$\frac{4}{7} + 2\cdot\frac{4}{7}\left(\frac{3}{2} - x\right.$

$\frac{4}{7} + \frac{21}{7} - \frac{8}{7}$

WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Advanced Certificate of Education
UACE August
Mathematics P425/2
July/August 2023

1. P(B)= $^1/_6$, P(AnB)= $^1/_{12}$, P(B/A) = $^1/_3$

From $P(B/A) = \frac{P(BnA)}{P(A)}$

(a) (i) $P(A) = \frac{P(BnA)}{P(B/A)}$

$= \frac{1}{12} \div \frac{1}{3}$ — M_1

$= \frac{1}{4}$ — A_1

(ii) $P(A/B^1) = \frac{P(A n B^1)}{P(CB^1)}$

$= \cancel{P(A)} = \frac{P(AuB)}{P\cancel{CB^1}}$

$= \frac{\frac{1}{4} - \frac{1}{12}}{\frac{5}{6}}$ — M_1

$= \frac{1}{5}$ — A_1

(b) For independence $\frac{1}{12} = \frac{1}{4} \cdot \frac{1}{6}$

$\frac{1}{12} \neq \frac{1}{24}$ — B_1

A and B are not independent.

05 marks

2. (i)

T(s)	240	300	360
θ^0c	75	θ_1	69

B_1

$\frac{69 - 75}{360 - 240} = \frac{\theta_1 - 75}{300 - 240}$ — M_1

$\frac{-6}{120} = \frac{\theta_1 - 75}{60}$

$\theta_1 = 75 + \left(\frac{-6 \times 60}{120}\right)$

$= \cancel{70^0c}$ $\theta_1 = 72°c.$ — A_1

(ii)

T(s)	4$\cancel{8}$50	600	T_1
θ^0c	5$\cancel{6}$4	4$\cancel{8}$6	42

$$\frac{42-5\cancel{6}4}{T_1-4\cancel{8}50}=\frac{4\cancel{8}6-5\cancel{6}4}{600-4\cancel{8}50}$$ M₁

$$\cancel{\frac{-14}{T_1-480}=\frac{-8}{120}}$$

$$\cancel{T_1=480+\frac{14\times 120}{8}}$$

$$\cancel{=690s}$$

T= 675s.

A₁

5 marks

3.
$$u=72\times\frac{1000ms^{-1}}{3600}$$
$$=20ms^{-1}$$

B₁ — for both $20ms^{-1}$ and $10ms^{-1}$

$$v=36\times\frac{1000}{3600}$$
$$=10ms^{-1}$$

From $v^2=u^2+2as$

$$10^2=20^2+2a\times 800$$ M₁
$$100=400+1600a$$
$$a=\tfrac{-3}{16}ms^{-2} or -0.1875ms^{-2}$$

A₁ — with correct units.

From $v^2=u^2+at$

$$10=20-\frac{3}{16}t$$ M₁

$$t=\frac{160}{3}$$ second or 53.3 seconds

A₁ — $\geq$1D

5 marks

4.
$$\frac{P2021}{P2000}=\frac{90}{100},\ \frac{P2022}{P2021}=\frac{120}{100}$$ B₁

$$\frac{P2022}{P2000}=\frac{P2022}{P2021}\times\frac{P2021}{P2000}$$

$$=\frac{120}{100}\times\frac{90}{100}$$ M₁

$$=\frac{27}{25}$$ A₁

$$\therefore P2022=\frac{27}{25}\times 200,000$$ M₁

$$=216000/-$$ A₁

5 marks

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5.	$d=\frac{2-1}{5}=0.2$ or $\frac{1}{5}$	B1	

x	$y=x\sin x$	~~sin x~~
1.0	0.8415	
1.2		1.1184
1.4		1.3796
1.6		1.5993
1.8		1.7529
2.0	1.8186	
sum	2.6601	5.8502

B1 – All values of x **B1 all values y**

Using the trapezium rule for 6 ordinates.

$=\frac{1}{2}\times 0.2\times[2.6601+2\times 5.8502]$ M1

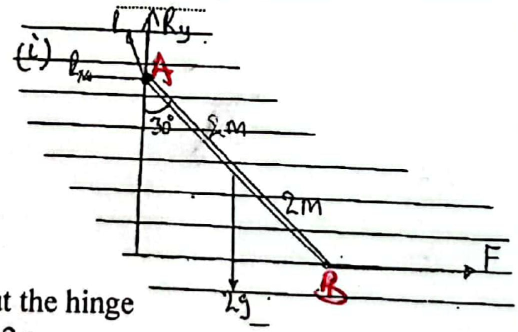
$=0.1\times \cancel{13.8205}$ 14.3605

$=1.38205$ $\simeq 1.43605$

$I\cong 1.382$ $\simeq 1.436$. (3dp). A1

5 marks

6. (i)



