Student Number: ______________

KAMBALA

Mathematics Extension 1

Preliminary Examination

September 2006

Time Allowed: 2 hours plus 5 minutes reading time

Outcomes assessed:

P2 provides reasoning to support conclusions which are appropriate to the context
P3 performs routine arithmetic and algebraic manipulation involving surds and simple rational expressions
P4 chooses and applies appropriate arithmetic, algebraic, graphical and trigonometric techniques
P5 understands the concept of a function and the relationship between a function and its graph
P6 relates the derivative of a function to the slope of its graph
P7 determines the derivative of a function through routine application of the rules of differentiation
P8 understands and uses the language and notation of calculus
H5 applies appropriate techniques from the study of calculus, geometry, probability, trigonometry and series to solve problems
H6 uses the derivative to determine the features of the graph of a function
H7 uses the features of a graph to deduce information about the derivative
PE2 uses multi-step deductive reasoning in a variety of contexts
PE3 solves problems involving inequalities
PE5 determines derivatives which require the application of more than one rule of differentiation
PE6 makes comprehensive use of mathematical language, diagrams and notation for communicating in a wide variety of situations
HE2 uses inductive reasoning in the construction of proofs

INSTRUCTIONS

- This examination contains 6 questions of 12 marks each.
- Marks for each part question are shown.
- Answer all questions on the writing paper provided. **Start each question on a new page.**
- Approved calculators may be used.
- Show all necessary working. Marks may not be awarded for careless or badly arranged work.

STANDARD INTEGRALS

$$\int x^n\,dx = \frac{1}{n+1}x^{n+1}, \quad n \neq -1;\ x \neq 0, \text{ if } n < 0$$

$$\int \frac{1}{x}\,dx = \ln x, \quad x > 0$$

$$\int e^{ax}\,dx = \frac{1}{a}e^{ax}, \quad a \neq 0$$

$$\int \cos ax\,dx = \frac{1}{a}\sin ax, \quad a \neq 0$$

$$\int \sin ax\,dx = -\frac{1}{a}\cos ax, \quad a \neq 0$$

$$\int \sec^2 ax\,dx = \frac{1}{a}\tan ax, \quad a \neq 0$$

$$\int \sec ax \tan ax\,dx = \frac{1}{a}\sec ax, \quad a \neq 0$$

$$\int \frac{1}{a^2+x^2}\,dx = \frac{1}{a}\tan^{-1}\frac{x}{a}, \quad a \neq 0$$

$$\int \frac{1}{\sqrt{a^2-x^2}}\,dx = \sin^{-1}\frac{x}{a}, \quad a > 0, \quad -a < x < a$$

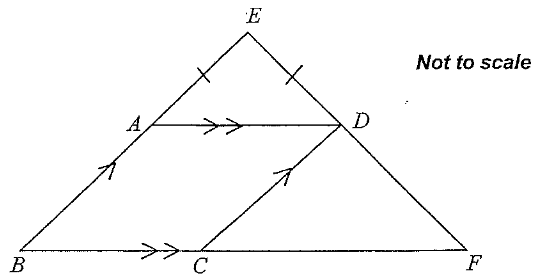
$$\int \frac{1}{\sqrt{x^2-a^2}}\,dx = \ln\left(x+\sqrt{x^2-a^2}\right), \quad x > a > 0$$

$$\int \frac{1}{\sqrt{x^2+a^2}}\,dx = \ln\left(x+\sqrt{x^2+a^2}\right)$$

NOTE : $\ln x = \log_e x, \quad x > 0$

Question 1 (12 marks) **Marks**
Start a new page.

(a) In the diagram, $ABCD$ is a parallelogram and BA is produced to E so that $AE = ED$. ED is produced to cut BC produced at F.



Copy the diagram onto your answer page and prove that ΔDCF is isosceles. **2**

(b) What is the value of $x^3 - 8y^3$ if $x - 2y = 4$ and $x^2 + 2xy + 4y^2 = -6$. **2**

(c) The point $(3, -4)$ divides the interval joining $A(1, 2)$ and $B(x, y)$ internally in the ratio $4:3$. **3**

Find the values of x and y.

