

JN ONE

Yr 11 3U, May 2002

List two properties of a Rhombus which are not the same as a parallelogram. (2)

b) Solve

$$(x+4)^2 = 3(x+4) \quad (2)$$

c) Sketch the following on separate diagram showing all the important features.

a) $y = \sqrt{16-x^2}$ (2)

b) $y = \sqrt{3+x}$ (2)

c) $y = \frac{1}{x+2}$ (2)

QUESTION TWO

a) Given $g(x) = \begin{cases} -x^2 & \text{for } x \leq 0 \\ 5x - 4 & \text{for } x > 0 \end{cases}$ (2)

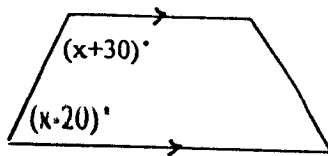
evaluate $g(-2) + g(1) - g(0)$.

b) State the domain of the following

i) $y = \frac{1}{x^2 - 4}$ (2)

ii) $y = \sqrt{4-x^2} + \sqrt{x+3}$ (3)

c) Find the value of x in the following giving reason. (3)



a) Sketch the function

$$G(x) = \begin{cases} 2x+2 & \text{for } x < 0 \\ x^2+2 & \text{for } 0 \leq x \leq 2 \\ x+7 & \text{for } x > 2 \end{cases}$$

(3)

b) If $y = x^2 - 2$, find the range if the domain is defined by $x > 0$. (1)

c) Solve $16^{4-x} = \frac{1}{8}$ (3)

d) Find the exact value of $(0.13131313\dots)^2$ (2)

e) Solve $\frac{1}{x+5} \geq 1$ (2)

QUESTION FOUR

a) If $f(x) = 4x^2 - 4x - 8$

i) Find $f(-3)$ (1)

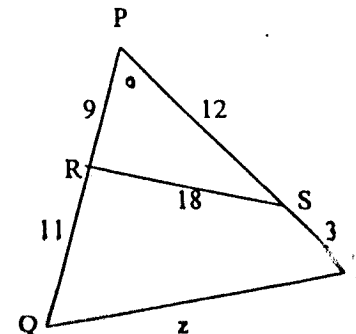
ii) Find $f(x+2)$ (2)

iii) For what values of x is $f(x) = 0$? (2)

iv) If $g(x) = 4x - 8$ for what values of x is $f(x) = g(x)$? (2)

b) Graph the region on the number plane satisfied by $y \leq x+3$ and $y > x^2 - 6x$. (3)

c) Prove that ΔPRS is similar to ΔPQT , hence find the value of z. (4)

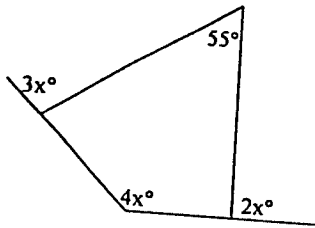


QUESTION FIVE

a) Solve $\frac{1}{3x} \geq \frac{1}{x+2}$

b) Determine whether the function $f(x) = \frac{4x}{x^2+4}$ is odd, even or neither.

c) Find the value of x , giving reason.

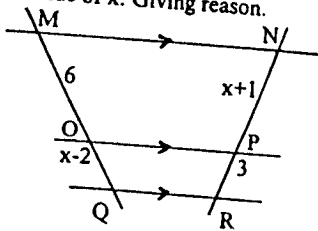


d) Factorise $a^2 - b^2 + 2b - 1$

QUESTION SIX

a) i) Sketch the curves $y = |x-3|$ and $y = 5-|x|$ on the same diagram (4)
 ii) Hence or otherwise solve $|x-3| + |x| < 5$ (2)

b) Find the value of x . Giving reason. (3)



THE END

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1) a)