B1

Taking moments about the hinge

$4F\cos 30^0 = 2\sin 30 \times 2g$ M1

$F = \frac{2\times \sin 30\times 2\times 9.8}{4\times \cos 30}$ A1

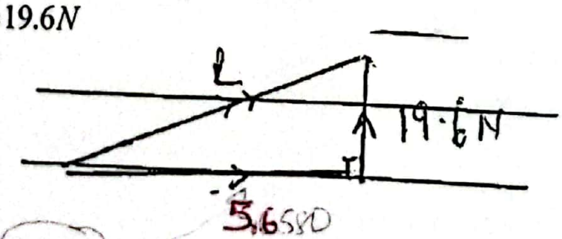
$=5.6580N$

(ii) Resolving forces

$= Ry = 2g$ $R_x = F$

$=2\times 9.8$ $R_x = 5.6580N$

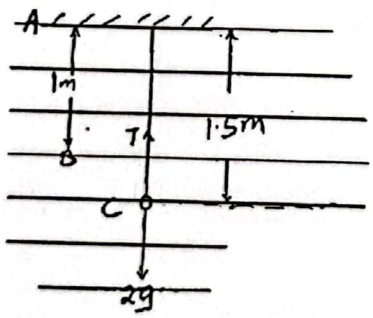
$=19.6N$



$R=\sqrt{5.6580^2+19.6^2}$ M1

$\therefore |R| = 20.4003N$ A1

5 marks

7.	(a)	Let J: Jane, M: Mary, A: Alice $P(J) = P(J^1 n M^1 n A) = P(J^1).P(M^1).P(A)$ $= \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}$ $= \frac{25}{216}$ *or* 0.1157 (4dp)	M_1 A_1	
	(b)	1^{st} time $P(A) = \frac{1}{6}$ 2^{nd} time $P(A) = \frac{1}{6} \times \left(\frac{5}{6}\right)^3$ 3^{rd} time $P(A) = \frac{1}{6} \times \left(\frac{5}{6}\right)^6$ $P(wining) = \frac{1}{6} + \frac{1}{6}\left(\frac{5}{6}\right)^3 + \frac{1}{6}\left(\frac{5}{6}\right)^6 + ...$ $a = \frac{1}{6}$, $r = \left(\frac{5}{6}\right)^3$ $S_\infty = \frac{a}{1-r}$ $= \frac{\frac{1}{6}}{1-\left(\frac{5}{6}\right)^3}$ $= \frac{36}{91}$ or 0.3956 (4dp)	 M_1 A_1	
				5 marks
8.		 From point A to B Loss in P.E = gain in K. E = 2 x 9.8 x 1 = 19.6 J From B to C Loss in P.E and K.E = elastic P.E stored $19.6 + 2x9.8\,x = \frac{\lambda x^2}{2lo}$ $19.6 + 2x9.8(1.5\text{-}1) = \frac{\lambda(1.5\text{-}1)^2}{2\times1}$ $\therefore \lambda = 235.2N$	B_1 A_1 M_1 M_1 A_1	
				5 marks

9.

Height	Freq	x	fx	fx^2	$C.f$	cb
120 - 124	5	122	610	74420	5	
125 – 129	17	127	2159	274193	22	
130 – 134	20	132	2640	348480	42	
135 – 139	25	137	3425	469225	67	
140 – 144	15	142	2130	302460	82	
145 – 149	6	147	882	129654	88	
150 - 154	2	152	304	46208	90	
	$\Sigma f=90$		$\Sigma fx=12150$ B$_1$	$\Sigma fx^2=1644640$ B$_1$		

(a) Mean $=\dfrac{\Sigma fx}{\Sigma f}$ $SD=\sqrt{\dfrac{1644640}{90}-(135)^2}$ M$_1$

$=\dfrac{12150}{90}$ M$_1$ $=6.9841$

$=135cm$ A$_1$ A$_1$ 7, 2D

(b) On graph paper at the back.

(c) (i) Median $=\dfrac{50}{100}\times 90$

$=45$

$=135cm$ ± 0.5 B$_1$ with location seen on graph.

(ii) 20^{th} percentile $=\dfrac{20}{100}\times 90$

$=18$

$=128.5$cm (graph)

80^{th} percentile $=\dfrac{80}{100}\times 90$ ± 0.5

$=72$ MA B$_1$

$=141$ cm (graph) for both values

Range $=141-128.5$ A$_1$ with location seen on graph.

