Algebra 1        9.2

Solve quadratic equations by graphing ← x-intercepts

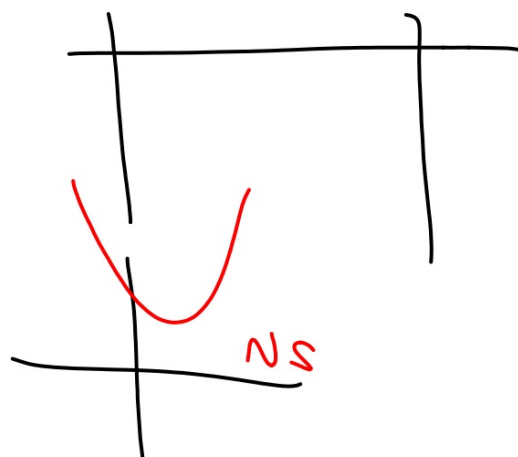Estimate quadratic solutions by graphing

integer

Solution

Root

x-intercept
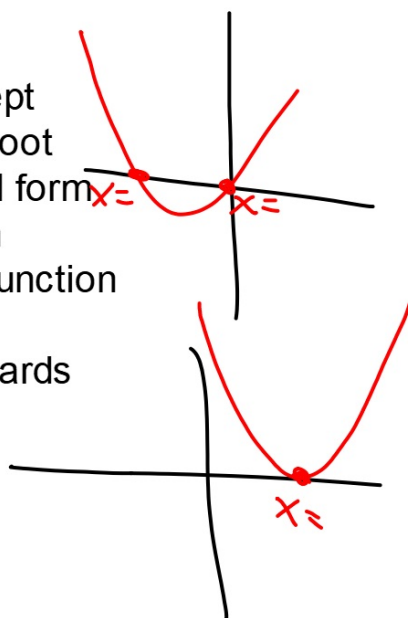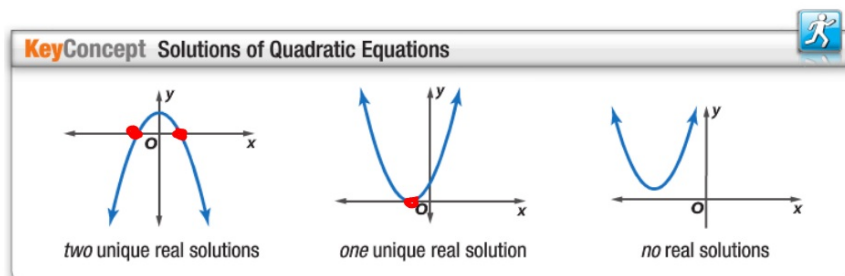
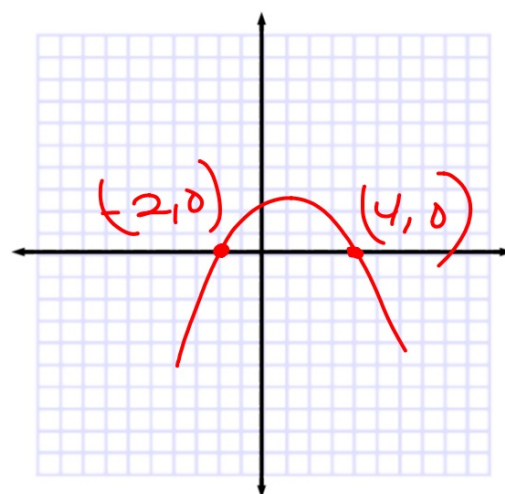Double root