(d) Find the second derivative of $f(x) = x^4 - 5x^{-3}$ **2**

(e) Express $2x^2 + 8x - 3$ in the form $a(x+b)^2 + c$ and hence, or otherwise, find the minimum value of $2x^2 + 8x - 3$. **3**

Question 2 (12 marks) **Marks**
Start a new page.

(a) If $x = 2\sec\theta$ and $y = 2\tan\theta$, express $x^2 - y^2$ in simplest form. **2**

(b) Given $P(x) = x(x+1)^2(x-2)(x-3)$ $x^2 \times x^3$ x^4 x^5

(i) State the leading term and the constant term of $P(x)$. **2**

(ii) Write down the zeros of $P(x)$. **1**

(iii) Hence make a neat sketch of $y = P(x)$, showing any intercepts. **1**

(iv) Solve $P(x) > 0$ for all x. **1**

(c) A and B are the fixed points $(1, 1)$ and $(-3, 5)$ respectively. P is a variable point (x, y). Suppose that P moves so that $PA^2 + PB^2 = 24$. Show that the locus of P is a circle and find its centre and radius. **3**

(d) (i) Show that $\dfrac{x^2}{x^2-3} = 1 + \dfrac{3}{x^2-3}$. **1**

(ii) Hence, or otherwise, evaluate $\lim\limits_{x\to\infty} \dfrac{x^2}{x^2-3}$. **1**

Question 3 (12 marks) — Marks
Start a new page.

(a) For the equation $kx^2-(k-1)x-(k+6)=0$ find the value of k given one root is two times the reciprocal of the other root. — 2

(b) Differentiate the following with respect to x.

(i) $\dfrac{x^2-7}{x}$ — 2

(ii) $(4x+3)^5$ — 2

(iii) $\dfrac{2x-1}{x^2+1}$ — 2

(c) (i) Sketch $y=\cos 2x$ for $0^\circ \le x \le 360^\circ$. — 1

(ii) On the same graph sketch $y=\dfrac{1}{2}$. — 1

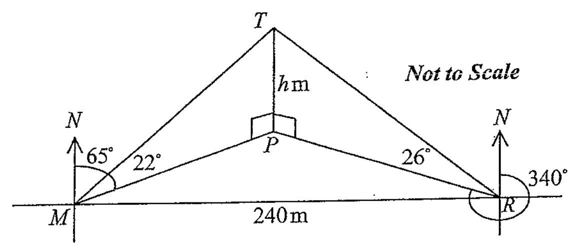
(iii) Solve $\cos 2x=\dfrac{1}{2}$ for $0^\circ \le x \le 360^\circ$. — 2

Question 4 (12 marks) — Marks
Start a new page.

(a) Solve $(x^2+x)+\dfrac{12}{x^2+x}-8=0$ for x. — 3

(b) Find the value of x on the curve $y=\sqrt{x}$ where the gradient of the curve is 2. — 2

(c) Janice walks along a straight road. At point M she notices a tower PT on a bearing of 065° with an angle of elevation to the top of the tower of 22°. After walking 240 m to R, the tower is on a bearing of 340°, with an angle of elevation to the top of the tower of 26°.



(i) Show that $\angle RPM = 85^\circ$. — 1

(ii) Show that $MP=\dfrac{h}{\tan 22^\circ}$. — 1

(iii) Find the height of the tower correct to the nearest metre. — 3

(d) (i) Show that $\dfrac{1}{\sqrt{x}+\sqrt{c}}=\dfrac{\sqrt{x}-\sqrt{c}}{x-c}$. — 1

(ii) Hence find $\lim\limits_{x\to c}\dfrac{\sqrt{x}-\sqrt{c}}{x-c}$. — 1

$\dfrac{x-c}{x\sqrt{x}}$

$(x-c)(\sqrt{x}+\sqrt{c})$

Question 5 (12 marks) **Marks**
Start a new page.

(a) Consider the function $f(x) = x^3 - 6x^2$.

(i) Find all stationary points and determine their nature. **3**

(ii) Sketch the curve $y = f(x)$, clearly showing the above features and the x and y intercepts. **2**

(b) Consider the polynomial $P(x) = x^3 - x^2 - 5x - 3$.