$=12.5$cm

10 (a) $x=\sqrt[4]{N}$ B$_1$

$x^4-N=0$

$f(x)=x^4-N$ B$_1$

$f^1(x)=4x^3$

~~$f^1(x_n)=4x_n^3$~~

$$\cancel{f(x_n) = x_n^4 - N}$$

$$x_{n+1} = x_n - \frac{f(x_n)}{f^1(x_n)}$$

$$x_{n+1} = x_n - \frac{x_n^4 - N}{4x_n^3}$$

M1

$$= \frac{4x_n^4 - x_n^4 + N}{4x_n^3}$$

$$= \frac{3x_n^4 + N}{4x_n^3}$$

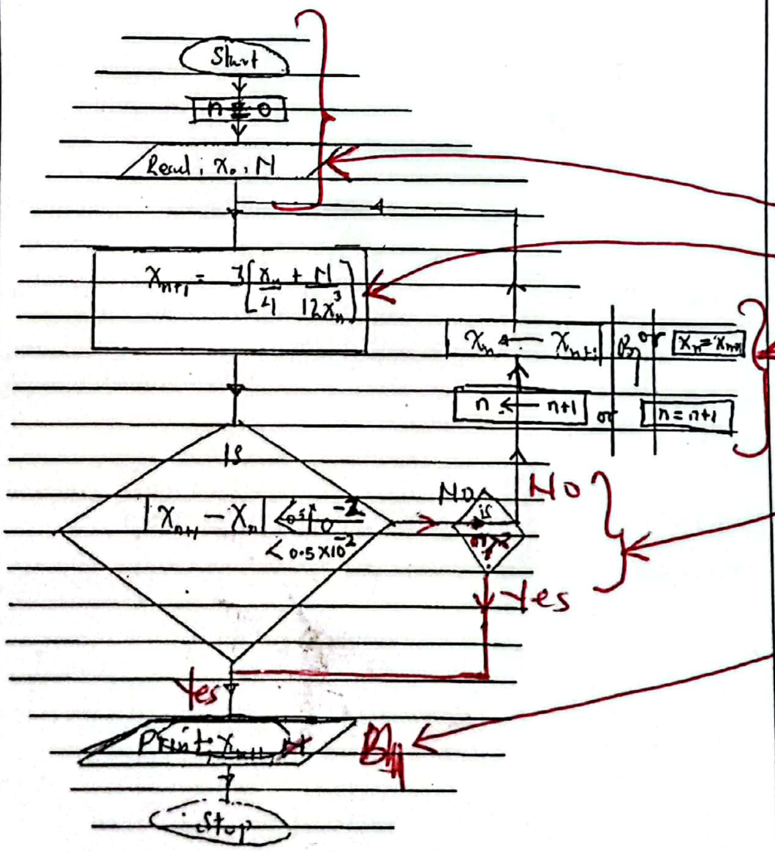
$$= \frac{3x^4}{4x_n^3} + \frac{N}{4x_n^3}$$

$$= 3\left[\frac{x_n}{4} + \frac{N}{3.4x_n^3}\right]$$

$$= 3\left[\frac{x_n}{4} + \frac{N}{12x_n^3}\right]$$ as required

B1

(b) (i) & (ii)



B1

B1

B1

B1

B1

$-2kx+4k$.

(c)

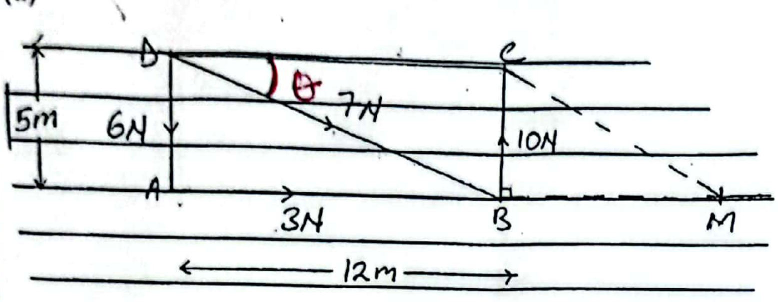
n	x_n	x_{n+1}	$\lvert x_{n+1}-x_n \rvert$
0	3	3.1667	0.1667
1	3.1667	3.1544	0.0123
2	3.1544	3.1543	0.0001

$x=3.15$, N = 99

B₁ → Correct x_n.
B₁ → Correct $|x_{n+1}-x_n|$
B₁ → Correct output.

12 marks

11 (a)



B₁

$$\underset{\sim}{R}=\begin{pmatrix}3\\0\end{pmatrix}+\begin{pmatrix}0\\10\end{pmatrix}+\begin{pmatrix}0\\-6\end{pmatrix}+\begin{pmatrix}+7\times\frac{12}{13}\\-7\times\frac{5}{13}\end{pmatrix}$$ M₁

Accept θ to ≥ 1D

to 1D of θ, i.e. 22.6

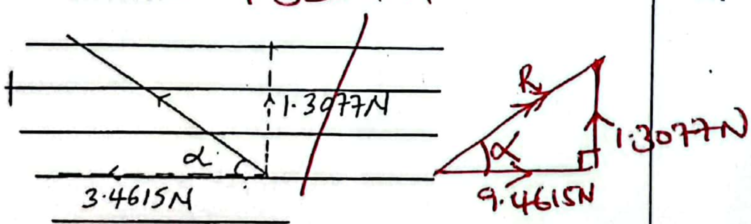
$$=\begin{pmatrix}\cancel{-3.4615}\ 9.4615\\1.3077\end{pmatrix}N$$ B₁

