} = 20\text{cm}$

$AO = 10\text{cm}$.

$VO^2 = 26^2 - 10^2$ M1

$VO = \sqrt{576}$ M1

$= 24\text{cm}$. A1

(b) The angle between VA and ABCD is α B1 — Implied

$\tan\alpha = \frac{24}{10}$ M1 — or equivalent

$\alpha = 67.38°$ A1

(9)

(c) The angle between the planes is β. B1 — Implied

$\tan\beta = \frac{24}{8}$ M1 — or equivalent

(5)

$\beta = 71.57°$ A1 — Accept 71.6

10

23 (a) $C = an + b/n$

$135 = 2a + b/2$

$140 = 3a + b/3$

$270 = 4a + b$ (i)

$420 = 9a + b$ (ii)

$150 = 5a$, $a = 30$

Sub $a = 30$ in (i),

$270 = 120 + b$, $b = 150$

$\therefore C = 30n + \frac{150}{n}$

(b) $C = 30 \times 10 + \frac{150}{10}$

$= Ksh\ 315$

(c) $756 = 30n + \frac{150}{n}$

$5n^2 - 126n + 25 = 0$

$(5n-1)(n-25) = 0$

$n = 1/5$ or $n = 25$

$\therefore$ the number of items $= 25$

B1
M1
M1 ✓ attempt to solve the equation
A1 for both values of a and b.
B1
M1
A1 ✓ if A above is lost
M1
M1 ✓ attempt to solve the equation
A1 ✓ if A in (c) is lost
10

24 (a) (i) $4x + 6y \geq 42$

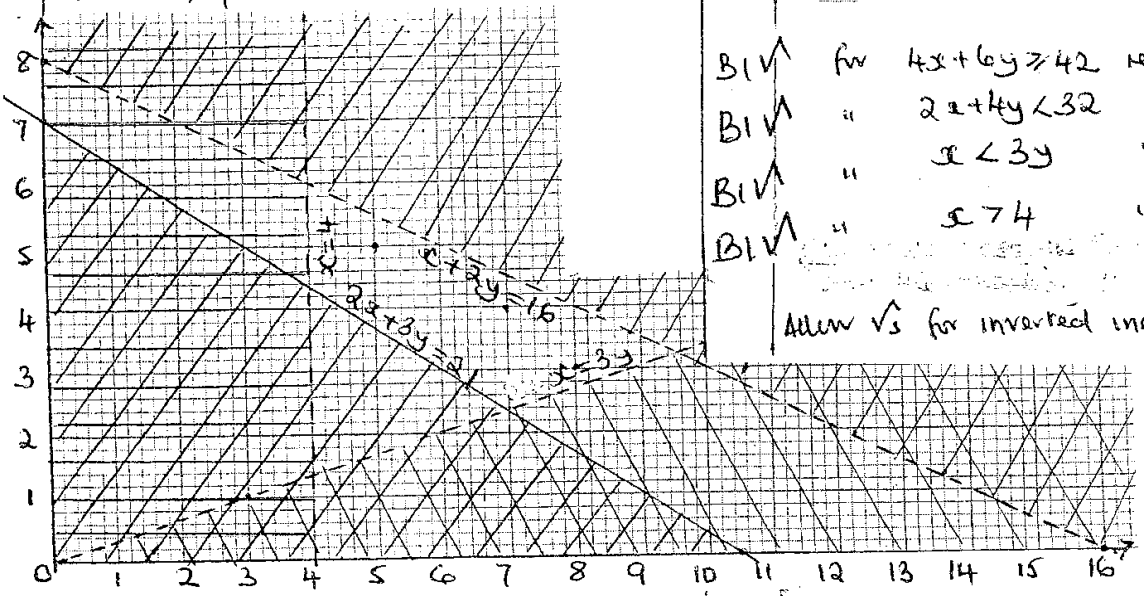
(ii) $2x + 4y < 32$

(iii) $x < 3y$

(iv) $x > 4$

B1
B1
B1
B1

(b)



B1 ✓ for $4x + 6y \geq 42$ represented by
B1 ✓ " $2x + 4y < 32$ "
B1 ✓ " $x < 3y$ "
B1 ✓ " $x > 4$ "

Allow ✓s for inverted inequalities

(c) when $x = 5$, $y = 5$, $5 \times 4 + 5 \times 6 = 50$ kms

" $x = 8$, $y = 3$, $2 \times 4 + 3 \times 6 = 50$ kms

" $x = 7$, $y = 4$, $7 \times 4 + 4 \times 6 = 52$ kms

7 trips by P and 4 by Q

M1 for at least two pts used (May be implied)

A1

10