(i) Show that $(x+1)$ is a factor of $P(x)$. **1**

(ii) Hence, or otherwise, factorise $P(x)$. **2**

(c) Prove by Mathematical Induction that $2+5+8+...+(3n-1) = \frac{n}{2}(3n+1)$ for all positive integral n. **4**

Question 6 (12 marks) **Marks**
Start a new page.

(a) A box manufacturer wishes to construct a closed rectangular box with height, h centimetres and whose length is twice its width. Let the width be x cm. The surface area of the box is $60\,\text{cm}^2$.

(i) Show that $h = \dfrac{30-2x^2}{3x}$. **2**

(ii) Show that the volume, $V\,\text{cm}^3$, of the box is given by **1**

$$V = 20x - \frac{4}{3}x^3$$

(iii) Hence find the dimensions of the box in order to maximise its volume. **3**

(b) (i) The quadratic equation $ax^2 + bx + c = 0$ has 2 unequal roots. What condition must the discriminant satisfy for this statement to be true? **1**

(ii) Consider the circle $x^2 + y^2 - 2x - 14y + 25 = 0$. **2**
The line $y = mx$ intersects the circle in 2 distinct points.
Show that $(1+7m)^2 - 25(1+m^2) > 0$.

(iii) For what values of m is the line $y = mx$ a tangent to the circle? **3**

END OF EXAMINATION

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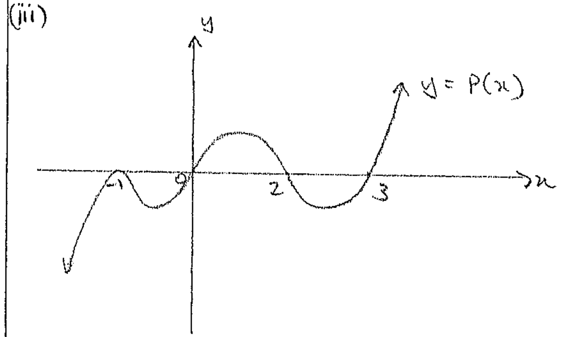
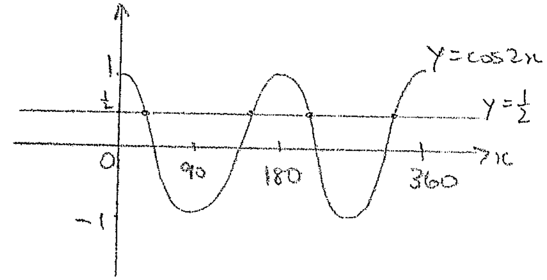
Qn	Solutions	Marks	Comments+Criteria
1	(a) $\angle EAD = \angle ABC$ ($AD \parallel BF$, Corresp. $\angle$s $=$) $\angle ABC = \angle DCF$ ($AB \parallel DC$, Corresp. $\angle$s $=$) $\angle EDA = \angle DFC$ ($AD \parallel BF$, corresp. $\angle$s $=$) $\therefore \angle DCF = \angle DFC$ Since base $\angle$s $=$ in $\triangle DCF$, then $\triangle DCF$ is isosceles	1 1	statements reasons
	(b) $\left.\begin{array}{l} x-2y=4 \\ x^2+2xy+4y^2=-6 \end{array}\right\}$ $x^3-8y^3 = (x)^3-(2y)^3$ $= (x-2y)(x^2+2xy+4y^2)$ $= 4 \times -6$ $= -24$	1 1	
	(c) $A(1,2)$ $(3,-4)$ $B(x,y)$ $x_1\ y_1$ $x\ y$ $x_2\ y_2$ ratio $4:3$ $m:n$ $\left(\frac{mx_2+nx_1}{m+n}, \frac{my_2+ny_1}{m+n}\right)$ $= \left(\frac{4 \times x+3.1}{7}, \frac{4y+3.2}{7}\right)$ $\frac{4x+3}{7} = 3$, $\frac{4y+6}{7} = -4$ $4x+3 = 21$ $4y+6 = -28$ $4x = 18$ $4y = -34$ $x = \frac{18}{4}$ $y = \frac{-34}{4}$ $= \frac{9}{2}$ $= \frac{-17}{2}$ $x = 4\frac{1}{2}$ $y = -8\frac{1}{2}$	1 2	correct use of formula 1mk for each soln