standard form

equation

related function

Whiteboards

$$AoS \quad x = \frac{-b}{2 \cdot a}$$

x=    x=

x=

NS

Where does the graph cross the x-axis?
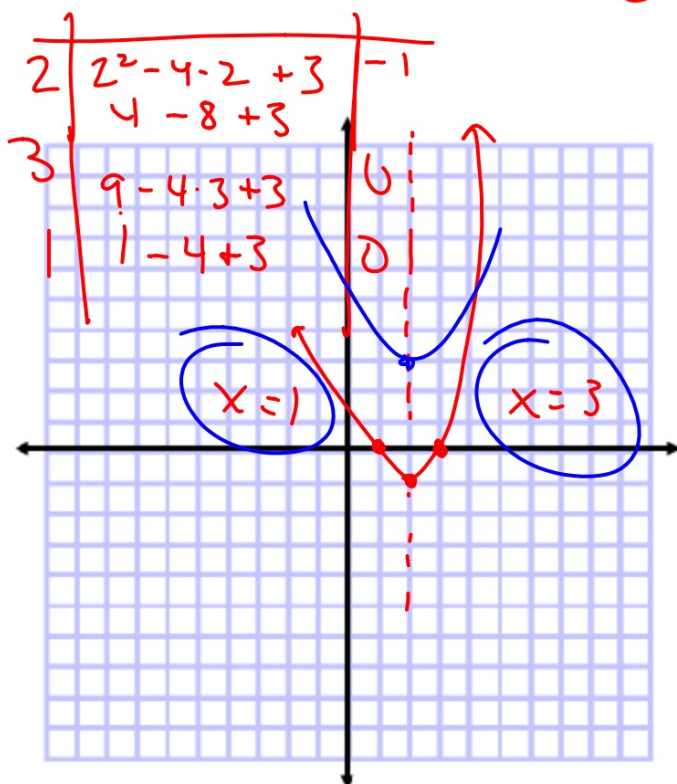What is true about the y-coordinate there?

$(-2, 0)$   $(4, 0)$

"double root"

$0 < x < 1$

$2 < x < 3$

$x \approx$

$y = 2x^2 - 6x + 3$

$x = \dfrac{6}{0 \cdot 2} = \dfrac{6}{4}$
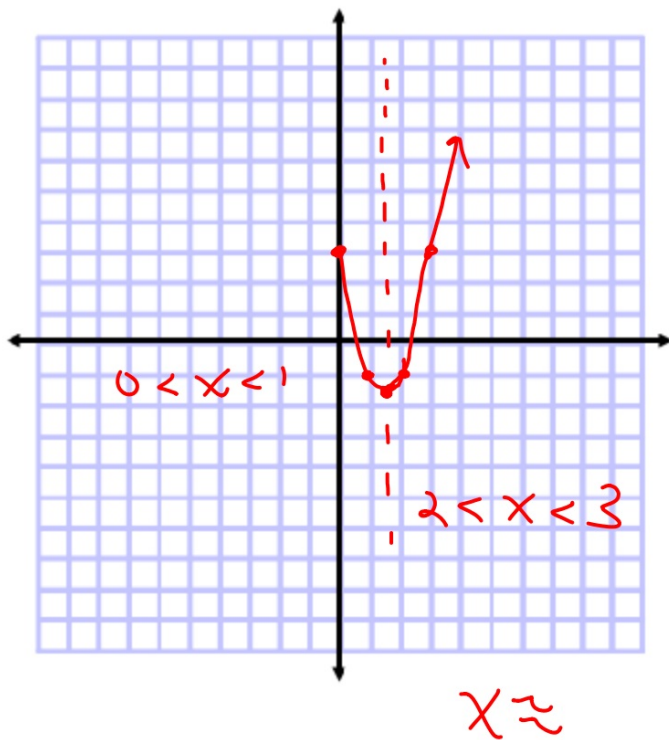
| | $2x^2 - 6x + 3$ | |
|---|---|---|
| 1.5 | $2 \quad -6(1.5)$ $4.5 - 9 + 3$ | $-1.5$ |
| 3 | $18 - 18 + 3$ | $3$ |
| 2 | $2 \cdot 4 - 6 \cdot 2 + 3$ $8 - 12 + 3$ | $-1$ |

**GuidedPractice** **Solve each equation by graphing.**

**1B.** $x^2 - 4x + 3 = 0$

ADS $x = \dfrac{4}{2 \cdot 1} = \dfrac{4}{2}$

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

| | |
|---|---|
| 2 | $2^2 - 4 \cdot 2 + 3$  $-1$ |
| | $4 - 8 + 3$ |
| 3 | |
| | $9 - 4 \cdot 3 + 3$  $6$ |
| 1 | $1 - 4 + 3$  $0$ |

