Quadratic continue

Thursday, November 12, 2020 5:55 AM

① $f(x) = (x-h)^2 + k$. vertex form (h, k)

② $f(x) = ax^2 + bx + c$ – general form.

③ $f(x) = a(x-p)(x-q)$ – factorized form.

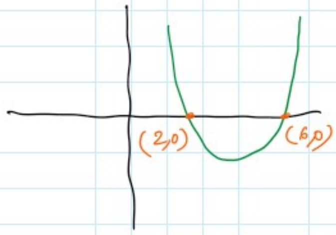
A quadratic f^n which is written in

$f(x) = a(x-p)(x-q)$, $a \neq 0$ (intercept form).

$(p, 0)$, $(q, 0)$

$f(x) = (x-2)(x-6)$

$a \neq 0$



Vertex: $\left\{ \frac{p+q}{2}, f\left(\frac{p+q}{2}\right) \right\}$

Ex axis of symmetry

x-intercepts, y-intercepts., vertex, sketch

a) $f(x) = (x-4)(x-2)$

x-inter ⇒ $(2,0), (4,0)$

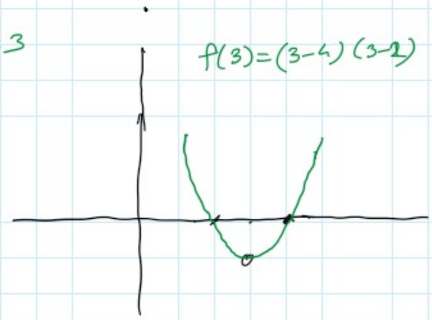
y ⇒ intercept : $f(0) = (0-4)(0-2) = 8$.

$y = 8$

AOS:- $x = \frac{2+4}{2} = 3$

$f(3) = (3-4)(3-2)$

Vertex: $(3, -1)$



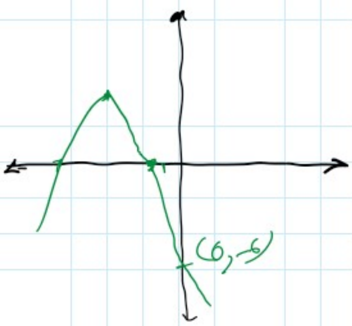
Ex $f(x) = -2(x+3)(x+1)$

AOS: $\boxed{x = -2}$

vertex: $(-2, 2)$

x-inter. $(-3, 0)$, $(-1, 0)$

y-interc $(0, -6)$



changing to general form or factorize form.

a) $f(x) = x^2 + 6x - 16$ ⇒ $f(x) = (x+8)(x-2)$

$f(x) = a(x-p)(x-q)$

b) $f(x) = -4x^2 + 2x$.

$= -2x(2x-1)$ ⇒ $-4x.(x-\frac{1}{2})$

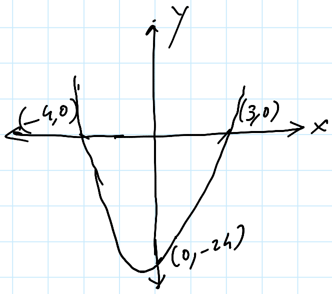
x-intercept: $0, \frac{1}{2}$

Y intercept $(x=0) \Rightarrow 0$ $(0,0)$

Vertex: $\left(\frac{1}{4}, f\left(\frac{1}{4}\right)\right)$

$a = -4.$ ← parabola concave down

Ex



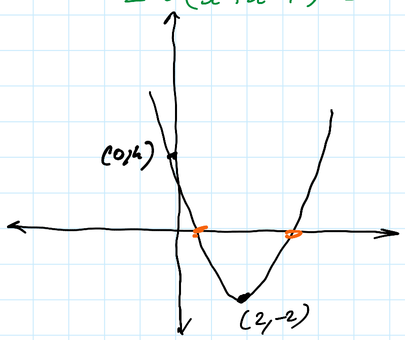
find quadratic f^n:

$f(x) = a(x-p)(x-q)$

$f(x) = a(x+4)(x-3) = 2(x+4)(x-3)$

$= 2(x^2+x-12) = 2x^2+2x-24$

Ex2 $f(x) = a(x-h)^2+k.$



$(x-3)(x-1)$

$f(x) = \frac{4}{3}(x-3)(x-1)$

Ex' $x^2+4x+3=0$ (quadratic eq^n)

completing the square.

$(x+3)(x+1)=0$

$T.T = \left(\frac{b}{2}\right)^2 = \left(\frac{4}{2}\right)^2 = 4$

$x^2+4x+4+3-4=0$

$(x+2)^2 = 1$

$(x+2) = \pm 1$

$x = -2 \pm 1$

$= -3, -1$

point of intersection. } GDC

$f(x) = 4x^2-2x-5$

$g(x) = 3x+2$

$4x^2-2x-5 = 3x+2$

$4x^2-5x-7=0$

$a=4,\ b=-5,\ c=-7$

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

$= \frac{5 \pm \sqrt{25-4(4)(-7)}}{8}$

$28 \times 4 = 112$

$$= \frac{5 \pm \sqrt{25 - 4(4)(-7)}}{8}$$

$28 \times 4 = 112$

$$= \frac{5 \pm \sqrt{25 + 112}}{8}$$

$$= \left.\frac{5 \pm \sqrt{137}}{8}\right\} \text{ Exact}$$

Ex Solve quadratic eqⁿ by completing the square.

$$x^2 - 5x + 3 = 0$$

$$\left(\frac{5}{2}\right)^2 = \frac{25}{4}$$

$$x^2 - 5x + \frac{25}{4} = -3 + \frac{25}{4}$$

$$\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$$

$$\left(x - \frac{5}{2}\right) = \pm\sqrt{\frac{13}{4}}$$

$$x = \frac{5}{2} \pm \frac{\sqrt{13}}{2}$$

$$= \frac{5 \pm \sqrt{13}}{2}$$

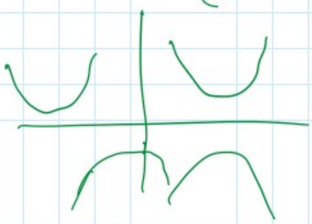
Summary: $\Delta = b^2 - 4ac$ discriminant.