$\underset{\sim}{R}=\begin{pmatrix}9.4625\end{pmatrix}$

$R^2=9.4615^2+1.3077^2$

$$\left|\underset{\sim}{R}\right|=\sqrt{(-3.4615)^2+(1.3077)^2}$$ M₁

$=\cancel{3.7002N}$ 9.5514N A₁ ≥ 2D.



$$\alpha=\tan^{-1}\left(\frac{1.3077}{3.4615}\right)$$

$\alpha=\tan^{-1}\dfrac{1.3077}{9.4615}$

$=20.6958^0$

$\alpha=7.87°$ → with AB or with the horizontal. N82.13°E

The resultant is ~~3.7002N~~ in the direction ~~N69.30⁰W~~ A₁ — Stating direction.

(b) A $G=10\times12-\left(7\times12\times\frac{5}{13}\right)$ B₁ Correct value of G with units

$=87.6923$ Nm.

$$\cancel{\begin{vmatrix}x & -3.4615\\ y & 1.3077\end{vmatrix}=87.6923}\qquad \begin{vmatrix}x & 9.4615\\ y & 1.3077\end{vmatrix}=87.6923$$

$1.3077x\cancel{+3}9.4615y=87.6923$ B₁ {eqn}.

When $y=0, x=\dfrac{87.6923}{1.3077}$

$=67.0584m$ B₁ (~~Subst y=0~~)

	$\overline{BM} = 67.0584 - 12$ $= 55.0584$ $\overline{MC} = \sqrt{5^2 + 550584^2}$ $= 55.285m$	B1 M1 A1	
12	(i) Area, $\frac{1}{2}k\left(2+\frac{3}{2}\right)=1$ $\frac{7}{4}k=1$ $k=\frac{4}{7}$	M1 A1	
	(ii) for $0 \le x \le \frac{3}{2}$, $\quad f(x)=\frac{4}{7}$ $for\,\frac{3}{2} \le x \le 2$, $\quad \frac{0-\frac{4}{7}}{2-\frac{3}{2}} = \frac{y-\frac{4}{7}}{x-\frac{3}{2}}$ $\frac{\frac{-4}{7}}{\frac{1}{2}} = \frac{y-\frac{4}{7}}{x-\frac{3}{2}}$ $y-\frac{4}{7}=\frac{-8}{7}\left(x-\frac{3}{2}\right)$ $y=\frac{-8x}{7}+\frac{16}{7}$ $f(x)=\frac{8}{7}(2-x)$ $f(x) = \begin{cases} \frac{4}{7}, & 0 \le x \le \frac{3}{2} \\ \frac{8}{7}(2-x), & \frac{3}{2} \le x \le 2 \\ 0, & \text{otherwise} \end{cases}$	B1 M1 A1 B1	≥4D $-2\cdot\frac{4}{7}$
	(iii) $P\left(\frac{1}{2} \le x \le \frac{7}{4}\right) = \int_{\frac{1}{2}}^{\frac{3}{2}} \frac{4}{7}\,dx + \int_{\frac{3}{2}}^{\frac{7}{4}} \frac{8}{7}(2-x)\,dx$ $= \left[\frac{4x}{7}\right]_{\frac{1}{2}}^{\frac{3}{2}} + \frac{8}{7}\left[2x-\frac{1}{2}x^2\right]_{\frac{3}{2}}^{\frac{7}{4}}$ $= \frac{4}{7}+\frac{8}{7}\left[\left(\frac{7}{2}-\frac{49}{32}\right)-\left(3-\frac{9}{8}\right)\right]$ $= \frac{4}{7}+\frac{8}{7}\left(\frac{63}{32}-\frac{15}{8}\right)$ $= \frac{4}{7}+\frac{3}{28}$ $= \frac{19}{28}$	M1 M1 A1	Correct integral with limits seen Substn of limits ≥4D

$\frac{4}{7}\cdot 2$

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$\frac{4}{7}(-\frac{1}{2}x^2+4x)$ $-\frac{8}{7}x+\frac{16}{7}$