Qn	Solutions	Marks	Comments+Criteria
1 ctd	(d) $f(x) = x^4 - 5x^{-3}$ $f'(x) = 4x^3 + 15x^{-4}$ $f''(x) = 12x^2 - 60x^{-5}$	1 1	
	(e) $2x^2+8x-3$ $= 2(x^2+4x)-3$ $= 2(x^2+4x+4)-3-8$ $= 2(x+2)^2-11$ $\therefore$ min. value is -11. OR $x = \frac{-b}{2a}$ $= \frac{-8}{2.2}$ $= \frac{-8}{4}$ $x = -2$ @ $x=-2$, $2 \times (-2)^2 + 8 \times -2 - 3$ $= 8-16-3$ $= -11$ $\therefore$ min. value is -11. OR Let $y = 2x^2+8x-3$ $\frac{dy}{dx} = 4x+8$ Stat pt @ $4x+8=0$ $4x = -8$ $x = -2$ $\frac{d^2y}{dx^2} = 4$ $\therefore$ min at $x=-2$. ie $y = -11$.	1 1 1 OR 1 1 1 1 1	

Qn	Solutions	Marks	Comments+Criteria
2	(a) $x = 2\sec\theta$, $y = 2\tan\theta$ $x^2 - y^2 = (2\sec\theta)^2 - (2\tan^2\theta)^2$ $= 4\sec^2\theta - 4\tan^2\theta$ $= 4(\sec^2\theta - (\sec^2\theta - 1)$ $= 4\cdot(0+1)$ $= 4$	1 1	
	or $x^2 - y^2 = 4\sec^2\theta - 4\tan^2\theta$ $= 4(\tan^2 + 1) - 4\tan^2\theta$ $= 4\tan^2\theta + 4 - 4\tan^2\theta$ $= 4$		
	(b) $P(x) = x(x+1)^2(x-2)(x-3)$ (i) leading term is $x.x^2.x.x$ $= x^5$ constant is $0.1^2.-2.-3 = 0$	1 1	
	(ii) zeros are $0, -1, 2, 3, -1$	1	
	(iii) 	1	
	(iv) $P(x) > 0$ for $0 < x < 2$, $x > 3$	1	

Qn	Solutions	Marks	Comments+Criteria
2 ctd	(c) $A(1,1)$ $P(x,y)$ $B(-3,5)$ $PA^2 + PB^2 = 24$ $PA^2 = (x-1)^2 + (y-1)^2$ $= x^2 - 2x + 1 + y^2 - 2y + 1$ $= x^2 - 2x + y^2 - 2y + 2$ $PB^2 = (x+3)^2 + (y-5)^2$ $= x^2 + 6x + 9 + y^2 - 10y + 25$ $= x^2 + 6x + y^2 - 10y + 34$ $PA^2 + PB^2 = 2x^2 + 4x + 2y^2 - 12y + 36$ $2(x^2 + 2x + y^2 - 6y + 18) = 24$ $x^2 + 2x + y^2 - 6y = -6$ $(x+1)^2 + (y-3)^2 = -6 + 1 + 9$ $= 4$ ∴ The locus of P is a circle, centre $(-1, 3)$ and radius 2 units.	 1 1 1	
	(d) (i) RHS $= 1 + \frac{3}{x^2-3}$ $= \frac{x^2 - 3 + 3}{x^2 - 3}$ $= \frac{x^2}{x^2-3}$ $=$ LHS	1	correct proof
	(ii) $\lim_{x\to\infty} \frac{x^2}{x^2-3} = \lim_{x\to\infty}\left[1 + \frac{3}{x^2-3}\right]$ $= 1 + 0$ $= 1$	1	correct proof