* Diagonals bisect at right angles
 * Diagonals bisect the angles they pass through

b) $x^2 + 8x + 16 = 3x + 12$

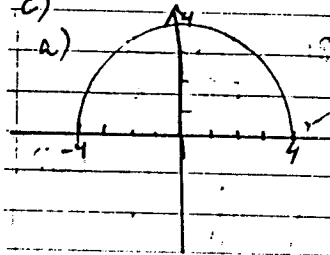
$x^2 + 5x + 4 = 0$

$(x+1)(x+4) = 0$

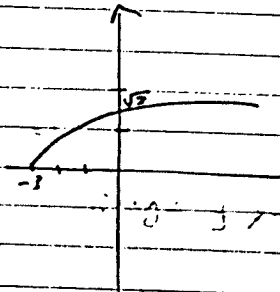
$x = -1$ or -4

c)

a)

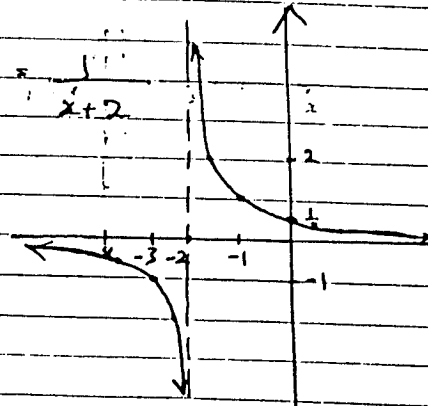


b)



c)

