MATIGO MOCKS 2024
UACE MARKING GUIDE 2024
PURE MATHEMATICS P425/1

NO	SOLUTION	REMARKS	MKS
NO.1	$4^x - 2^{x+3} + 15 = 0$		M1
	$2^{2x} - 2^{3+3} + 15 = 0$		
	$(2^x)^2 - 2^3 - 2^x + 15 = 0$		
	let $2^x = \mathrm{m}$		
	$\mathrm{m}^2 - 8\mathrm{m} + 15 = 0$		
	$\mathrm{m} = \dfrac{8 \pm \sqrt{(-8)^2 - 4(1)(15)}}{2 \times 1}$		M1
	either $\mathrm{m} = 5$ or $\mathrm{m} = 3$		B1
	for $\mathbf{m = 5}$		
	$2^x = 5$		
	$\mathrm{x}\log 2 = \log 5$		
	$x = \dfrac{\log 5}{\log 2}$		
	$\underline{= 2.3219}$		A1
	for $\mathbf{m = 3}$		
	$2^x = 3$		
	$x \log 2 = \log 3$		
	$x = \dfrac{\log 3}{\log 2}$		
	$\underline{= 1.5850}$		A1
			<u>05</u>

No.2	$$\frac{\tan\theta}{\sin\theta}-\frac{\sin\theta}{\tan\theta}=\frac{\sin\theta}{\cos\theta\sin\theta}-\frac{\sin\theta}{\frac{\sin\theta}{\cos\theta}}$$ $$=\frac{1}{\cos\theta}-\sin\theta.\frac{\cos\theta}{\sin\theta}$$ $$=\frac{1}{\cos\theta}-\frac{\cos\theta}{1}$$ $$=\frac{1-\cos^2\theta}{\cos\theta s}$$ $$\frac{\tan\theta}{\sin\theta}-\frac{\sin\theta}{\cos\theta}=\frac{\sin^2\theta}{\cos\theta}$$ $$\underline{=\tan\theta.\sin\theta}$$		M1 M1 M1 M1 A1 <u>05</u>
NO.3	$$\underset{\mathrm{OP}}{\rightarrow}=\frac{\mu\underset{OA}{\rightarrow}+\lambda\underset{OB}{\rightarrow}}{\lambda+\mu}$$ $$\underset{OM}{\rightarrow}=\frac{3\left(3\underbrace{\mathrm{i}}+2\underbrace{\mathrm{j}}-5\mathrm{k}\right)+4\left(\underbrace{\mathrm{i}}+3\underbrace{\mathrm{j}}+2\mathrm{k}\right)}{2+4}$$ $$=\frac{13\underbrace{\mathrm{i}}+18\underbrace{\mathrm{j}}=7\mathrm{k}}{7}$$ $$=\frac{13}{7}\underbrace{\mathrm{i}}+\frac{18}{7}\underbrace{\mathrm{j}}-\underbrace{\mathrm{k}}$$		M1 M1 M1 M1 A1 <u>05</u>
No.4	$$3x-4y+14=0$$ $$x=\left(\frac{4y-14}{3}\right)$$ from $x^2+y^2+4x+6y-3=0$		M1 M1

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$$\left(\frac{4y-14}{3}\right)^2 + y^2 + 4\left(\frac{4y-14}{3}\right) + 6y - 3 = 0$$

$$\frac{16y^2 - 112y + 169}{9} + y^2 + \frac{16y - 56}{3} + 6y - 3 = 0$$

$$16y^2 - 112y + 196 + 9y^2 + 48y - 168 + 54y - 12 = 0$$

$$25y^2 - 10y + 1 = 0$$

$$\mathrm{A} = 25\,, \mathrm{B} = 10, \qquad \mathrm{C} = 1$$

$$B^2 = (-10)^2 = 100$$

$$4AC = 4 \times 25 \times 1 = 100$$

Since $B^2 = 4AC$, the line is a tangent to circle.

