KAMBALA

MATHEMATICS

2 UNIT- YEAR 11

ASSESSMENT 2

MAY 2003

Time allowed: 50 minutes

INSTRUCTIONS

- All questions should be attempted.
- All necessary working should be shown
- Start each new question on a new page
- Approved scientific calculators and drawing templates may be used

Question 1: (Start a NEW page) 12 marks

(a) Factorise $3x^2+14x-5$ 2

(b) Find the exact values of a and b if $\frac{\sqrt{3}-4}{2+\sqrt{3}} = a+b\sqrt{3}$ 2

(c) Neatly sketch of the curve $y=|x+2|$ and state its domain and range. 3

(d) Solve the following equations simultaneously . 3

$y=2x-10$

$x^2+y^2=25$

(e) Find the exact value of (i) tan 300° 1

(ii) sec 30° 1

Question 2 (Start a NEW page) 12 marks

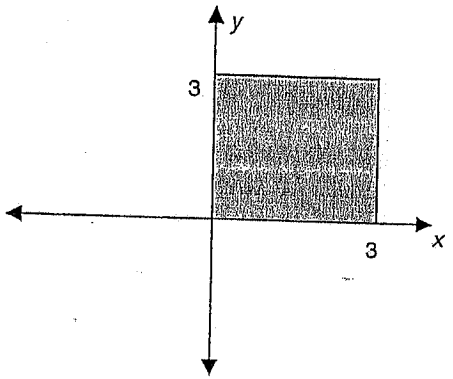
(a) A function is defined as follows 2

$$f(x)=\begin{cases} x \text{ for } & x>2 \\ x^2 \text{ for } & -2\le x\le 2 \\ 6 \text{ for } & x<-2 \end{cases}$$

Find the value of $f(1)+f(-2)-f(3)$

(b) Find all values of α between 0° and 360° for which sec $\alpha = -\frac{2}{\sqrt{3}}$ 2

(c) Write down two inequalities to describe the shaded region below. 2



(d) A circle is given by $x^2 - 6x + y^2 + 8y + 8 = 0$. 3

By completing the square, find

(i) The co-ordinates of its centre

(ii) The length of it radius

(e) For the equation $y = \dfrac{1}{2x-3}$

(i) Find the y intercept 1

(ii) Find any vertical asymptote/s 1

(iii) State whether the equation is even, odd or neither 1

Question 3 (Start a NEW page) 12 marks

(a) It is given that β is an acute angle and that $\tan\beta = \dfrac{\sqrt{5}}{3}$.

(i) Draw a right- angled triangle showing this information. 1

(ii) Use Pythagoras' theorem to find the length of the missing side 1

(iii) Write down the exact values of $\sin\beta$ and $\cos\beta$ 2

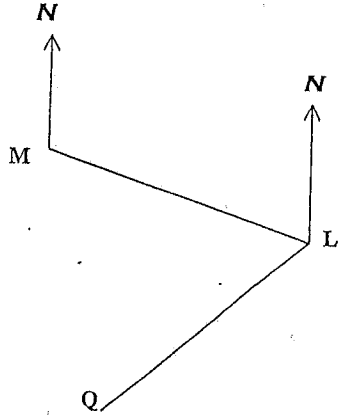
(iv) Show that $\sin^2\beta + \cos^2\beta = 1$ 2

(b) A ship leaves Port M and travels 200 nautical miles to Port L on a bearing of 130 degrees. It then travels 110 nautical miles to port Q on a bearing of 220 degrees.

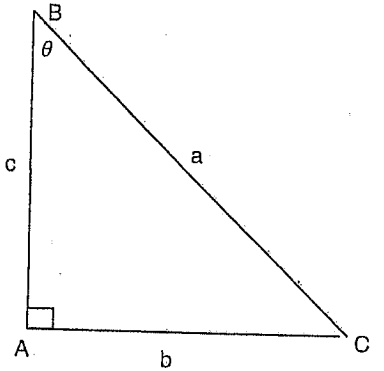
(i) Copy and complete the diagram below to show all the above information. 1

(ii) Explain why $\angle MLQ = 90°$ 1

(iii) Find the bearing of the Port Q from Port M. 2

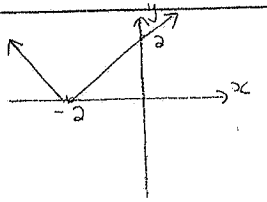
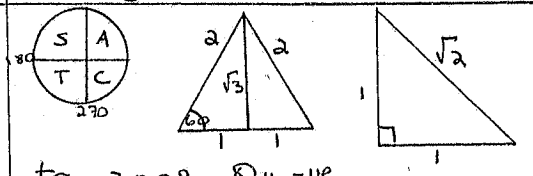


(c)