Does it open up or down?
Function form (y=)
x=-b/2a etc.
Table of values

Answer the question
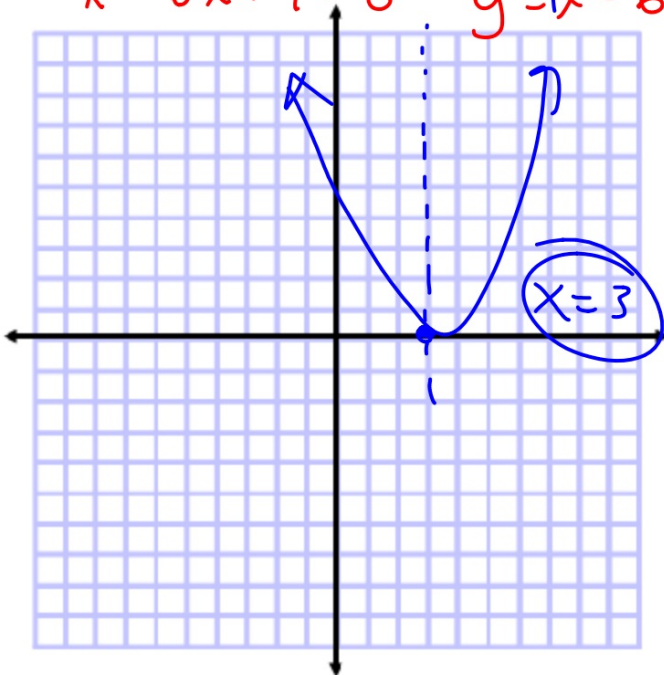  Solve: where does it cross x-axis?
    hint: y-coordinate there is 0

$X = 1$    $X = 3$

## Example 2  Double Root

Solve $x^2 - 6x = -9$ by graphing.

$$+9 \quad +9$$

$$x^2 - 6x + 9 = 0 \qquad y = x^2 - 6x + 9$$

Change to =0 (if necessary)
Open up or down?
Use function form (y=) for graphing
Answer the question
If your graph is inaccurate...

$$\text{AOS} \quad x = \frac{6}{2} = 3$$

$$\begin{array}{c|cc} 3 & 3^2 - 6\cdot3 + 9 & 0 \\ & 9 - 18 + 9 & \end{array}$$

$x = 3$

**Solve each equation by graphing.**

**2A.** $x^2 + 25 = 10x$

**2B.** $x^2 = -8x - 16$

$-10x \quad -10x$

$x^2 + -10x + 25 = 0$

$y = x^2 + -10x + 25$

$2 < x < 3$
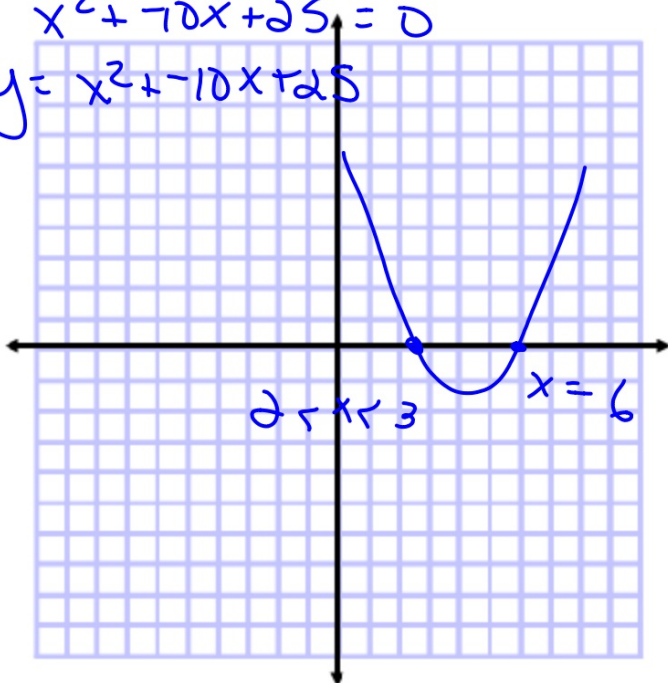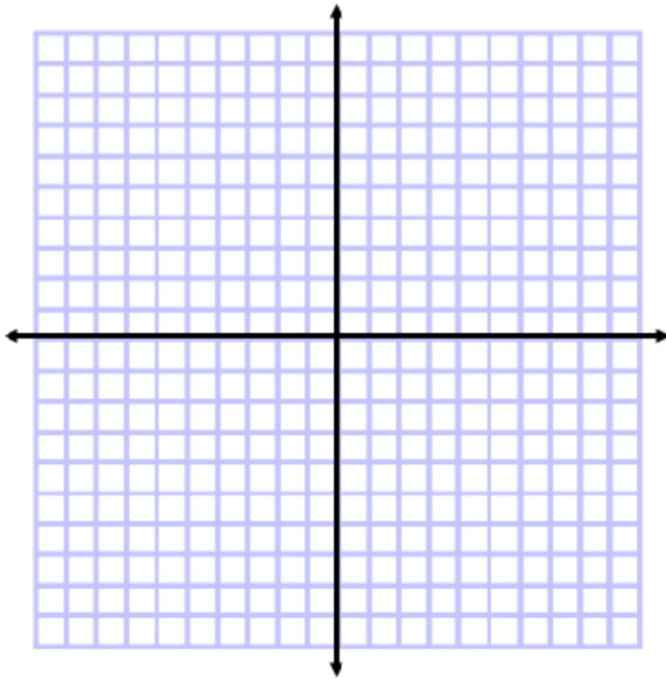
$x = 6$