</td>
<td>Accept
$B^2 - 4AC = 0$
$B^2 = 4AC$

Give marks to a student who solves the equation and gets one point of intersection.</td>
<td>M1

M1

B1</td>
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<td>NO.5</td>
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$$|x-2| < 3x - 4$$

$$(|\mathrm{x}-2|)^2 < (3x-4)^2$$

$$x^2 - 4x + 4 < 9x^2 - 24x + 16$$

$$-8x^2 + 20x - 12 < 0$$

$$2x^2 - 5x + 3 > 0$$

$$(2x-3)(x-1) > 0$$

Critical points are x=1 and x = 1.5

<table>
<tr><td>x</td><td>x < 1</td><td>1 < x < 1.5</td><td>x > 1.5</td></tr>
<tr><td>2x – 3

x – 1

(2x – 3) (x –1)</td><td>-

-

+</td><td>-

+

-</td><td>+

+

+</td></tr>
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x < *1* and *x* > *1-5*

testing

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M1
M1

M1</td>
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	for x < 1 taking x = 0.5 $$\lvert 0.5-2\rvert < 3(0.5)-4$$ $$1.5 < -2.5 \text{: false}$$ For x> 1.5, taking x = 2. $$\lvert 2-2\rvert < 3(2)-4$$ $$0 < 2.: true.$$ $$: x > 1.5$$		A1 05
NO.6	$$\frac{dv}{dt} = 0.05m^2s^{-1}$$ $$A = 4\pi r^2$$ $$\frac{dA}{dt} = 8\pi r$$ $$\frac{dA}{dt} = \frac{dA}{dr}\cdot\frac{dr}{dt}$$ $$V = \frac{4}{3}\pi r^2$$ $$\frac{dv}{dr} = 4\pi r^2$$ $$\frac{dv}{dt} = \frac{dv}{dr}\cdot\frac{dr}{dt}$$ $$0.05 = 4\pi r^2\ \frac{dr}{dt}$$ $$\frac{dA}{dt} = 8\pi r\cdot\frac{0.05}{4\pi r^2}$$ $$= \frac{8\times 0.05}{4r}$$		M1 M1 M1 M1

	$= \frac{8 \times 0.05}{4 \times 0.4}$ $\underline{= \mathbf{0.25 cm^2 s^{-1}}}$		A1 **05**
No.7	$\tan\theta = \pm \frac{m_2 - m_1}{1 + m_1 m_2}$ $\tan 45 = \pm \frac{2 - m_1}{1 + 2m_1}$ $1 = \frac{2 - m_1}{1 + 2m_1}$ $2 - m_1 = 1 + 2m_1$ $3m_1 = 1$ $m_1 = \frac{1}{3}$ Also: $\frac{-1}{1} = \frac{2 - m_1}{1 + 2m_1}$ $-1(1 + 2m_1) = 2 - m_1$ $-1 - 2m_1 = 2 - m_1$ $m_1 = -3$ if $m_1 = -3$ $\frac{y - 3}{x - 2} = \frac{-3}{1}$ $y - 3 = 3x + 6$ $y = -3x + 9$		M1 M1 A1 if done

	$\text{if } m_1 = \frac{1}{3}$ $\frac{y-3}{x-2} = \frac{1}{3}$ $3y - 9 = x - 2$ $3y - x - 7 = 0$		M1 A1 **05**
No.8	$\frac{dy}{dx} = \frac{114y^2}{e^2}$ $\frac{dy}{1+4y^2} = \frac{dx}{e^x}$ $\int \frac{1}{1 = 4y^2} dy = \int e^{-x} dx$ $\frac{1}{1 \times 2} \tan^{-1}\left(\frac{2y}{1}\right) = e^{-x} + \text{c}$ $\frac{1}{2} \tan^{-1}(2y) + e^{-x} = \text{c}$		 M1 M1 M1 M1 A1 **05**
No.9	SECTION B: (i) $\overrightarrow{AB} = \begin{pmatrix} 5 \\ -2 \\ -2 \end{pmatrix} - \begin{pmatrix} 4 \\ 0 \\ 1 \end{pmatrix}$ $= \begin{pmatrix} 1 \\ -2 \\ 13 \end{pmatrix}$ $\overrightarrow{CD} = \begin{pmatrix} -1 \\ 0 \\ -4 \end{pmatrix} - \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$ $= \begin{pmatrix} -2 \\ -1 \\ -4 \end{pmatrix}$ $\lvert\overrightarrow{AB}\rvert = \sqrt{1^2 + (-2)^2 + (-1)^2} = \sqrt{14}$ $\lvert\overrightarrow{CD}\rvert = \sqrt{(-2)^2 + (-1)^2 + (-4)^2} = \sqrt{21}$		 M1 M1

