CHEMISTRY ONLINE
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PURE MATH

ALGEBRA AND FUNCTION

Level & Board	EDEXCEL (A-LEVEL)
TOPIC:	QUADRATICS
PAPER TYPE:	SOLUTION 5
TOTAL QUESTIONS	8
TOTAL MARKS	38

Quadratics 5 (solution)

Q.1

As, given

$\Longrightarrow \quad \frac{-x^2-1}{-2x-6} = \frac{1}{5}$

$\Longrightarrow \quad \frac{-(X^2+1)}{-(2X+6)} = \frac{1}{5}$

$\Longrightarrow \quad \frac{X^2+1}{2X+6} = \frac{1}{5}$

$\therefore$ Cross multiplication

$5(x^2+1) = 1(2x+6)$

$5x^2+5 = 2x+6$

$5x^2-2x+5-6 = 0$

$5x^2-2x-1 = 0$

Here,

$a = 5, b = -2, c = -1$

Using quadratic equation

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-(-2) \pm \sqrt{(-2)^2-4(5)(-1)}}{2(5)}$

$x = \frac{2 \pm \sqrt{4+20}}{10}$

$x = \frac{2 \pm 2\sqrt{6}}{10}$

$x = \frac{2(1 \pm \sqrt{6})}{10}$

$\Longrightarrow \quad x = \frac{1 \pm \sqrt{5}}{5}$

$\Longrightarrow \quad x = \frac{1+\sqrt{6}}{5}$ or $x = \frac{1-\sqrt{6}}{5}$

$\Longrightarrow \quad x = 0.6898 - - -$ or $x = -0.2898 - - -$

OR

$\Longrightarrow \quad x = 0.7$ or $x = -0.3$

Thus,

$s.s = \{0.7\ , -0.3\}$

Q.2

(a) According to given condition for two roots

$\Longrightarrow \quad b^2 - 4ac > 0$

$\Longrightarrow \quad (k-3)^2 - 4(1)(3-2k) > 0$

$\Longrightarrow \quad k^2 - 6k + 9 - 12 + 8k > 0$

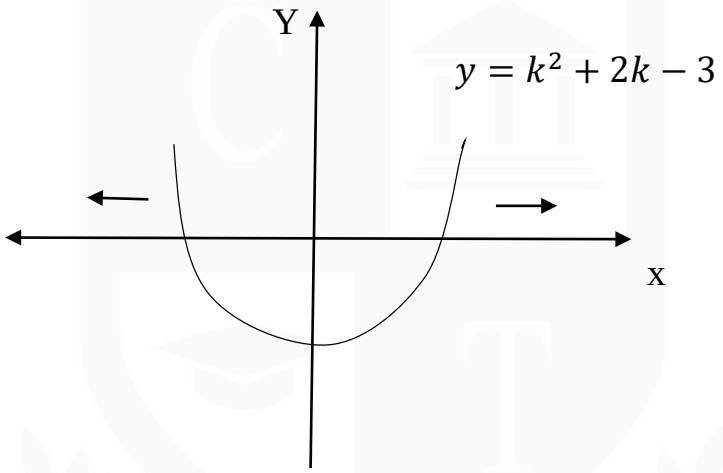
$\Longrightarrow \quad k^2 + 2k - 3 > 0$