	(iv) $E(X)=\int_0^1 x.\frac{4}{7}dx+\int_1^2 x.\frac{8}{7}(2-x)dx$		
	$=\frac{4}{7}\left(\frac{1}{2}x^2\right)\Big\vert_0^1+\frac{8}{7}\left[x^2-\frac{1}{3}x^3\right]_1^2$	M1	Integration with limits
	$=\frac{2}{7}\cdot\frac{9}{4}+\frac{8}{7}\left(\frac{4}{3}-\frac{9}{8}\right)$	M1	Subst of limits
	$=\frac{9}{14}+\frac{8}{7}\left(\frac{5}{24}\right)$		
	$=\frac{37}{42}$	A1	$\geq 2D$
			12 marks
13	(a) $y_1=x_1+e_1,\ y_2=x_2+e_2$		
	$ey_1y_2=y_1y_2-x_1x_2$	M1	defn of error
	$=(x_1+e_2)(x_2+e_2)-x_1x_2$		
	$=x_1x_2+x_1e_2+x_1e_2+e_1e_2-x_1x_2$		
	$=x_1e_2+x_2e_1+e_1e_2$		
	As e_1e_2 becomes two small then $e_1e_2\approx 0$	B1	assumption
	$ey_1y_2=x_1e_2+x_2e_1$	B1	
	$\left\vert\frac{ey_1y_2}{y_1y_2}\right\vert=\left\vert\frac{x_1e_2+x_1e_2}{x_1x_2}\right\vert$	M1	→ RE
	$=\left\vert\frac{e_2}{x_2}+\frac{e_1}{x_1}\right\vert$	B1	→ simplification
	$\leq\left\vert\frac{e_2}{x_2}\right\vert+\left\vert\frac{e_1}{x_1}\right\vert$	B1	triangular inequality
	$\left\vert\frac{ey_1y_2}{y_1y_2}\right\vert_{Max}=\left\vert\frac{e_1}{x_1}\right\vert+\left\vert\frac{e_2}{x_2}\right\vert$ ~~as required~~.	A1	
	(b) Let a = 2.675, b=4.800, c= 15.2		
	$e_a=0.5\times10^{-3}$, $e_b=0.5\times10^{-3}$ $e_c=0.5\times10^{-1}$		
	$d=0.92$ $e_d=0.5\times10^{-2}$		
	$Max\left(2.675\left(4.800-\frac{15.2}{0.92}\right)\right)$		
	$=2.6755\left[4.8005-\frac{15.15}{0.925}\right]$	M1	
	$=-30.9766$ -30.977	A1	
	$Min\left[2.675\left(4.800-\frac{15.2}{0.92}\right)\right]$		
	$=2.6745\left[4.7995-\frac{15.25}{0.915}\right]$	M1	
	$=-31.7508$ -31.739	A1	
	$Range[-31.7508,-30.9766]$ $[-31.739,-30.977]$	B1	

$-\frac{4}{7}$ $\frac{4}{7}$ $\frac{4}{7}x$ $\frac{6}{7}(2x-2x)$

14 (a) $\underset{\sim}{r}(t) = 4\sin 3t\underset{\sim}{i} + 8\cos 3t\underset{\sim}{j}$

at $t = 0$, $r(o) = 4\sin o\underset{\sim}{i} + 8\cos o\underset{\sim}{j}$

$\cancel{= 8im}$ $8\underset{\sim}{j}\ m$

$v = \dfrac{d(r(t))}{dt} = 12\cos 3t\underset{\sim}{i} - 24\sin 3t\underset{\sim}{j}$ — B_1

at $t = 0$, $v(o) = 12\cos oi + 8\cos oi - 24\sin o\underset{\sim}{j}$ — M_1

$= 12\underset{\sim}{i}\ ms^{-1}$ — M_1

$\underset{\sim}{a} = \dfrac{dv}{dt} = -36\sin 3t\underset{\sim}{i} - 72\cos 3t\underset{\sim}{j}$ — A_1

but $\underset{\sim}{F} = m\underset{\sim}{a}$ — B_1

$\underset{\sim}{F} = 3(-36\sin 3t\ \underset{\sim}{i} - 72\cos 3t\ \underset{\sim}{j})$ — M_1

$= 3(-9)(4\sin 3t\ \underset{\sim}{i} - 8\cos 3t\underset{\sim}{j})$

$= -27(4\sin 3t\ \underset{\sim}{i} + 8\cos 3t\underset{\sim}{j})$ — M_1

$= -27\underset{\sim}{r}$ — A_1

(b) Speed = $10ms^{-1}$ cross section area = $5cm^2$

h = 4m

Volume of water = $10 \times \dfrac{5}{100^2} m^3$

$= \dfrac{50}{100^2} m^3$ — B_1

Mass of water raised and issued per second.

$= \dfrac{50}{100^2} \times 1000kg(density)$

$= 5kg$ — B_1

$PE = mgh$

$= 5(9.8)(4)$

$= 196J$

$KE = \dfrac{1}{2}mv^2$

$= \dfrac{1}{2}(s)(10)^2$

$= 250J$

Work done per second by the pump.