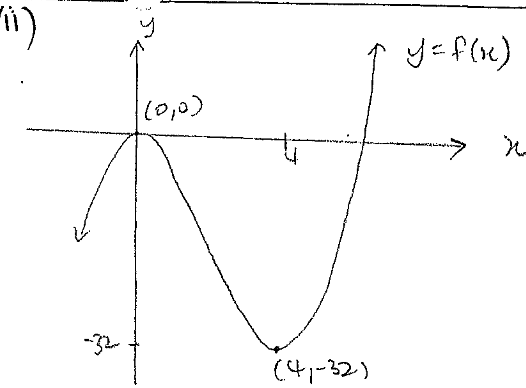
Qn	Solutions	Marks	Comments+Criteria
3	(a) $kx^2 - (k-1)x - (k+6) = 0$ Let the roots be $\alpha, \frac{2}{\alpha}$. $\alpha + \frac{2}{\alpha} = -\frac{b}{a}$ $= \frac{k-1}{k}$ $\alpha \cdot \frac{2}{\alpha} = \frac{c}{a}$ $\therefore 2 = \frac{-(k+6)}{k}$ $2k = -k-6$ $3k = -6$ $\boxed{k = -2}$	1 1	
	(b)(i) $\frac{d}{dx}\left[\frac{x^2-7}{x}\right]$ $= \frac{d}{dx}\left[x - 7x^{-1}\right]$ $= 1 + 7x^{-2}$ $= 1 + \frac{7}{x^2}$	1 1	$\frac{d}{dx}\left[\frac{x^2-7}{x}\right]$ $= \frac{2x(x) - 1(x^2-7)}{x^2}$ $= \frac{2x^2 - x^2 + 7}{x^2}$ $= \frac{x^2+7}{x^2}$
	(ii) $\frac{d}{dx}\left[(4x+3)^5\right]$ $= 5(4x+3)^4 \times 4$ $= 20(4x+3)^4$	1 1	
	(iii) $\frac{d}{dx}\left[\frac{2x-1}{x^2+1}\right]$ $= \frac{2(x^2+1) - 2x(2x-1)}{[x^2+1]^2}$ $= \frac{2x^2+2-4x^2+2x}{(x^2+1)^2}$ $= \frac{-2x^2+2x+2}{(x^2+1)^2}$ $= \frac{-2(x^2-x-1)}{(x^2+1)^2}$	1 1 1	

Qn	Solutions	Marks	Comments+Criteria
3	(c)(i) $y = \cos 2x$, $0 \le x \le 360°$  (ii) Sketch $y = \frac{1}{2}$	1 1	
	(iii) $\cos 2x = \frac{1}{2}$ $0 \le x \le 360°$ basic angle, $2x = 60°$ $2x = 60°, 300°, 420°, 660°$ $x = 30°, 150°, 210°, 330°$	1 1	

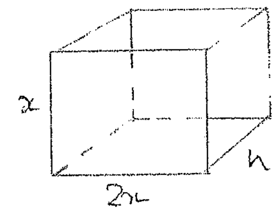
Qn	Solutions	Marks	Comments+Criteria
4	(a) $(x^2+x)+\frac{12}{x^2+x}-8=0$ Let $m = x^2+x$ $m+\frac{12}{m}-8=0$ $m^2-8m+12=0$ $(m-6)(m-2)=0$ $\therefore x^2+x-6=0$ or $x^2+x-2=0$ $(x+3)(x-2)=0$ $(x+2)(x-1)=0$ $x=-3, 2$ $x=-2, 1$	1 1 1	
	(b) $y=\sqrt{x}$ $y'=2$ $x=?$ $y=x^{\frac{1}{2}}$ $\frac{dy}{dx}=\frac{1}{2}x^{-\frac{1}{2}}$ $=\frac{1}{2\sqrt{x}}$ when gradient is 2, $\frac{1}{2\sqrt{x}}=2$ $2\sqrt{x}=\frac{1}{2}$ $\sqrt{x}=\frac{1}{4}$ $x=\frac{1}{16}$	1 1	