	$\overrightarrow{AB} \cdot \overrightarrow{CD} = \lvert\overrightarrow{AB}\rvert . \lvert\overrightarrow{CD}\rvert \cos\theta$		
	$\begin{pmatrix}1\\-2\\-3\end{pmatrix}\begin{pmatrix}-2\\-1\\-4\end{pmatrix} = \sqrt{14}\,.\sqrt{21}\,\cos\theta$		M1
	$-2+2+12 = \sqrt{294}\,\cos\theta$		
	$12 = \sqrt{294}\,\cos\theta$		M1
	$\cos\theta = \dfrac{12}{\sqrt{294}}$		
	$\theta = \cos^{-1}\left(\dfrac{12}{7\sqrt{6}}\right)$		
	$\theta = 45.58^{0}$		A1
	(ii) $\underset{\sim}{r}\,AB = \begin{pmatrix}4\\0\\1\end{pmatrix} + \mu\begin{pmatrix}-2\\-1\\-4\end{pmatrix}$		
	For intersection:		
	$\underset{\sim}{r}\,AB = r\,\underset{\sim}{CD}$		
	$\begin{pmatrix}4\\0\\1\end{pmatrix} + \lambda\begin{pmatrix}1\\-2\\-3\end{pmatrix} = \begin{pmatrix}1\\1\\0\end{pmatrix} + \mu\begin{pmatrix}-2\\-1\\-4\end{pmatrix}$		M1
	$\begin{pmatrix}4+\lambda\\-2\lambda\\1-3\lambda\end{pmatrix} = \begin{pmatrix}1-2\mu\\1-\mu\\-4\mu\end{pmatrix}$		
	$4+\lambda = 1+2\mu$		
	$\lambda + 2\mu = -3 \ldots.(i)$		M1
	$-2\lambda + \mu = 1 \ldots(ii)$		
	$-3\lambda + 4\mu = -1 \ldots.(iii)$		
	$2\lambda + 4\mu = -6$		

M1

$$\underline{-2\lambda + \mu = 1}$$

$$5\mu = -5$$

$$\mu = -1$$

From equation (ii) $-2\lambda - 1 = 1$

$$-2\lambda = 2$$

$$\lambda = -1$$

Subtracting μ and λ in equation (iii)

$$-3(-1) + 4(-1) = -1$$
$$3 - 4 = -1$$
$$-1 = -1$$

Since R.H.S. = L.H.S. the lines intersect. A1

(iii) $\overrightarrow{OM} = \begin{pmatrix} 4+\lambda \\ -2\lambda \\ 1-3\lambda \end{pmatrix}$ $\overrightarrow{AB}$

$$\rightarrow \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$$

$$\overrightarrow{OP} = \begin{pmatrix} 1 \\ 5 \\ 6 \end{pmatrix}$$

$$\overrightarrow{PM} = \begin{pmatrix} 4+\lambda \\ -2\lambda \\ 1-3\lambda \end{pmatrix} - \begin{pmatrix} 1 \\ 5 \\ 6 \end{pmatrix}$$

$$\overrightarrow{PM} = \begin{pmatrix} 3+\lambda \\ -2\lambda-5 \\ -5-3\lambda \end{pmatrix}$$ M1

$$\overrightarrow{\mathrm{PM}}.\mathrm{d} = 0$$

$$\begin{pmatrix} 3+\lambda \\ -5-2\lambda \\ -5-3\lambda \end{pmatrix} . \begin{pmatrix} 1 \\ -2 \\ -3 \end{pmatrix} = 0$$

