Mathematics 10D

Q.06 – Solving From Vertex Form

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Mathematics 10D

First of all, and most importantly, what is solving?

Solving is to find the value or values of a variable that make the equation true.

Ex1: $3x - 8 = 13$ $^{+8}$ $^{+8}$

$$3x = 21$$
$$\frac{3x}{3} = \frac{21}{3}$$
$$x = 7$$

Ex2: $2x^2 + 3 = 21$ $^{-3}$ $^{-3}$

$$\frac{2x^2}{2} = \frac{18}{2}$$
$$\sqrt{x^2} = \sqrt{9}$$
$$x = 3 \text{ and } x = -3 \quad , \boxed{x = \pm 3}$$

However, how would you solve: $3x^2 - 8x + 4 = 2x + 3$

we can't do this one using the above technique.

In the world of quadratics, solving means to find the x-intercepts or the zeros, hence we need to substitute 0 into y, or rewrite the equation so that it equals 0 (which is why I say to solve for the zeros, meaning find the value(s) of x so that y=0)

Solve!   from vertex form

shirt   pants
$y = 2(x-3)^2 - 18$ socks

↑   underwear
You

evaluate | -3 | $+3$
         | $(\ )^2$ | $\div\sqrt{\ }$
         | $\times 2$ | $\div 2$
         | -18 | $+18$ undo

$\dfrac{18}{2} = \dfrac{2(x-3)^2}{2}$

$\sqrt{9} = \sqrt{(x-3)^2}$

$\pm 3^{+3} = x - 3^{+3}$

$\pm 3 + 3 = x$

Two Solutions.

⊕ $x = +3 + 3$

    $\underline{x = 6}$

⊖ $x = -3 + 3$

    $\underline{x = 0}$

Solve another!

$$0 = -5(x+6)^2 + 70$$

$$-70 = -5(x+6)^2$$

$$\frac{-70}{-5} = \frac{-5(x+6)^2}{-5}$$

$$\sqrt{14} = \sqrt{(x+6)^2}$$

$$\pm 3.74 = x + 6$$

$$\pm 3.74 - 6 = x$$

$\oplus$ $x = +3.74 - 6$

$\quad x = -2.26$

$\ominus$ $x = -3.74 - 6$

$\quad x = -9.74$

The first two were neat and tidy, how about one that isn't!

$$0 = -7(x-12)^2 + 19$$

$$-19 = -7(x-12)^2$$

$$\frac{-19}{-7} = \frac{-7(x-12)^2}{-7}$$

$$\sqrt{2.71} = \sqrt{(x-12)^2}$$

$$\pm 1.65 = x - 12$$

$$\pm 1.65 + 12 = x$$

$\oplus$ $x = 1.65 + 12$

$x = 13.65$

$\ominus$ $x = -1.65 + 12$

$x = 10.35$

Are there always 2 answers?

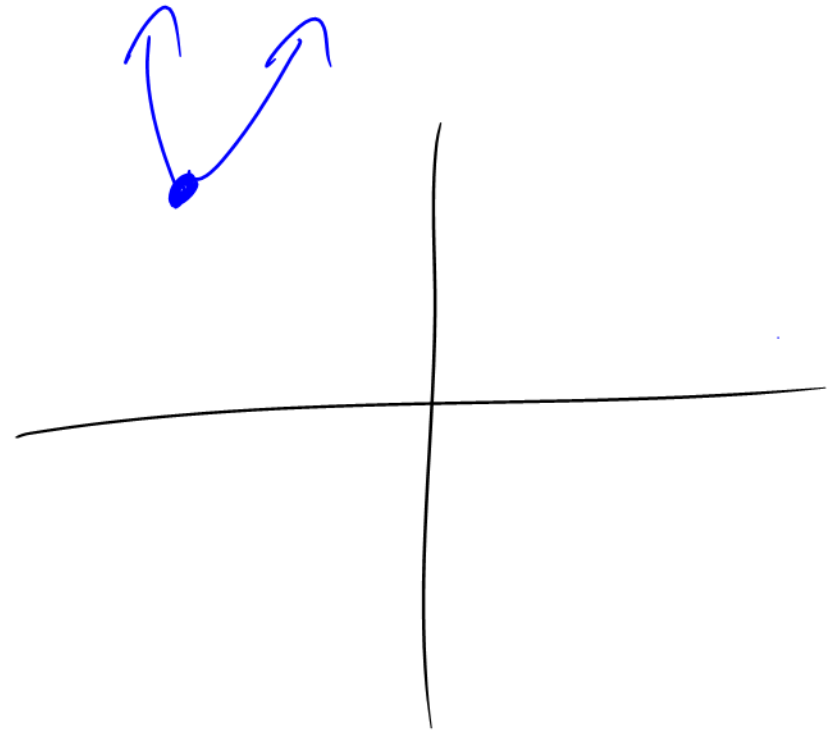$$0 = 4(x+8)^2 + 6$$

$$-6 = \frac{4(x+8)^2}{4}$$

$$\frac{-6}{4}$$

$$\sqrt{\pm 1.5} = \sqrt{(x+8)^2}$$

Cannot square root a negative!!

$\therefore$ No Solutions

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

$$\frac{-3}{-3} \qquad \frac{-3}{-3}$$

$$\sqrt{0} = \sqrt{(x+4)^2}$$

$$0 = x+4$$

$$-4 = x$$