Qn	Solutions	Marks	Comments+Criteria
4 Ctd	(c) (i) $\angle RPM = 180-(25+70)$ $=180-95$ $=85°$ (angle sum of Δ)	1	
	(ii) $\tan 22 = \frac{h}{MP}$ $\therefore MP = \frac{h}{\tan 22}$	1	
	(iii) $\tan 26 = \frac{h}{PR}$ $\therefore PR = \frac{h}{\tan 26}$ $240^2 = PM^2+PR^2-2PM.PR\cos 85$ $240^2 = \frac{h^2}{\tan^2 22}+\frac{h^2}{\tan^2 26}-2.\frac{h}{\tan 22}.\frac{h}{\tan 26}.\cos 85$ $240^2 = \frac{h^2(\tan^2 26+\tan^2 22-2\cos 85\tan 22\tan 26)}{\tan^2 22\tan^2 26}$ $h^2 = \frac{240^2\tan^2 22\tan^2 26}{\tan^2 26+\tan^2 22-2\cos 85\tan 22\tan 26}$ $=6098.319035$ $h=78.0917\ldots$ $h=78m$	 $\Big\}$	1 1 working 1
	(d) (i) $\frac{1}{\sqrt{x}+\sqrt{c}}\times\frac{\sqrt{x}-\sqrt{c}}{\sqrt{x}-\sqrt{c}}$ $=\frac{\sqrt{x}-\sqrt{c}}{x-c}$	1	working and answer
	(ii) $\lim_{x\to c}\frac{\sqrt{x}-\sqrt{c}}{x-c}=\lim_{x\to c}\frac{1}{\sqrt{x}+\sqrt{c}}$ $=\frac{1}{\sqrt{c}+\sqrt{c}}$ $=\frac{1}{2\sqrt{c}}$	1	correct proof

Qn	Solutions	Marks	Comments+Criteria
5	(a) $f(x) = x^3 - 6x^2$		
	(i) $f'(x) = 3x^2 - 12x$	1	
	stat pts at $f'(x) = 0$		
	ie $3x(x-4) = 0$		
	$x = 0, \; x = 4.$	1	
	$y = 0 \quad y = -32$		
	$(0,0)$: $\begin{array}{c\|ccc} x & -1 & 0 & 1 \\ \hline f'(x) & 15 & 0 & -9 \end{array}$		
	$/ \; - \; \backslash$		
	$\therefore$ max at $(0,0)$		
	$(4,-32)$: $\begin{array}{c\|ccc} x & 3 & 4 & 5 \\ \hline f'(x) & -9 & 0 & 15 \end{array}$	1	testing
	$\backslash \; - \; /$		
	$\therefore$ min. turning pt at $(4,-32)$	OR	
	OR $f''(x) = 6x - 12$	1	
	$(0,0)$: $f''(0) = 0 - 12$		
	$= -12 < 0$		
	$\therefore$ max at $(0,0)$		
	$(4,-32)$: $f''(4) = 24 - 12$		
	$= 12 > 0$		
	$\therefore$ min at $(4,-32)$.	1	testing

Qn	Solutions	Marks	Comments+Criteria
5 ctd	(ii) 	1 1	curve correct labelling of features
	(b) $P(x) = x^3 - x^2 - 5x - 3$		
	(i) $P(-1) = (-1)^3 - (-1)^2 - 5.-1 - 3$		
	$= -1 - 1 + 5 - 3$		
	$= 0$		
	$\therefore (x+1)$ is a factor of $P(x)$.	1	
	(ii) $x+1 \overline{) x^3 - x^2 - 5x - 3}$ quotient $x^2 - 2x - 3$		
	$x^3 + x^2$		
	$-2x^2 - 5x$	1	long division
	$-2x^2 - 2x$		
	$-3x - 3$		
	$-3x - 3$		
	$\therefore P(x) = (x+1)(x^2 - 2x - 3)$		
	$= (x+1)(x-3)(x+1)$	1	