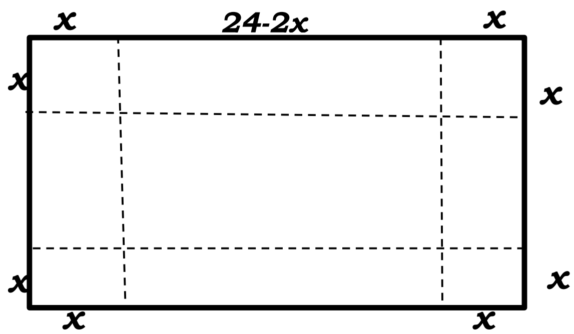
M1

	$3+\lambda+10+4\lambda+15+9\lambda=0$ $14\lambda+28=0$ $\lambda=\frac{-28}{14}$ $\lambda=-2$ $\overrightarrow{PM}=\begin{pmatrix}3-2\\-5+4\\-5+6\end{pmatrix}=\begin{pmatrix}1\\-1\\1\end{pmatrix}$ $\lvert\overrightarrow{PM}\rvert=1^2+(-1)^2+1^2$ $=\sqrt{3}$		A1 **12**
NO.10	a) $\frac{\cos\theta}{1-\cos\theta}-\frac{1-\cos\theta}{1+\cos\theta}=\frac{4}{\sin\theta\tan\theta}$ $L.H.C=\frac{1+\cos\theta}{1-\cos\theta}-\frac{1-\cos\theta}{1+\cos\theta}$ $=\frac{(1+\cos\theta)^2-(1-\cos\theta)}{(1-\cos\theta)\,(1+\cos\theta)}$ $=\frac{1+2\cos\theta+\cos^2\theta-1+2\cos\theta-\cos^2\theta}{1-\cos^2\theta}$ $=\frac{4\cos\theta}{\sin^2\theta}$ $=\frac{4\cos\theta}{\sin\theta\,.\frac{\sin\theta}{\cos\theta}}$ $=\frac{4}{\sin\theta\tan\theta}$ $\frac{1+\cos\theta}{1-\cos\theta}-\frac{1-\cos\theta}{1+\cos\theta}=3$		M1 M1 M1 M1

	$$\frac{4}{\sin\theta\tan\theta} = 3$$		
	$$\frac{4}{\sin\theta \,.\, \frac{\sin\theta}{\cos\theta}} = 3$$		M1
	$$\frac{4\cos\theta}{1-\cos^2\theta} - 3 = 0$$		
	$$\frac{4\cos\theta - 3(1-\cos^2\theta}{1-\cos^2\theta} = 0$$		M1
	$$3\cos^2\theta + 4\cos\theta - 3$$		
	$$\cos\theta = \frac{-4 \pm \sqrt{4^2 - 2(3)(-3)}}{2\times 3}$$		M1
	$$either\ \cos\theta = \frac{-2+\sqrt{13}}{3} \quad or\ \cos\theta = \frac{-2-\sqrt{13}}{3}$$		
	$$\text{for } \cos\theta = \frac{-2+\sqrt{13}}{3} \qquad \text{for } \cos\theta = \frac{-2-\sqrt{13}}{3}$$		
	$$\theta = 57.64^0, \qquad 302.36^0$$		A1
	b) Let $\tan^{-1}({}^{1}/_{2}) = \propto, \tan^{-1}({}^{1}/_{3}) = \beta$		
	$$\tan\propto = {}^{1}/_{2}\,;\ \tan\beta = {}^{1}/_{2}$$		
	$$\tan(\propto + B) = \frac{\tan\propto + \tan\beta}{1 - \tan\propto\tan\beta}$$		M1
	$$\propto + \beta = \tan^{-1}\left[\frac{\frac{1}{2}+\frac{1}{3}}{1-\left(\frac{1}{2}\right)\left(\frac{1}{3}\right)}\right]$$		M1
	$$\propto + \beta = \tan^{-1}(1)$$		M1
	$$\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = {}^{\pi}/_{4}$$		A1 **12**

