

Unit 11: Equation of a First or Second Degree Polynomial Function

$$\cdot y = ax^2 + bx + c$$

$$\cdot y = a(x-h)^2 + k$$

$V(h, k)$

$$\cdot y = a(x-x_1)(x-x_2)$$

$$y = mx + b$$

\uparrow slope
 $= \frac{\text{rise}}{\text{run}}$
 $= \frac{y_2 - y_1}{x_2 - x_1}$

\uparrow y-int

Give the set builder notation of this inequality

1st degree

$$y = \frac{2}{3}x + b$$

sub (2, 2)

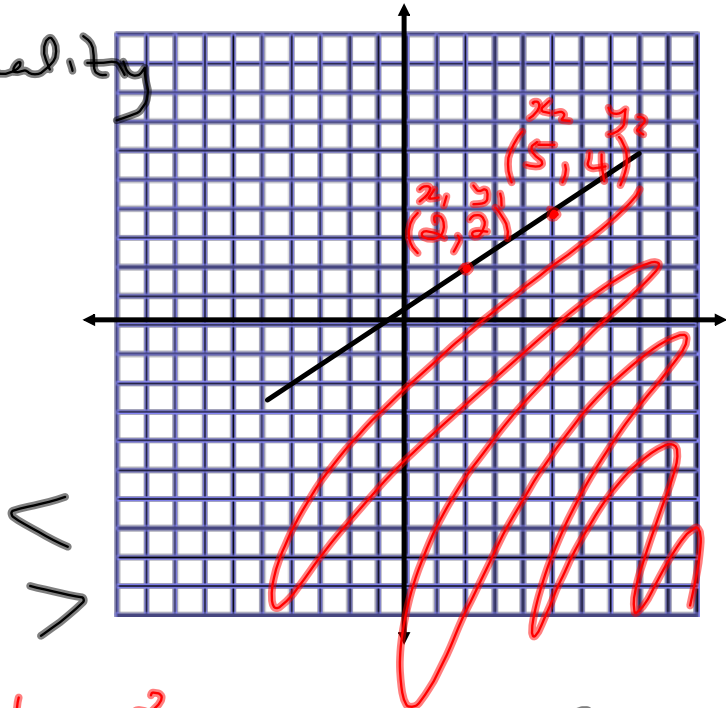
$$2 = \frac{2}{3}(\underline{2}) + b$$

$$\frac{3 \times 2}{3 \times 1} - \frac{4}{3} = b$$

$$\frac{6}{3} - \frac{4}{3} = b$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{4 - 2}{5 - 2} = \frac{2}{3} = \frac{\text{rise}}{\text{run}}$$



$$b = \frac{2}{3}$$

$$y = \frac{2}{3}x + \frac{2}{3}$$

sub (0, 0)
point in shaded area

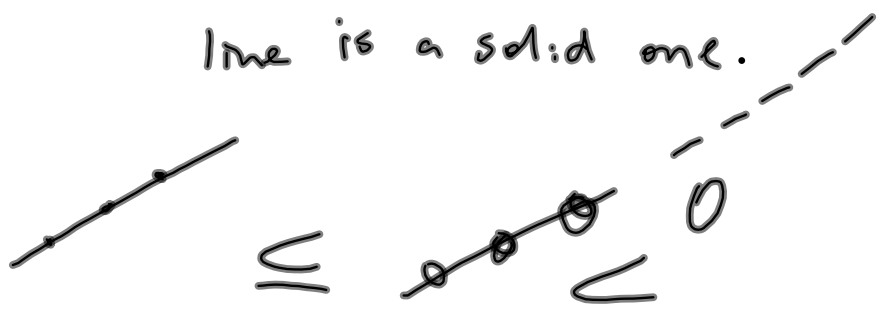
$$0 = \frac{2}{3}(0) + \frac{2}{3}$$

$$0 < \frac{2}{3}$$

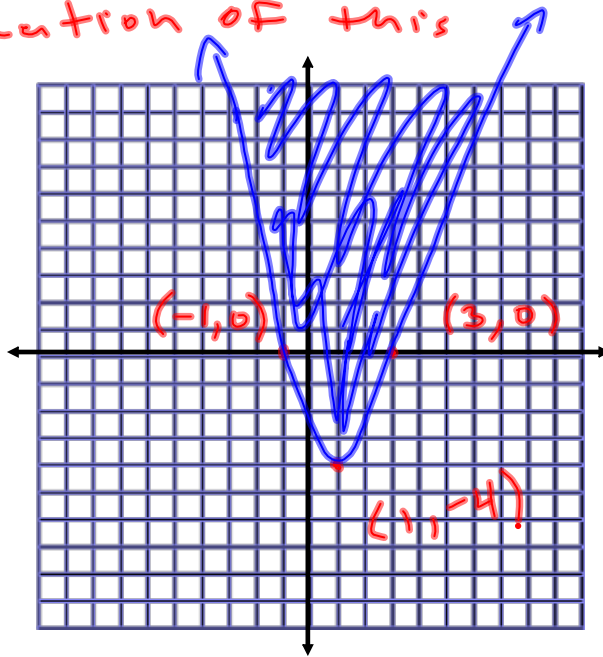
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$$\mathbb{R} = \left\{ (x, y) \in \mathbb{R} \times \mathbb{R} \mid y \leq \frac{2}{3}x + \frac{2}{3} \right\}$$

dash underneath because the line is a solid one.