= PE + K.E

= (96 + 250) J

= 446J — M_1

= 446W — A_1

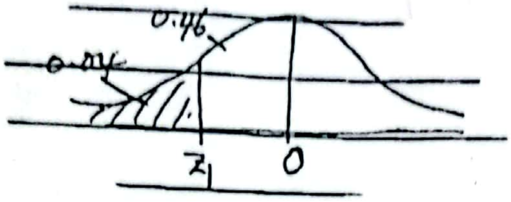
15 (a) Let x be a .r.v for "the marks scored"

n = 350

$P(X < 40) = \dfrac{14}{350}$

$P(X > 60) = \dfrac{21}{350}$

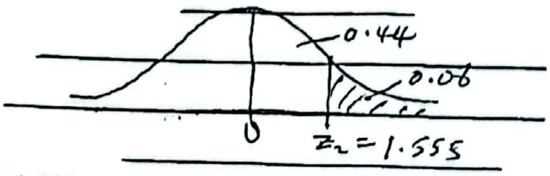
$P(X<40)=P\left(z<\dfrac{40-\mu}{\sigma}\right)$



$\dfrac{40-\mu}{\sigma}=-1.751$ B1

$40-\mu=-1.751\sigma$ ....(i)

$P(X>60)=P(z<)\dfrac{60-\mu}{\sigma}$



$\dfrac{60-\mu}{\sigma}=1.555$ B1

$60-\mu=1.555\sigma$ ......(ii)

$\mu-1.751\sigma=40$

$$\begin{array}{l} \mu+1.555\sigma=60 \\ \hline -3.30688=-20 \end{array}$$ M1

$\sigma=6.050$ (3dp) A1 $\geqslant$ 3D

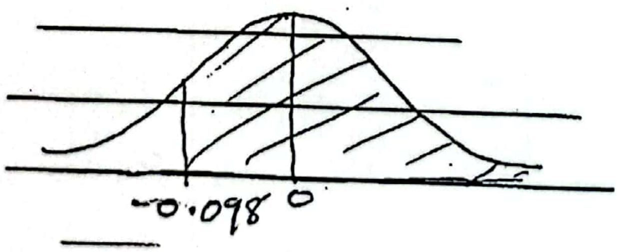
From $\mu=40+1.751\sigma$

$=40+1.751(6.050)$ M1

$=50.594$ (3dp) A1 $\geqslant$ 3D

(b) $P(X>50)=P\left(Z>\dfrac{50-50.594}{6.050}\right)$

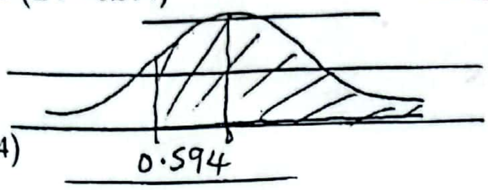
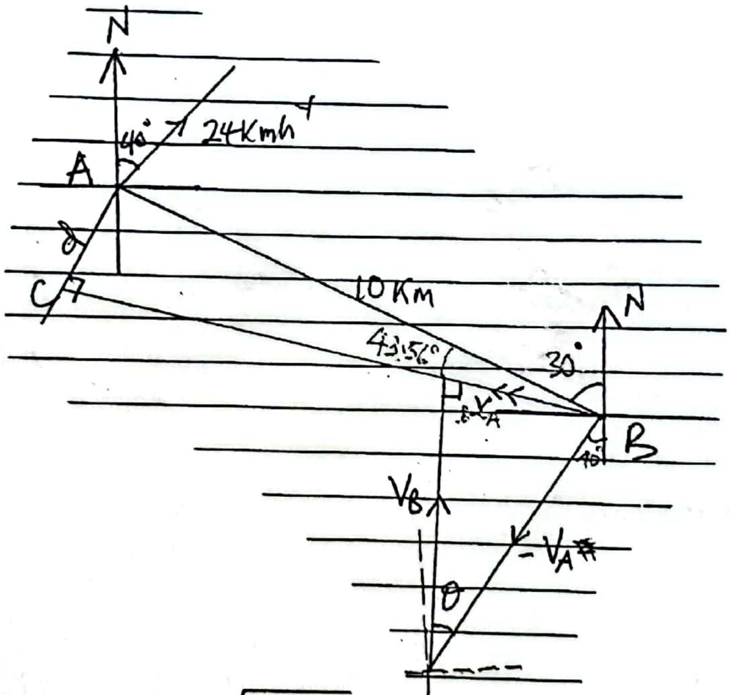
$=P(Z>-0.098)$ M1 $\geqslant$ 3D