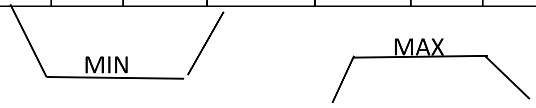
No.11	$a + ar = -4 \ldots.(\mathrm{i})$ $ar^2 = 4ar^2 \ldots(ii)$ $ar^2.r^2 = 4a.r^2$ $r^2 = 4$ $r = \pm 2.$		M1
	from equation (i) $a(1 + r) = -4$ $a(1 + 2) = -4$ $a = {}^{-4}/_{3}$ when $r = -2$ $a(1 - 2) = -4$ $a = {}^{-4}/_{-1}$ $a = 1$		M1
	when $r = 2, a = \frac{4}{3}$		B1
	when $r = -2, a = 1$		B1
	the possible G. P. S are; $\frac{-4}{3}, \frac{-8}{3} \frac{-16}{3} \frac{-32}{3} + \cdots.$ $1 - 2 + 4 - 8 + 16 - 32 + \cdots$		A1
	b) (i) $\propto + \beta = 7k$ $\propto \beta = k^2$		
	$(\propto - \beta) = \sqrt{\propto^2 - 2 \propto \beta + \beta^2}$ $(\propto - \beta) = \sqrt{(\propto + \beta)^2 - 4 \propto \beta}$ $= \sqrt{(7k)^2 - 4k^2}$		M1

	$= \sqrt{49k^2 - 4k^2}$ $= \sqrt{45k^2}$ $= \sqrt{9k^2 \times 5}$ $3k\sqrt{5}$ (ii) sum of roots $= \propto +1 + \beta - 1$ $= \propto + \beta$ $= 7k$ product of roots $= (\propto +1)(\beta - 1)$ $= \propto \beta - \propto + \beta - 1$ $= \propto \beta - 1 - (\propto - \beta)$ product of roots $= k^2 - 1 - 3k\sqrt{5}$ $= k^2 - 3k\sqrt{5 - 1}$ $x^2 + 7kx + k^2 - 3k\sqrt{5 - 1} = 0$		A1 M1 M1 M1 A1
No.12 (a)	$\frac{dy}{dx} = \sqrt{1 + 2x}$ $\frac{dy}{dx} = (1 + 2x)^{\frac{1}{2}}$ $\int dy = \int (1 + 2x)^{\frac{1}{2}} dx$ $y = \frac{(1 + 2x)^{\frac{3}{2}}}{{}^{3}/_{2}\,(2)} + c$ $y = {}^{1}/_{3}\,(1 + 2x)^{\frac{3}{2}} + c$ $y(4) = 11$ $11 = {}^{1}/_{3}\,(1 + 2(4)^{\frac{3}{2}} + c$		M1 M1

	$11 = {}^{1}/_{3}\,(9)^{\frac{3}{2}} + c$		
	$c = 2$		
	$: y = \frac{1}{3}(1 + 2x)^{\frac{3}{2}} + 2$		A1
(b)			
	$\mathrm{v} = \mathrm{L} \times \mathrm{w} \times \mathrm{h}$ $\mathrm{v} = (24 - 2x)(9 - 2x)x$ $\mathrm{v} = (216 - 48x - 18x + 4x^2)x$ $v = (216 - 48x - 18x + 4x^2)x$ $v = (216 - 66x + 4x^2)x$ $v = 216x - 66x^2 + 4x^3$		M1
	$\frac{dy}{dx} = 216 - 132x + 12x^2$ for maximum volume		M1
	$\frac{dy}{dx} = 0$		
	$216 - 132x + 12x^2 = 0$		M1
	$12x^2 - 132x + 216 = 0.$ $x = -132 \pm \sqrt{(-132)^2 - (12)(216)}$		M1
	$Either\ x = 9\ or\ x = 2.$		M1