Give the equation of this inequality in set builder notation



$$y = a(x-h)^2 + k$$

$h(1, -4)$

$$y = a(x-1)^2 - 4$$

sub in (3,0)
x y

$$0 = a(3-1)^2 - 4$$

$$+4 \quad 0 = a(2)^2 - 4 \quad +4$$

$$\frac{4}{4} = \frac{a4}{4}$$

$$a = 1$$

$$y = a(x-x_1)(x-x_2)$$

$x_1 = -1$
 $x_2 = 3$

$$y = a(x+1)(x-3)$$

$$-4 = a(1+1)(1-3)$$

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

$$\frac{-4}{-4} = \frac{a(-4)}{-4}$$

$$a = 1$$

$$y \geq (x-1)^2 - 4$$

sub in (0,0)
shady

$$0 = (0-1)^2 - 4$$

$$0 = 1 - 4$$

$$0 = -3$$

<
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$$R = \{(x,y) \in \mathbb{R} \times \mathbb{R} \mid y \geq (x-1)^2 - 4\}$$

$$y = 1(x+1)(x-3) \Rightarrow y = (x-1)^2 - 4$$

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

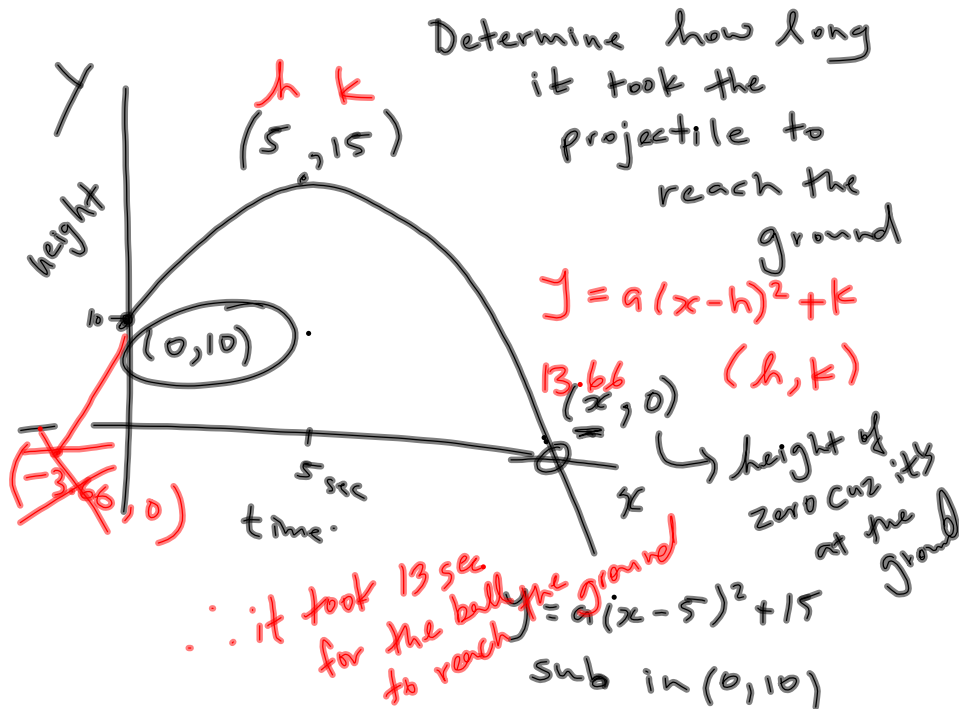
$$y = (x-1)(x-1) - 4$$

$$y = x^2 - 2x + 1 - 4$$

Translate the information
into points.

Figure which point the question
is asking for.

LABEL LABEL LABEL



Solve a
isolate a
get a by self
get a alone
one side

$$y = a(x-h)^2 + k$$

sub in $(0, 10)$

$$10 = a(0-5)^2 + 15$$

$$10 = a(-5)^2 + 15$$

$$10 - 15 = a \cdot 25 + 15 - 15$$

$$\frac{-5}{2.5} = \frac{a \cdot 25}{25}$$

$$a = -0.2$$

a is a lower!

$$y = -0.2(x-5)^2 + 15$$

Sub $y=0$

$$0 = -0.2(x-5)^2 + 15$$

$$\frac{-15}{-0.2} = \frac{-0.2(x-5)^2}{-0.2}$$

$$\pm \sqrt{75} = \sqrt{(x-5)^2}$$

$$\pm 8.66 = x - 5$$

$$x = 5 \pm 8.66$$

Always \pm when you take the square root of sthg

$$x_1 = 5 - 8.66 = -3.66$$

$$x_{11} = 5 + 8.66 = 13.66$$