Qn	Solutions	Marks	Comments+Criteria
5	(c) Prove $2+5+8+\dots+(3n-1)=\frac{n}{2}(3n+1)$		
	Step 1 $n=1$		
	LHS $=2$ RHS $=\frac{1}{2}(3+1)$		
	$=\frac{1}{2}\times 4$		
	$=2$		
	$=$ LHS		
	$\therefore$ true for $n=1$		
	Step 2 Assume true for $n=k$.		
	ie $2+5+8+\dots+(3k-1)=\frac{k}{2}(3k+1)$	(A)	
	Step 3 Prove true for $n=k+1$		
	ie Prove $2+5+8+\dots+(3k-1)+(3k+2)$		
	$=\frac{k+1}{2}(3k+4)$		
	LHS $=\underbrace{2+5+8+\dots+(3k-1)}+(3k+2)$		
	$=\frac{k}{2}(3k+1)+(3k+2)$	}	
	$=\frac{1}{2}\left[k(3k+1)+2(3k+2)\right]$	1	
	$=\frac{1}{2}\left[3k^2+k+6k+4\right]$		
	$=\frac{1}{2}\left[3k^2+7k+4\right]$		
	$=\frac{1}{2}\left[(3k+4)(k+1)\right]$		
	$=\frac{k+1}{2}(3k+4)$	1	
	$=$ RHS		
	Step 4		

Qn	Solutions	Marks	Comments+Criteria
6	(a) (i)		
	 SA $=60\text{cm}^2$		
	SA: $2(2x^2+2xh+xh)=60$	1	
	$2x^2+3xh=30$		
	$3xh=30-2x^2$		
	$h=\frac{30-2x^2}{3x}$	1	
	(ii) $V=x.2x.h$		
	$=2x^2.\left[\frac{30-2x^2}{3x}\right]$		
	$=\frac{2x}{3}(30-2x^2)$		
	$=\frac{60x}{3}-\frac{4x^3}{3}$		
	$V=20x-\frac{4x^3}{3}$	1	
	(iii) $V'=20-4x^2$		
	stat pts at $V'=0$, ie $20-4x^2=0$		
	$4x^2=20$		
	$x^2=5$		
	$x>0$ $\therefore$ $x=\sqrt{5}$ only	1	
	$x=\sqrt{5}$: $\begin{array}{c\|ccc} x & 2 & \sqrt{5} & 3 \\ \hline v' & 4 & 0 & -16 \end{array}$ $\therefore$ max.	1	
	OR $V''=-8x$		
	@ $x=\sqrt{5}$, $V''=-8\sqrt{5}<0$ $\therefore$ max		

Qn	Solutions	Marks	Comments+Criteria
6 ctd	$x=\sqrt{5}$ ∴ width is $\sqrt{5}$ cm. $2x = 2\sqrt{5}$ ∴ length is $2\sqrt{5}$ cm $h = \dfrac{30-2x^2}{3x}$ $= \dfrac{30-2.5}{3\sqrt{5}}$ $= \dfrac{20}{3\sqrt{5}}$ cm ie $h = \dfrac{20\sqrt{5}}{15}$ $= \dfrac{4\sqrt{5}}{3}$ cm	1	for $2x$, h
	(b)(i) $\Delta > 0$	1	
	(ii) $\left.\begin{array}{l} x^2+y^2-2x-14y+25=0 \quad ① \\ y = mx \quad ② \end{array}\right\}$ ② into ①: $x^2+(mx)^2-2x-14.mx+25=0$ $x^2+m^2x^2-2x-14mx+25=0$ $x^2(1+m^2)-2x(1+7m)+25=0$ Line intersects twice, ∴ $\Delta > 0$ ie $b^2-4ac>0$ $[-2(1+7m)]^2-4(1+m^2).25>0$ $4(1+7m)^2-4.25(1+m^2)>0$ ie $(1+7m)^2-25(1+m^2)>0$	1 1	
	(iii) $y=mx$ a tangent if $\Delta=0$. ie $(1+7m)^2-25(1+m^2)=0$	1	

Qn	Solutions	Marks	Comments+Criteria
6 ctd	$1+14m+49m^2-25-25m^2=0$ $24m^2+14m-24=0$ $12m^2+7m-12=0$ $m = \dfrac{-7\pm\sqrt{49-4.12.12}}{2.12}$ $= \dfrac{-7\pm\sqrt{625}}{24}$ $= \dfrac{-7\pm 25}{24}$ $m = \dfrac{-7+25}{24}$ or $m = \dfrac{-7-25}{24}$ $m = \dfrac{18}{24}$ $\quad$ $m = -\dfrac{32}{24}$ $= \dfrac{6}{8}$ $\quad$ $= -\dfrac{4}{3}$ $m = \dfrac{3}{4}$ or $m = -1\frac{1}{3}$	1 1	