$when\ x = 9$ $\qquad$ $when\ x = 2$

Value of x	L	9	R		L	2	R
Sign of x	-	0	+		+	0	-



Dimension for maximum volume are 20cm, 5cm, and 2cm. A1

12

No.13

$$\int xtan^2 xdx$$

$$let\ a = x$$

$$\frac{dy}{dx} = 1$$

$$\frac{dy}{dx} = \tan^2 x$$ M1

$$v = \int tan^2 xdx$$

$$v = \int sec^2 x - 1\, dx$$

$$v = tanx - x$$ M1

$$\int xtan^2 xdx = x(tanx - x) - \int tanx - x\, dx$$ M1

$$= xtanx - x^2 + -in|secx| + \frac{x^2}{2} + c$$ M1

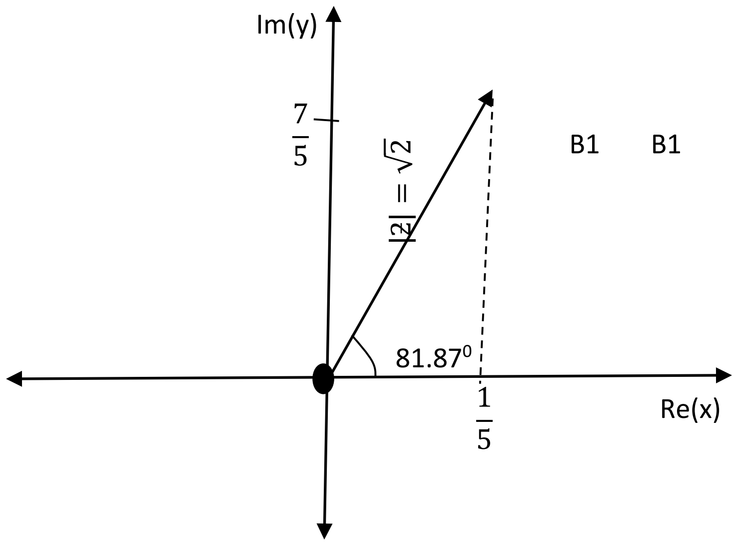
$$\int \sqrt{1 - x^2}\ dx = {}^1/_4 . 2 \sin u \cos u + \frac{u}{2} + k$$

$$= {}^1/_2 \sin u \cos u + \frac{u}{2} + k$$

$$= {}^1/_2 x\sqrt{1 - x^2} + \frac{sin^{-1}x}{2} + k$$ M1

$$\int xsin^{-1}xdx = \frac{x^2}{2}\ sin^{-1}x + {}^{-1}/_2\, sin^{-1} + \frac{1}{2}\left(\frac{x}{2}\sqrt{1 - x^2} + \frac{sinx^{-1}}{2} + c\right)$$

	$=\frac{x^2}{2}sin^{-1}x+\frac{1}{4}x\sqrt{1-x^2}-{}^1\!/_4\,sin^{-1}x+c$ $={}^1\!/_4\,(2x^2-1)sin^{-1}x+{}^1\!/_4\,x\sqrt{1-x^2}+c.$		M1 A1
14(a) (b)(i)	$\sqrt{-3+4i}=\pm(a+bi)$ $-3+4i=\ a^2+2bi\pm b^2$ $-3=a^2-b^2\ldots(i)$ $2b=4\ldots(ii)$ $b=2$ from (i) $-3=a^2-2^2$ $a^2=1$ $a=1$ $\sqrt{3+4i}=\pm(1+2i)$ $=1+2\underbrace{i}\ and-1-2i$ $=\frac{-1+3i}{2+i}$ $=\frac{(-1+3i)(2-i)}{(2+i)(2-i)}$ $=\frac{-2+i+6i+3}{2^2+1}$ $z=\frac{1+7i}{5}\quad M1$ $z=\frac{1}{5}+\frac{7}{5}i\quad A1$		 M1 M1 M1 M1 A1A1 M1 M1

