Everyone Loves Word Problems!

Let's start by solving some quadratic inequalities:

$$y \geq 3x^2 - 12x + 9$$

$y \geq 3(x^2 - 4x) + 9$

$y \geq 3(x-2)^2 - 12 + 9$

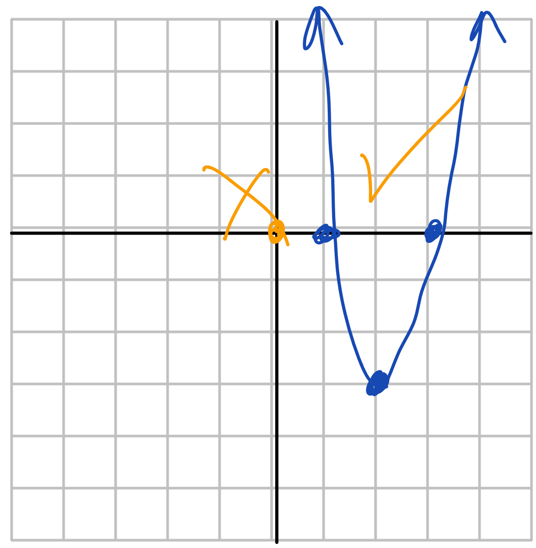
$y \geq 3(x-2)^2 - 3$

vertex $(2, -3)$

test $(0, 0)$

$0 \geq 3(0)^2 - 12(0) + 9$

$0 \geq +9$ False



$$y < -\frac{x^2}{3} - \frac{2x}{3} + \frac{11}{3}$$

$y < -\frac{1}{3}(x^2 + 2x) + \frac{11}{3}$

$y < -\frac{1}{3}(x+1)^2 + \frac{1}{3} + \frac{11}{3}$

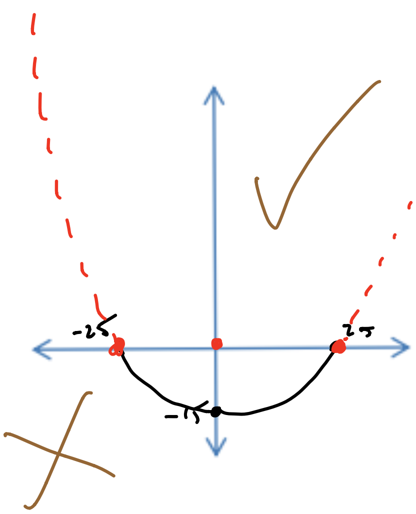
$y < -\frac{1}{3}(x+1)^2 + 4$

$(-1, 4)$

test $(0, 0)$

$0 < \frac{11}{3}$

You can use a parabolic reflector to focus sound, light, or radio waves to a single point. A parabolic microphone has a parabolic reflector attached that directs incoming sounds to the microphone. A reporter on the sidelines of a BC Lion game points the microphone at the field to pick up the game sounds. If the microphone has a depth of 15 cm and a width of 50 cm, what is the region that the microphone can pick up?



$y = A(x-b)^2 + c$

$y \geq Ax^2 - 15$

$(25, 0)$

$0 \geq A(25)^2 - 15$

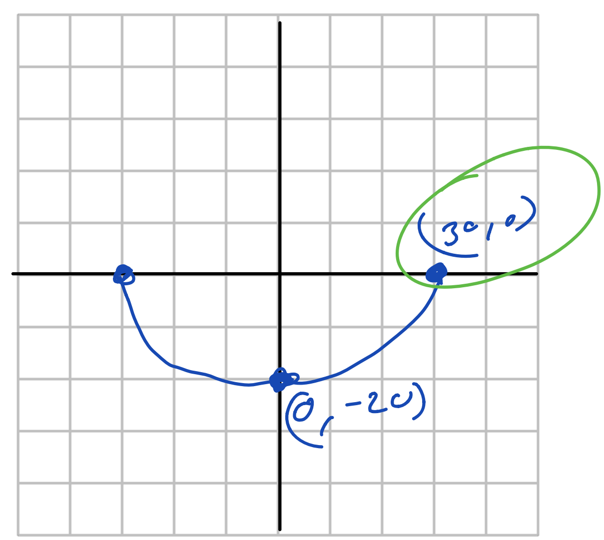
$\frac{15}{25^2} \geq A \qquad A = \frac{3}{125}$

$\rightarrow y \geq \frac{3}{125}x^2 - 15$

A satellite dish is 60 cm in diameter and 20 cm deep. The dish has a parabolic cross-section.

A. Sketch the parabola that represents this dish.

B. Determine the inequality that this represents.



$y \geq A(x-b)^2 + k$

$y \geq A(x-0)^2 - 20$

$y \geq Ax^2 - 20$

find A

$0 = A(30)^2 - 20$

$\frac{20}{30^2} = A \Rightarrow \frac{1}{45}$

$y \geq \frac{x^2}{45} - 20$

Sports climbers use synthetic ropes to assure belays or rappels. A rope can safely support a mass, m, in kg, modelled by the inequality $m \le 980d^2$ where d, is the diameter of the rope in cm.

A. Graph the inequality
B. What mass can an 8 mm diameter rope support?
C. What mass can a 10.4 mm diameter rope support?
D. What diameter rope would be needed to support a 3.5 ton whale?

$m \le 980d^2$

$m \le 980(.8)^2$

$m \le 627.2$

$m \le 630$ kg

$m \le 980(1.04)^2$

$m \le 1059$ kg

$m \le 1100$ kg

$\frac{3500}{980} \le d^2$

$3.57 \le d^2$

$\sqrt{3.6} \le \sqrt{d^2}$

$1.89 \le d$

$1.9\text{ cm} \le d$