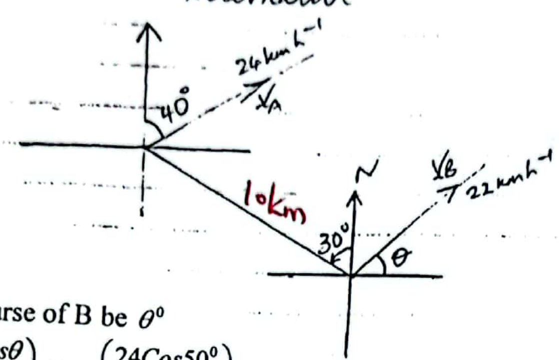


$=0.5+\phi(0.098)$

$=0.5+0.0391$ M1

$=0.5391$ A1

	(c) $p(X>47)=P\left(Z>\frac{47-50.594}{6.050}\right)$ $=P(Z>-0.594)$  $=0.5+\phi(0.594)$ $=0.5+0.2238$ $=0.7238$ Number of students = 350 (0.7238 – 0.5391) = 350 (0.1847) = 64.6 $\approx 65 students$	M_1 B_1 M_1 A_1	
16	(a)  BVA $=\sqrt{24^2-22^2}$ $=9.5917\text{kmh}^{-1}$ Cos $\theta=\frac{22}{24}, \theta=Cos^{-1}\left(\frac{22}{24}\right), \theta=23.56^0$ Course is N16.44^{0}E or Bearing is 016.44^0	B_1 B_1 M_1 B_1 M_1B_1 A_1	Location of position correct vector diagrams
	(b) d = 10 sin 43.56^0 = 6.8911km	M_1 A_1	
	(c) Time = $\frac{BC}{\lvert BVA\rvert}=\frac{10Cos43.56^0}{9.5917}$ $=0.7555hrs\times60$ $=45\min utes.$	M_1 B_1 A_1	
			12marks

	Working	Marks	Comments
	(a) Alternative 	B_1	Correct vector diagrams
	Let the course of B be θ^o $\underset{\sim}{V_B} = \begin{pmatrix} 22Cos\theta \\ 22Sin\theta \end{pmatrix}, V_A = \begin{pmatrix} 24Cos50^0 \\ 24Sin50^0 \end{pmatrix}$	B_1	for both
	${}_B\underset{\sim}{V_A} = \begin{pmatrix} 22Cos\theta \\ 22Sin\theta \end{pmatrix}, V_A = \begin{pmatrix} 24Cos50^0 \\ 24Sin50^0 \end{pmatrix}$ $= \begin{pmatrix} 22Cos\theta - 15.4269 \\ 22Sin\theta - 18.3851 \end{pmatrix}$	B_1	
	$\underset{\sim}{V_B} \cdot {}_B\underset{\sim}{V_A} = 0;\ \begin{pmatrix} 22Cos\theta \\ 22Sin\theta \end{pmatrix} \cdot \begin{pmatrix} 22Cos\theta - 15.4269 \\ 24Cos\theta - 183851 \end{pmatrix} = 0$	M_1	
	$339.3918Cos\theta + 404.4722Sin\theta = 484$		
	$\sqrt{339.3918^2 + 404.4722^2}Cos(\theta - 50^0) = 484$	M_1	
	$Cos(\theta - 50^0) = \frac{484}{528.0005}$ $\theta - 50^0 = 23.56^0$ $\theta = 73.56^0$		
	The course must be on bearing 016.44^0 or N 16.44^0E	B_1 A_1	

(b) $r_B(o) = \begin{pmatrix} 0 \\ 0 \end{pmatrix} km \quad r_A(o) = \begin{pmatrix} -10Cos60^\circ \\ +10Sin60^\circ \end{pmatrix}$ — B1 — for both

$r_B(t) = \begin{pmatrix} 0 \\ 0 \end{pmatrix} + \begin{pmatrix} 22Cos73.56^\circ \\ 22Sin73.56^\circ \end{pmatrix} t$

$r_A(t) = \begin{pmatrix} -10Cos60^\circ \\ 10\sin 60^\circ \end{pmatrix} + \begin{pmatrix} 24Cos50^\circ \\ 24Sin50^\circ \end{pmatrix} t$

$B r_A(t) = \cancel{B r_A(0) + B v_A t}$.

$= . \; r_B(t) - r_A(t)$

$_B r_A(t) = \begin{pmatrix} 6.2262t \\ 21.8006t \end{pmatrix} - \begin{pmatrix} -5 + 15.4269t \\ 8.6603 + 18.3851t \end{pmatrix}$ — B1

$_B r_A(t) = \begin{pmatrix} 5 - 9.227t \\ -8.6603 + 2.7155t \end{pmatrix}$ ....⊗

$_B v_A \cdot {_B r_A} = 0$

$\begin{pmatrix} 5 - 9.227t \\ -8.6603 + 2.7155t \end{pmatrix} \cdot \begin{pmatrix} -9.2007 \\ 2.7155 \end{pmatrix} = 0$ — M1

$-46.0035 + 84.6529t - 23.5170 + 7.3739t = 0$

$92.0268t = 69.5205$

$T = 0.7554$ hours x 60

Or t = 45 minutes — A1

Distance

$_B r_A(0.7554) = \begin{pmatrix} -1.9502 \\ -6.6090 \end{pmatrix} km$

$\left| {_B r_A}(0.7554) \right| = \sqrt{(-1.9502)^2 + (-6.6090)^2}$

$= 6.8907 km$ — A1

alternative ii (from)