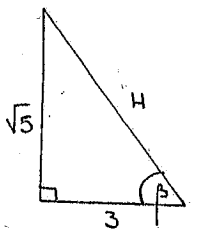
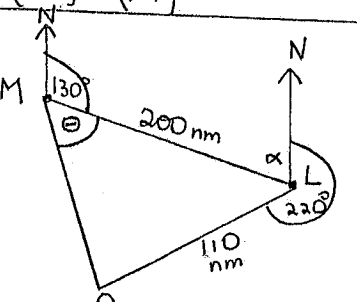
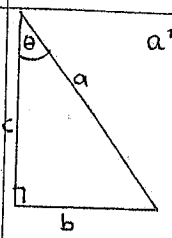


Show that $\sin^2\theta = \dfrac{b^2}{b^2 + c^2}$ in the above diagram. 2

End of Test

Qn	Solutions	Marks	Comments+Criteria
1(a)	$3x^2+14x-5$ $3x^2+15x-1x-5$ $3x(x+5)-1(x+5)$ $(3x-1)(x+5)$	2	
b	$\frac{\sqrt{3}-4}{(2+\sqrt{3})} \cdot \frac{(2-\sqrt{3})}{(2-\sqrt{3})} = \frac{2\sqrt{3}-3-8+4\sqrt{3}}{4-3}$ $= 6\sqrt{3}-11$ $\therefore a=-11 \quad b=6$	2	
c	 D: all real x R: $y \geq 0$	3.	
d.	$y=2x-10$ —① $x^2+y^2=25$ —② Sub ① into ② $x^2+(2x-10)^2=25$ $x^2+4x^2-40x+100=25$ $5x^2-40x+75=0 \ (\div 5)$ $x^2-8x+15=0$ $(x-5)(x-3)=0$ $x=5 \quad x=3$ $\underline{x=5 \ y=0}$, $\underline{x=3, y=-4}$	3.	
e	 tan 300° – Q4 -ve tan 60° = $\sqrt{3}$ ∴ $\underline{\tan 300 = -\sqrt{3}}$ $\sec 30° = \frac{1}{\cos 30°}$ $\cos 30° = \frac{\sqrt{3}}{2}$ ∴ $\sec 30° = \frac{2}{\sqrt{3}}$ or $\frac{2\sqrt{3}}{3}$	1 1	

Qn	Solutions	Mark	Comments+Criteria
2 (a)	$f(1) = 1^2 = 1$ $f(-2) = (-2)^2 = 4$ $f(3) = 3$ $1+4-3 = 2$	2.	
(b)	$\sec\alpha = -\frac{2}{\sqrt{3}}$ $\cos\alpha = -\frac{\sqrt{3}}{2}$. $-ve$ $\therefore$ Q 2+3 $\alpha = 30^\circ$ $\frac{1}{2}$ $\therefore 180-30 = 150^\circ$ $180+30 = 210^\circ$	2	$\frac{1}{2}$ 30° $\frac{1}{2}$ quadrants. $\frac{1}{2}$ 150° $\frac{1}{2}$ 210° } or ise.
(c)	$0 \le y \le 3 \cap 0 \le x \le 3$	2	1/2 for $y \le 3$, $x \le 3$.
(d)	$x^2 - 6x + \boxed{3^2} + y^2 + 8y + \triangle^2 = -8 + 9 + 16$ $(x-3)^2 + (y+4)^2 = 17$ centre $(3,-4)$ radius $= \sqrt{17}$	3	2 for completing square $\frac{1}{2}$ centre $\frac{1}{2}$ radius.
(e)	(i) y intercept occurs $x=0$ $y = -\frac{1}{3}$ $(0,-\frac{1}{3})$	1	
	(ii) $2x-3 \neq 0$ $2x \neq 3$ $\therefore x \neq 1\frac{1}{2}$ $\therefore$ Vertical Asymptote at $x = 1\frac{1}{2}$	1	
	(iii) $f(x) = \frac{1}{2x-3}$ $f(-x) = \frac{1}{-2x-3} = \frac{1}{-(2x+3)}$ $\therefore$ neither	1	

Qn	Solutions	Marks	Comments+Criteria
3 (a)	 $H^2 = 3^2 + (\sqrt{5})^2$ $= 9+5 = 14$ $H = \sqrt{14}$	1 1	
	$\sin\beta = \frac{\sqrt{5}}{\sqrt{14}}$ $\cos\beta = \frac{3}{\sqrt{14}}$	2	
	LHS $= \sin^2\beta + \cos^2\beta$ $= \left(\frac{\sqrt{5}}{\sqrt{14}}\right)^2 + \left(\frac{3}{\sqrt{14}}\right)^2 = \frac{5}{14} + \frac{9}{14} = 1 =$ RHS	2	
b.		1	
	$L\alpha = 180-130^\circ = 50^\circ$ (cont. L's) $LMLQ = 360-220-50^\circ$ (angles at a pt.) $= 90^\circ$	1	
	$\tan\Theta = \frac{110}{200}$ $\Theta = 28^\circ 48' 38.....$ Bearing of Q from M $= 130+28^\circ.....$ $= 158^\circ 49'$ nwm.	2	
(c)	 $a^2 = b^2 + c^2$ $\therefore a = \sqrt{b^2+c^2}$ $\sin\theta = \frac{b}{\sqrt{b^2+c^2}}$ $\sin^2\theta = \frac{b^2}{b^2+c^2}$	2.	