QUADRATIC FN

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LOCUS

2 - UNIT

LESSON 50 — HW

Quest ①: By investigating $\Delta = b^2 - 4ac$ (but NOT solving the eqn's).... find whether the following quadratic equations have:-

(*) REAL or UNREAL ROOTS (*) EQUAL or UNEQUAL Roots (*) RATIONAL or IRRATIONAL Roots.

(1) $4x^2 - 4x + 1 = 0$ (2) $x^2 + 2x + 3 = 0$ (3) $6x^2 + x - 2 = 0$

(4) $3x^2 - 5x + 5 = 0$ (5) $x^2 - 3x - 7 = 0$ (6) $4x^2 - 16x + 16 = 0$

(7) $2x^2 - 11x - 21 = 0$ (8) $x^2 - 3 = 0$ (9) $2x^2 - 5x = 0$

Quest ②:

(a) For what values of k, does $kx^2 + 3x - 4 = 0$ have real roots?

(b) If $(2k+3)x^2 - 4kx + 4 = 0$ has equal roots, find k.

(c) If the equation $x^2 + kx + 36 = 0$ has No real roots, what values can k take?

Quest ③: Which of the following are (i) positive definite (ii) negative definite (iii) Neither?

a) $3x^2 + 2x - 1$ b) $x^2 - 2x + 5$ c) $3x - 2x^2 - 4$

LESSON (51) — HW

Quest①: By considering the value of $\Delta = b^2 - 4ac$ & the sign of "a", classify the following quadratic functions as either :-
(i) positive definite (ii) negative definite or (iii) Indefinite

a) $2x^2 - 10x + 11$ b) $2x - x^2 - 5$ c) $x^2 - 3x$ d) $x^2 + 6$

Quest②: Given the axis of symmetry of the parabola $y = ax^2 + bx + c$ is the line $x = -\frac{b}{2a}$, find the axis of symmetry & the co-ordinates of the vertex of each of the following.

a) $y = x^2 - 7x + 10$ b) $y = 2x^2 + x + 4$ c) $y = 16 - 9x^2$

Quest③: If the roots of the quadratic equation $ax^2 + bx + c = 0$ are α and β; the sum of the roots $\alpha + \beta = -\frac{b}{a}$
& the product of the roots $\alpha\beta = \frac{c}{a}$

Find the a) SUM & b) PRODUCT of the roots for each of the following quadratic eqn's.

a) $x^2 + x - 6 = 0$ b) $x^2 + x + 6 = 0$ c) $5x - 2x^2 - 9 = 0$

Quest④: Find A and B if $A(x+1)(x+2) + B(x-3) = x^2 + 5x - 4$

LESSON (52) — HW

Quest ① If α and β are the roots of the equation $x^2 - 3x - 5 = 0$ find (without solving the equation!) the values of:-

a) $\alpha + \beta$ b) $\alpha\beta$ c) $(\alpha+4)(\beta+4)$ d) $\frac{1}{\alpha} + \frac{1}{\beta}$

e) $\alpha^2\beta + \beta^2\alpha$ f) $\alpha^3\beta^2 + \beta^3\alpha^2$ g) $\alpha^2 + \beta^2$ **h) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

Quest ② For what value of "k" will the equation: $x^2 - (k+2)x + (k-4) = 0$ have:- a) One root equal to zero? b) One root equal to 4?

c) One root is the reciprocal of the other? d) The 2 roots are opposites! (same value opposite signs)

Quest ③ Reduce to a quadratic and Solve:—

(a) $x^6 - 9x^3 + 8 = 0$ (b) $4^x + 2^x - 2 = 0$

LESSON (53) — HW

Quest ①:

(a) If the roots of $kx^2-(k+1)x+(4-k)=0$ are reciprocals find k.

(b) Find k if the roots of $kx^2-(k+1)x+(4-k)=0$ are opposites.

(c) If one root of $3x^2-8x+k=0$ is three times the other, find k.

Quest ②: Solve the following by reducing each one to a quadratic equ.

(a) $x^4-5x^2+4=0$ (b) $(2x-1)^4-13(2x-1)^2+36=0$

(c) $(x^2-1)^2-2(x^2-1)-3=0$ (d) $25^x-26(5^x)+25=0$

LESSON (54) – HW

Quest ①:

(a) If $A=(2,3)$ and $P=(x,y)$ find an expression for :-

(i) The gradient of AP (ii) The length of AP

(b) Find the equation of the locus of any point $P(x,y)$ moving so that it is always equi-distant from $A=(2,3)$ and $B=(0,-1)$

(c) Find the equation of the locus of the point moving so that it is always 4 units from the point $C=(2,-1)$

* (d) Find equation of locus of $P(x,y)$ such that $AP \perp PB$ if $A=(-3,0)$ and $B=(3,0)$

(e) Find the equation of the locus of a point $P(x,y)$ which is always:-

(i) equi-distant from both the x-axis and y-axis (ii) always 3 units away from the line $x+1=0$

Quest ②:

(a) If $x^2=6y$ find the focus S.

(b) If $x^2=-12y$ find the focus S.

** (c) If $x^2=4y-4$ find (i) the Vertex (ii) the focus.

LESSON (55) – HW.

Quest (1) (a) Find the locus equation of the point which moves so that it is always 5 units from the point $(1, -1)$. Show that this locus passes through the point $(4, 3)$

(d) · Find the equation of the locus of a point moving so that it is always equidistant from the point $(0, 6)$ & the x-axis

Quest (2)

(a) Find the Vertex, V & the focus, S of the following parabolas.

(i) $(x+4)^2 = 8(y-3)$ (ii) $(x-5)^2 = -4y$

(b) Find the equation of the parabolas with:

(i) $V = (0, 1)$ $S = (0, 5)$ (ii) $V = (3, 0)$ $S = (3, -4)$

LESSON (56) – HW

Quest 1:

(a) A parabola with vertex $(0,-4)$ is known to pass through the point $(4,2)$. Find the equation.

(b) Find the equation of the locus of the point moving equi-distance from the point $(-3,1)$ and the line $y=-5$

Quest (2):

(a) Find the Vertex & focus of the following parabola;

(i) $10y = x^2+20$

(ii) $4y = x^2-4x$

(iii) $2y = x^2+6x+5$

Quest (3) If $\frac{dy}{dx} = 6x^2 - 5$

find $y =$

(the primitive function!)