$B^v A(t) = \begin{pmatrix} 5 - 9.2007t \\ -8.6603 + 2.7155t \end{pmatrix}$

$\frac{d}{dt} \left| B^r A(t)^2 = 0 \right|$ — B1

$\frac{d}{dt}\left((5 - 9.2007t)^2 + (-8.6603 + 2.7155)^2 \right) = 0$ — M1

$t = 0.7554 \times 60$

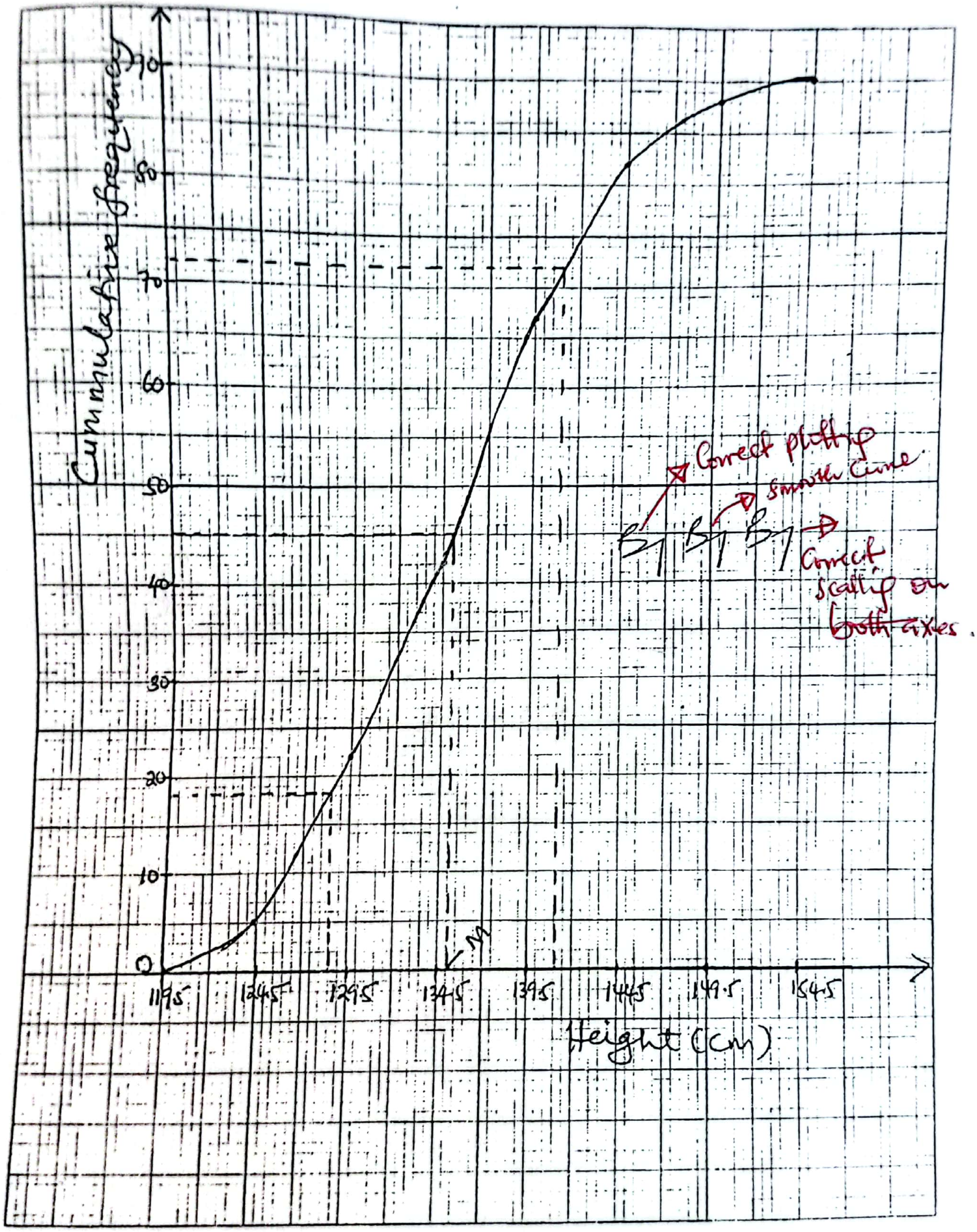
$= 45$ minutes — A1

$\left| B^r A(t) = 0.7554 \right| = \left| \begin{pmatrix} -1.9502 \\ -6.6090 \end{pmatrix} \right|$ — M1

$= 6.8907 km$ — A1

CamScanner

9. (b)


Cummulative frequency
90
80
70
60
50
40
30
20
10
0
119.5
124.5
129.5
134.5
139.5
144.5
149.5
154.5
Height (cm)
M
Correct plotting
Smooth curve
B1 B1 B1
Correct scaling on both axes.

END