HAT
Quadratic Transformations and Inequalities

9/27/17

Use substitution to verify $(5-2i)$ is a
solution to the equation $x^2 + 29 = 10x$

$$(5-2i)^2 + 29 \overset{?}{=} 10(5-2i)$$

$$(5-2i)(5-2i) + 29 \overset{?}{=} 50 - 20i$$

$$25 - 10i - 10i + 4i^2 + 29 \overset{?}{=} 50 - 20i$$

$$-4$$

$$50 - 20i = 50 - 20i$$

Warm Up:

QUICKLY determine the number and type of solutions for this equation.

$$2x^2 - 12x + 26 = 0$$

Note: You should NOT find the solutions!

Discriminant: $b^2 - 4ac$

$(-12)^2 - 4(2)(26) < 0$
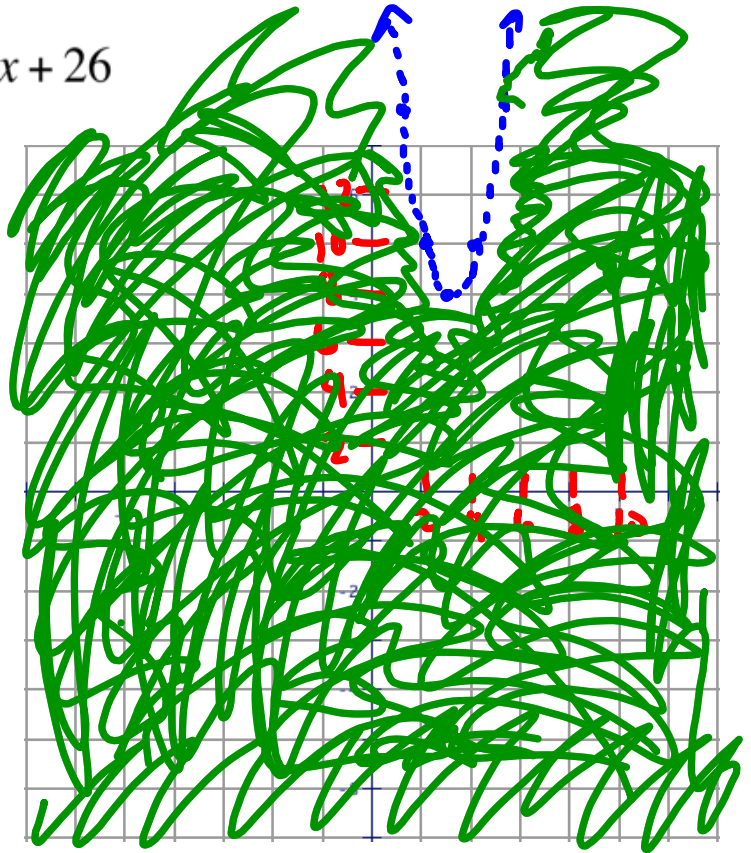
so 2 complex sol.

Ex#1: Graph $y < 2x^2 - 12x + 26$

Vertex:

$x = \dfrac{12}{2(2)}$

$x = 3$

$(3, 8)$

$2(3)^2 - 12(3) + 26$

$18 - 36 + 26 = 8$

Ex#2: Solve $x^2 + 2x - 8 \geq 0$
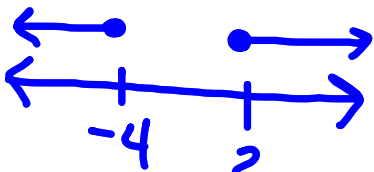
For what x-values is the graph above the x-axis?

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

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

$x = -4 \quad x = 2$

$x \in (-\infty, -4] \cup [2, \infty)$

$\{x | x \in$
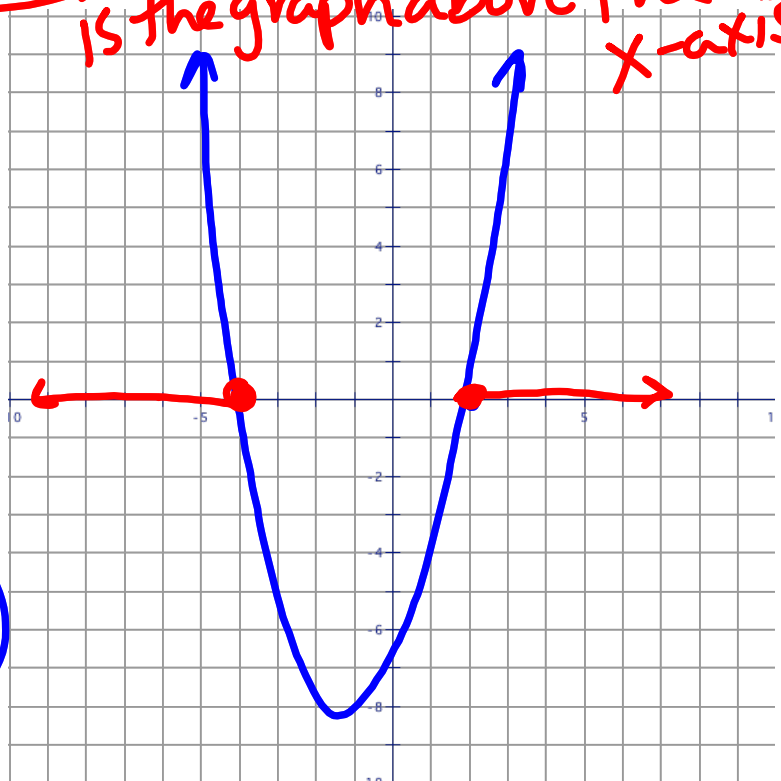
Ex#3: Solve $2x^2 + x < 15$