$ax^2 + bx + c = 0$.

$\Delta > 0$ — 2 solⁿ.

$\Delta = 0$ — 2 equal solⁿ (repeated)

$\Delta < 0$ — No real roots. (No x-intercept)



Solving inequality

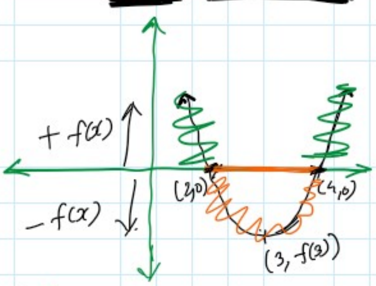
$x^2 - 6x + 8 < 0$.

$(x-2)^1 (x-4)^1 < 0$.

$x > 2$ and $x < 4$

$2 < x < 4$

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



$f(x) = (x-2)^{2}(x-4)$ -ve +ve +ve / 2 4 / +ve -ve

$x < 2$ and $x > 4$

$x > 2$ and $x < 4$

Ex $2x^2 - 5 \geq x - 3$

$2x^2 - x - 2 \geq 0$

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

$x = ?$

$$x = \frac{1 \pm \sqrt{17}}{4}$$

$\left(x - \frac{1 - \sqrt{17}}{4}\right)\left(x - \frac{1 + \sqrt{17}}{4}\right) \geq 0.$

$x = \frac{1 \pm \sqrt{17}}{4}$

$x = ?$

$\left(x - \frac{1-\sqrt{17}}{4}\right)\left(x - \frac{1+\sqrt{17}}{4}\right) \geq 0.$

+ve   −ve   +ve

$\left(\frac{1-\sqrt{17}}{4}\right)$ $\frac{(1+\sqrt{17})}{4}$

$x \geq \frac{1+\sqrt{17}}{4}$ and $x \leq \frac{1-\sqrt{17}}{4}.$

Ex find for K, $y = x^2 + Kx + 9$ has no x-intercept

$\Delta = b^2 - 4ac$

$= K^2 - 36 < 0.$

$K^2 - 36 < 0.$

$K^2 < 36.$

$\boxed{-6 < K < 6}$

Ex A rancher plans to use 120 m of fencing build a rectangular pen.

a) Let x represents the width of the pen. Find the length of area of the pen in terms of x.

b) Find the dimension of pen if area is $800 m^2$

c) Find the maximum possible area of pen.

Perimeter $= 120 = 2l + 2x.$

$\Rightarrow 60 = l + x$

$l = (60 - x)$

Area $= A = (60 - x)x.$

$A = f(x) = x(60 - x)$

$A = 800 \quad \Rightarrow \quad x(60 - x) = 800$

$60x - x^2 = 800$

$x^2 - 60x + 800 = 0.$

$(x - 40)(x - 20) = 0$

$x = 40$ / $x = 20.$

$l = 20$ / $l = 40.$

Dimension = 20 m by 40 m

c) $A = x(60 - x) = -x^2 + 60x$

$x = \frac{-b}{2a} = \frac{-60}{2(-1)} = 30.$

$A = 30(60 - 30) = 900 m^2$

A y Y 90−y B

2700 each

5400 − 30 = 5400 − 9...

2. area of DCX = Area of ADXB

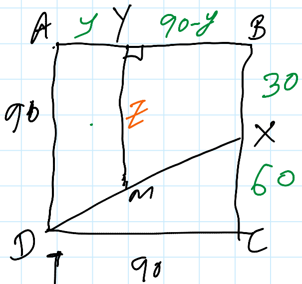
$\cancel{2}\times \frac{1}{\cancel{2}} \times 90 \times x =$

$\frac{1}{2}(90+90-x)\times 90$

$\overset{2}{\cancel{180}}x = (180-x)\cancel{90}$

$2x = 180 - x$

$3x = 180 \Rightarrow x = 60$



Area of DXBA $= 8100 - \frac{1}{2}\times 90 \times \cancel{60}^{30}$

$= 8100 - 2700$

$= 5400$

2700 each area

$\frac{1}{2}(Z+30)\times(90-y) = 2700$

$(Z+30) = \frac{5400}{90-y}$

$Z = \frac{5400}{90-y} - 30$

$\frac{1}{2}(Z+90)\times y = 2700$

$(Z+90) = \frac{5400}{y}$

$z = \frac{5400}{y} - 90$

$\frac{5400}{90-y} - 30 = \frac{5400}{y} - 90$

$\frac{5400}{90-y} = \frac{5400}{y} - 60$

$\frac{5400}{90-y} = \frac{5400-60y}{y}$

$5400y = (5400-60y)(90-y)$