$y = \frac{1}{x+2}$



Q2

a) $g(-2) = -(-2)^2 = -4$

$g(3) = 5(3) - 4 = 15 - 4 = 11$

$g(0) = 0$

$g(-2) + g(3) - g(0) = -4 + 11 - 0 = 7$

$$= -36 + 12 - 8$$

$$= -40$$

ii) $f(x+2) = 4(x+2)^2 - 4(x+2) - 8$

$$= 4(x^2 + 4x + 4) - 4x - 8 - 8$$

$$= 4x^2 + 16x + 16 - 4x - 8 - 8$$

$$= 4x^2 + 12x$$

iii) $0 = 4x^2 - 4x - 8$

$$4(x^2 - x - 2) = 0$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

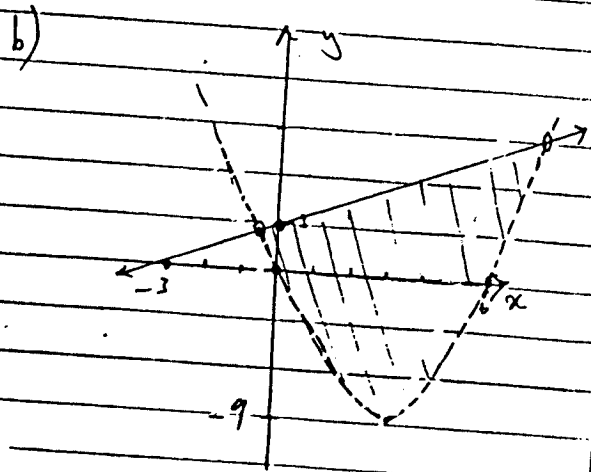
$$x = 2 \text{ or } -1$$

iv) $4x - 8 = 4x^2 - 4x - 8$

$$4x^2 - 8x = 0$$

$$4x(x-2) = 0$$

$$x = 0 \text{ or } 2$$



4) c) $\frac{PR}{PT} = \frac{9}{15} = \frac{3}{5}$

$$\frac{PS}{PQ} = \frac{12}{20} = \frac{3}{5}$$

$\angle RPS$ is common

$\therefore \triangle PRS \sim \triangle PTQ$

Two sides in ratio and
the included \angle equal

$$\frac{18}{Z_1} = \frac{3}{5} \text{ (Corresponding side in proportion)}$$

$$3Z_1 = 90$$

$$Z_1 = 30$$

ii) $4 = x^2 \neq 0$

$$x + 3 > 0$$

$$x > -3$$

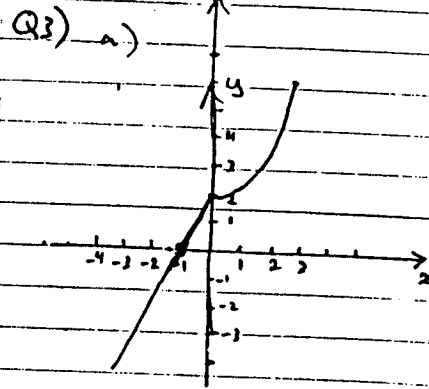
Domain: $x \neq -3$

$$-2 \leq x \leq 2$$

c) $x + 30 + x - 20 = 180^\circ$ (const. \angle s, || lines)

$$2x + 10 = 180$$

$$x = 85$$



b) Range $y > -2$

c) $\begin{cases} 4 - 4 = x & -3x \\ 2 & = 2 \end{cases}$

$$16 - 4x = -3x$$

$$x = 16$$

d) Let $x = 0.\overline{131313}$

$$100x = 13.\overline{1313} \dots$$

$$99x = 13$$

$$x = \frac{13}{99}$$

$$\left(\frac{13}{99}\right)^2 = \frac{169}{9801}$$

e) $\frac{1}{x+5} > 1$

$$-5 < x < -4$$

$$3x \quad x+2$$

$$x < -2$$

$$0 < x \leq 1$$

b) for even functions $f(x)$ & $f(-x)$

$$f(-x) = \frac{4(-x)}{(-x)^2 + 4}$$

$$= \frac{-4x}{x^2 + 4}$$

$$f(x) \neq f(-x)$$

not even

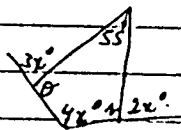
for odd functions $f(-x) = -f(x)$

$$-f(x) = \frac{-4x}{x^2 + 4}$$

$$f(-x) = -f(x)$$

odd function

c)



$$\theta = 180 - 3x \text{ (st. } \angle)$$

$$z = 180 - 2x \text{ (ext. } \angle)$$

$$55^\circ + 4x + 180^\circ - 2x + 180^\circ - 3x = 360$$

$$x = 55$$

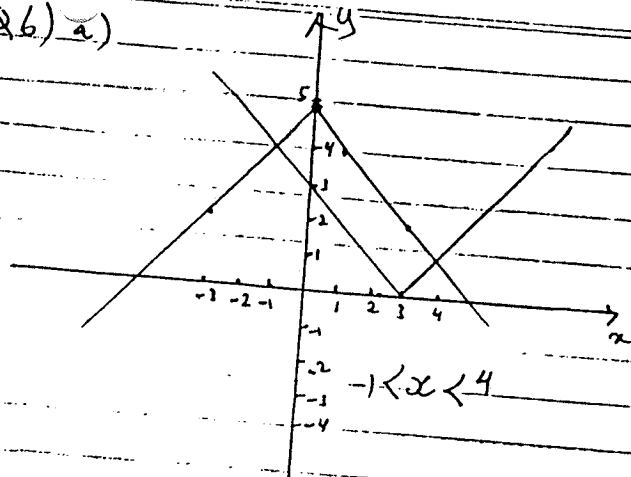
(sum of angles)

$$d) \quad a^2 (b^2 - 2b + 1)$$

$$a^2 (b-1)^2$$

$$[a-(b-1)][a+(b-1)] = (a-b+1)(a+b-1)$$

Q6) a)



$$b) \quad \frac{MO}{OQ} = \frac{NP}{PR} \text{ (Ratio of intercepts)}$$

$$\frac{6}{x-2} = \frac{x+1}{3}$$

$$18 = (x+1)(x-2)$$

$$18 = x^2 - x - 2$$

$$x^2 - x - 20 = 0$$

$$(x-5)(x+4) = 0$$

$$x-5 = 0 \quad \text{or} \quad -4$$

$$x \text{ has to be } +ve$$

$$\therefore x = 5$$