	 B1 B1		
15(a)	$y^2 = 4ax$ let the point A$(at^1, 2at)$ lie on the parabola. $2\mathrm{y}\frac{\mathrm{dy}}{\mathrm{dx}} = 4\mathrm{a}$ $\frac{\mathrm{dy}}{\mathrm{dx}} = \frac{4a}{2y}$ $\frac{dy}{dx} = \frac{4a}{4at}$ $\frac{dy}{dx} = {}^1/_t$ equation of a tangent is; $(y - 2at) = {}^1/_t\,(x - at^2)$ $ty - 2at^2 = x - at^2$ $ty = x + at^2. \ldots (i)$ $y = \frac{x + at^2}{t}$ from $y^2 = 8ax. \ldots (iii)$		M1 M1 M1

	$$\left(\frac{x+at^2}{t}\right)^2 = 8ax$$ $$x^2+2axt^2+a^2+4 = 8axt^2$$ $$x^2-6axt^2+a^2+4=0$$ let the mid − point of LM be (X, Y) $$X = 3at^2.......\text{(iii)}$$ from equation (i) and (ii) $$x = ty - at^2$$ $$: y^2 = 8a(ty - at^2)$$ $$y^2 = 8aty - 8a^2t^2$$ $$y^2 - 8aty + 8a^2t^2 = 0$$ $$Y = 4at \dots .(iv)$$ $$: t = {}^{Y}/_{4a}.$$ from eqn (iii) $$X = 3a\ \frac{Y^2}{(4a)^2}$$ $$X = \frac{3y^2}{16a}$$ $$16ax = 3y^2$$ $$16ax = 3y^2$$		M1 M1 M1 A1
(b)	Equation of chord of contact is $$\frac{xx_1}{a^2}+\frac{yy_1}{b^2}=1$$ $$when\ x = 0$$ $$y = \frac{b^2}{y_1}$$ $$when\ y = 0$$ $$x = \frac{a^2}{x_1}$$		M1 M1

	$L\ is\ \left(0, \frac{b^2}{y_1}\right)\ and\ M\ is\ \left(\frac{a^2}{x_1}, 0\right)$ $mid\ point\ is\ \left(\frac{a^2}{2x_1}, \frac{b^2}{2y_1}\right)$ $\left(\frac{a^2}{2x_1}\right)^2 + \left(\frac{b^2}{2y_1}\right)^2 = 1$ $\frac{a^4}{4x_1^2} + \frac{b^4}{4b_1^2} = 1$ $: The\ locus\ of\ (x_1, y_1) is\ \frac{a^4}{4x_1^2} + \frac{b^4}{4y_1^2} = 1$		M1 M1 A1 **12**
16.	$lny + \frac{x}{y}\frac{dy}{dx} = secxtanx\ ; y(0) = \frac{\pi}{2}$ $\int \frac{d}{dx}(xlny)dx = \int secxtanx\ dx$ $xlny = secx + c$ $(0)ln\left(\frac{\pi}{2}\right) = \sec(o) + c$ $o = 1 + c$ $c = -1$ $: xiny = \sec x - 1$		M1 M1 M1 B1 A1
(b)	Rate in =0 Rate out = $\frac{y}{1000}\ (kg/L) \times 20(L/min)$ $= \frac{y}{50}(kg/min)$ $\frac{dy}{dt} = 0 - \frac{y}{50}$		M1

	$$\frac{dy}{dt} = \frac{-y}{50}$$ $$\int \frac{dy}{y} = \int \frac{-1}{50} dt$$ $$Iny = \frac{-1}{50}(0) + c.$$ $$c = In10.$$ $$Iny = \frac{-1}{50} t + In10$$ $$Iny - In10 = \frac{-t}{50}$$ $$e\frac{-t}{50} = \frac{y}{10}$$ $$y = 10\, e\frac{-t}{50}$$		M1 A1
	(i) $$at\ t = 5, y = ?$$ $$y = 10\, e\frac{-5}{50}$$ $$y = 9.0484kg.$$		M1 A1
	(ii) $$y = 5kg, t = ?$$ $$5 = 10.\, e\frac{-t}{50}$$ $$in\ 0.5 = \frac{-t}{50}$$ $$t = -50In(0.5)$$ $$t = 34.6574\ minutes$$		M1 A1 **12**