$\underline{2x^2 + x - 15 < 0}$

$2x^2 + x - 15 = 0$

$(2x - 5)(x + 3) = 0$

$x = \frac{5}{2} \quad x = -3$

$x \in \left(-3, \frac{5}{2}\right)$

-3   5/2
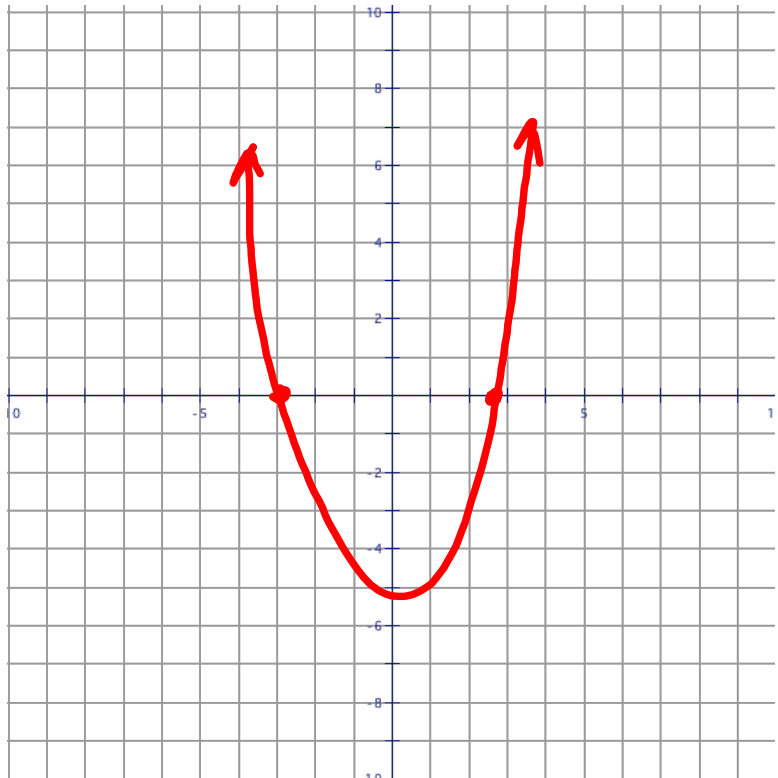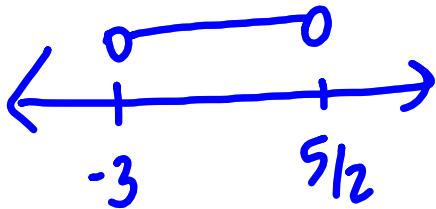
Ex#4: Solve $3x^2 + 5 > 6x$
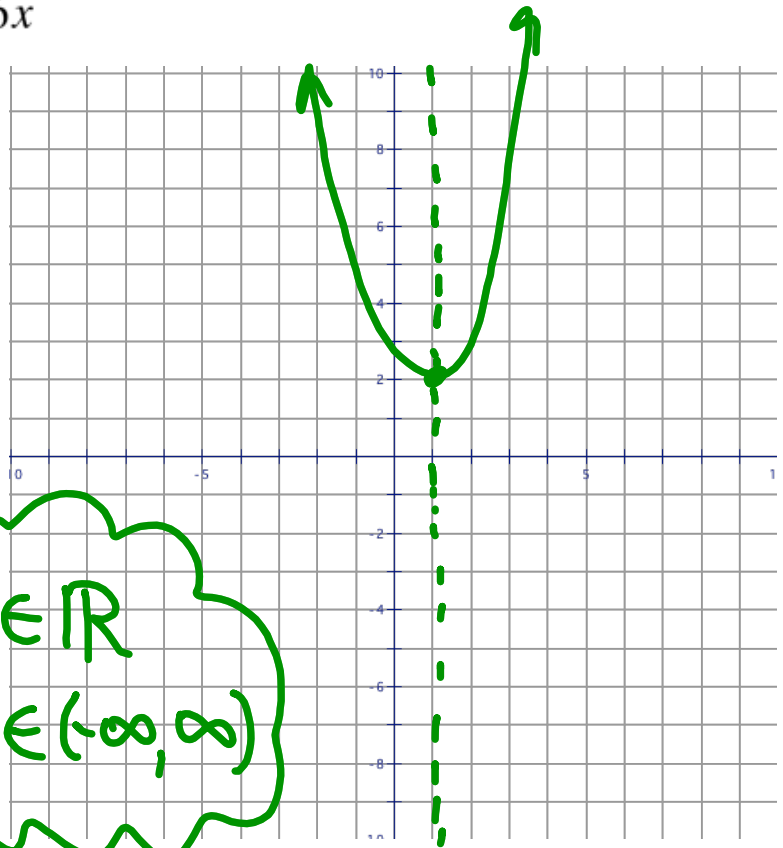
$3x^2 - 6x + 5 \overset{<}{>} 0$

$3x^2 - 6x + 5 = 0$

$(-6)^2 - 4(3)(5)$

$36 - 60$

2 complex sol.

No x-int.

$x \in \mathbb{R}$

$x \in (-\infty, \infty)$

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