(b) $\therefore k^2 + 2k - 3 > 0$

$\Longrightarrow \quad (k+3)(k-1) > 0$

$\therefore Critical\ values\ are$

$k = -3$ or $K = 1$



For the graph y > 0

When

$k < -3$ or $k > 1$

Q.3

$\therefore x^2 + 3px + q = 0$

If $a = 1, b = 3p, c = p$

For equal roots

$b^2 - 4ac = 0$

$\therefore (3p)^2 - 4(1)(p) = 0$

$\therefore 9p^2 - 4p = 0$

$\Longrightarrow \quad P(9P - 4) = 0$

$\Longrightarrow \quad P = 0$ or $9p - 4 = 0$

Or $p = \frac{4}{9}$

Since $p \neq 0$

Q.4

(a) $(k+3)x^2 + 6x + k = 5$

$\therefore$ $(k+3)x^2 + 6x + (k-5) = 0$

$\therefore$ for two distinct solutions

$b^2 - 4ac > 0$

$\Longrightarrow$ $(6)^2 - 4(k+3)(k-5) > 0$

$\Longrightarrow$ $36 - 4(k^2 - 2k - 15) > 0$

$(\div by''4'')$

$9 - (k^2 - 2k - 15) > 0$

$9 - k^2 + 2k + 15 > 0$

$(Multiply\ \ (-1))$

$\Longrightarrow$ $k^2 - 2k - 9 - 15 < 0$

$\Longrightarrow$ $k^2 - 2k - 24 < 0$

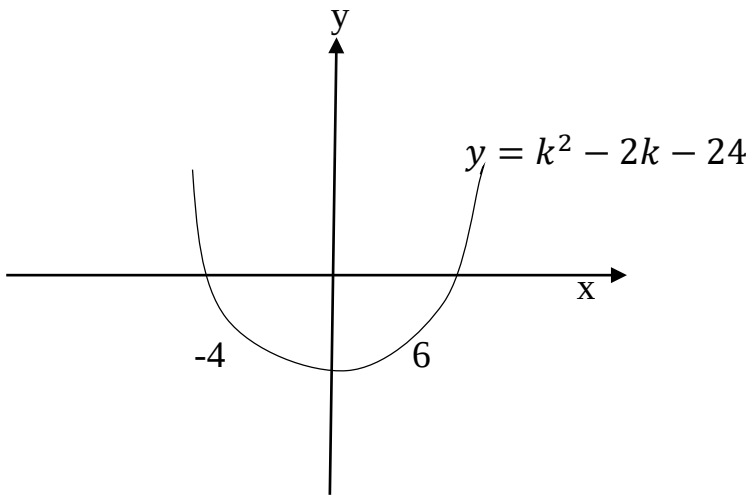
(b) $\therefore$ $(k-6)(k+4) < 0$

$\Longrightarrow$ Critical values are

When

$\Longrightarrow$ $k - 6 = 0$ or $k + 4 = 0$

$\Longrightarrow$ $k = 6$ or $k = -4$



$\therefore$ For the graph $y < 0$

For

$$-4 < k < 6$$

Q.5

$$6x^2 - x - 2 = 0$$

Factorization

$\Longrightarrow \quad 6x^2 - 4x + 3x - 2 = 0$

$\Longrightarrow \quad 2x(3x - 2) + 1(3x - 2) = 0$

$\Longrightarrow \quad (2x + 1)(3x - 2) = 0$

$\Longrightarrow \quad 2x + 1 = 0 \quad$ or $\quad 3x - 2 = 0$

$\Longrightarrow \quad x = \frac{-1}{2} \quad$ or $\quad x = \frac{2}{3}$

Thus,

$$\text{S.S} = \left\{\frac{-1}{2}, \frac{2}{3}\right\}$$

Q.6

As $\quad (x + 1)^2 = 2(x - 3)$

$\Longrightarrow \quad x^2 + 2x + 1 = 2x - 6$

$\Longrightarrow \quad x^2 + 2x - 2x + 1 + 6 = 0$

$\Longrightarrow \quad x^2 + 7 = 0$

It in not in the form of $ax^2 + bx + c = 0$

$\therefore$ The given equation is not a quadratic equation.

Q.7

$$x^2 + 13x + 21 = 21 \quad \text{or} \quad x^2 + 13x + 21 = -21$$

$$\Longrightarrow \quad x^2 + 13x + 21 - 21 = 0 \quad \text{or} \quad x^2 + 13x + 21 + 21 = 0$$

$$\Longrightarrow \quad x^2 + 13x = 0 \quad \text{or} \quad x^2 + 13x + 42 = 0$$

$$\Longrightarrow \quad x(x + 13) = 0 \quad \text{or} \quad (x + 6)(x + 7) = 0$$

$$\Longrightarrow \quad x = 0 \; and \; x = -13 \quad \text{or} \quad x = -6 \; and \; x = -7$$

$$\text{S.S} = \{-13, -7, -6, 0\}$$

Q.8

As , given

$$\Longrightarrow \quad 3x^2 - 5x = 7 \quad \text{(In standard form is:)}$$

$$\Longrightarrow \quad 3x^2 - 5x - 7 = 0$$

$$\Longrightarrow \quad a = 3 \, , b - 5 \, , c = -7$$

$\therefore$ Using quadratic equation

$$\Longrightarrow \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Longrightarrow \quad x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-7)}}{2(3)}$$

$$x = \frac{5 \pm \sqrt{25 + 84}}{6}$$

$$x = \frac{5 \pm \sqrt{109}}{6}$$

Thus,

The solution set is $\left\{\frac{5+\sqrt{109}}{6}, \frac{5-\sqrt{109}}{6}\right\}$

Or simply $\left\{\frac{5 \pm \sqrt{109}}{6}\right\}$

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I am Sorry !!!!!