Rearrange
  (if necessary)
Change to function
form

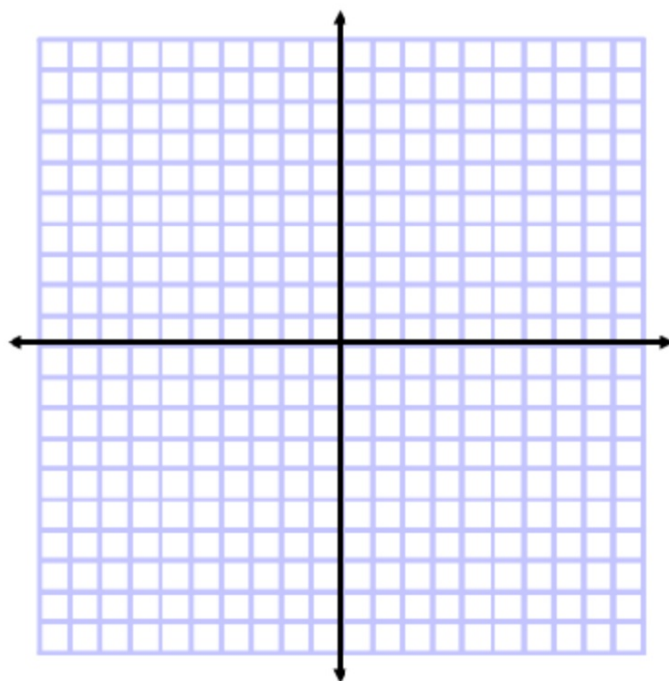**Example 3** No Real Roots

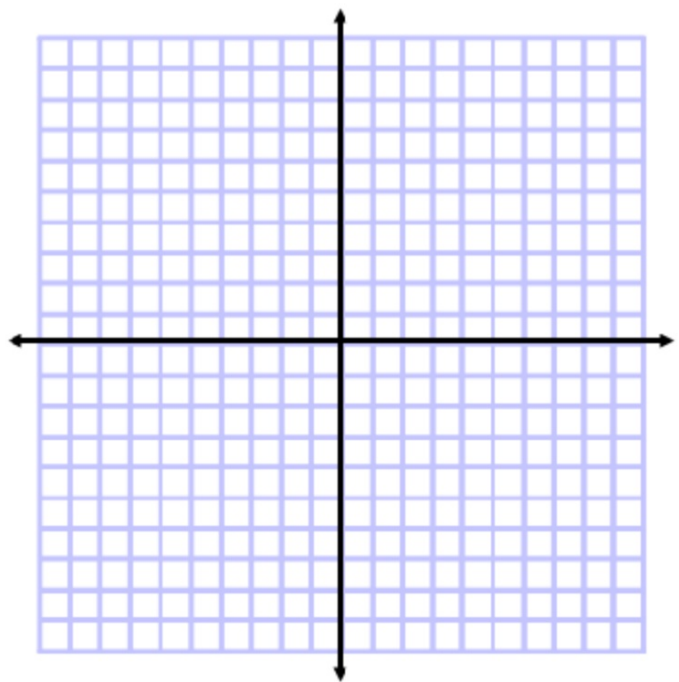Solve $2x^2 - 3x + 5 = 0$ by graphing.

complex number

**Solve each equation by graphing.**
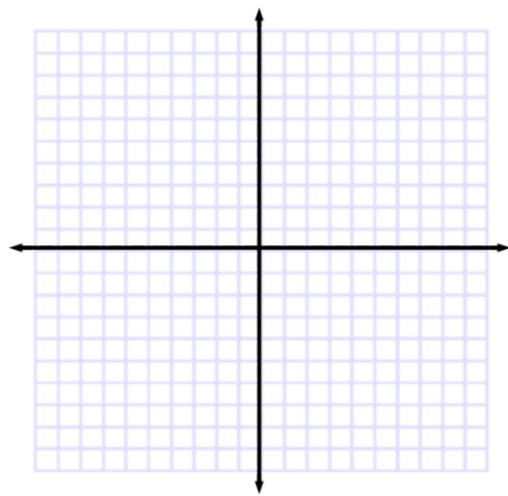
**3A.** $-x^2 - 3x = 5$

**3B.** $-2x^2 - 8 = 6x$

What if the answer isn't an
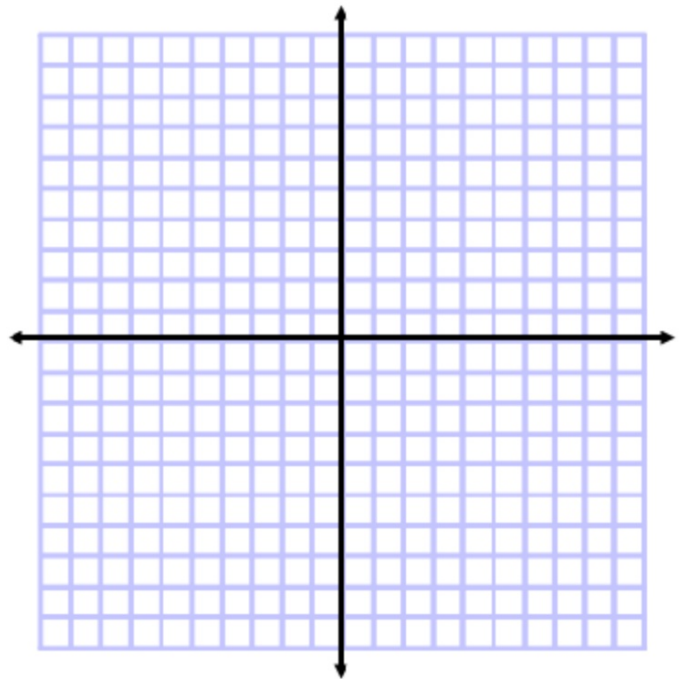integer?
What is it between?
$y = x^2 + 3x - 1$

## Example 4 Approximate Roots with a Table

Solve $x^2 + 6x + 6 = 0$ by graphing. If integral roots cannot be found, estimate the roots to the nearest tenth.
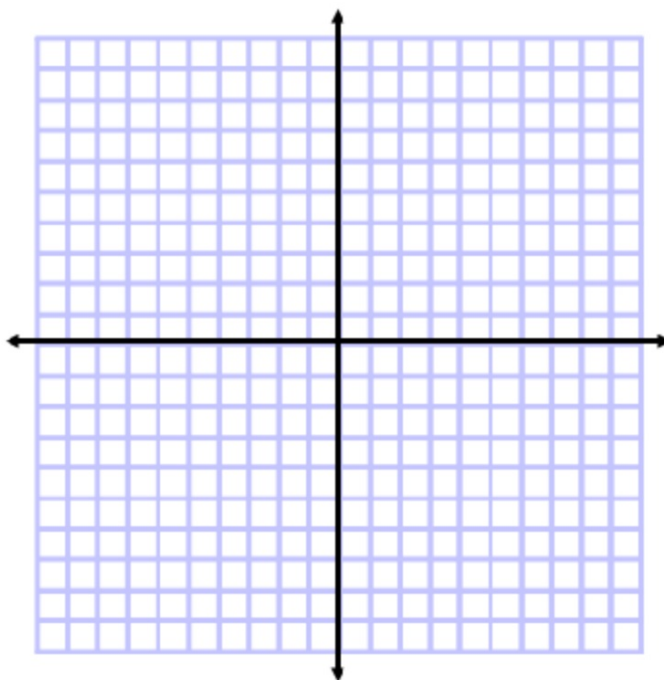
between

9.2 11-33 o

if not integers...
what is it between?
vs
nearest tenth?

**4.** Solve $2x^2 + 6x - 3 = 0$ by graphing. If integral roots cannot be found, ~~estimate the roots to the nearest tenth~~.

What is it
between?
     vs
nearest
tenth?