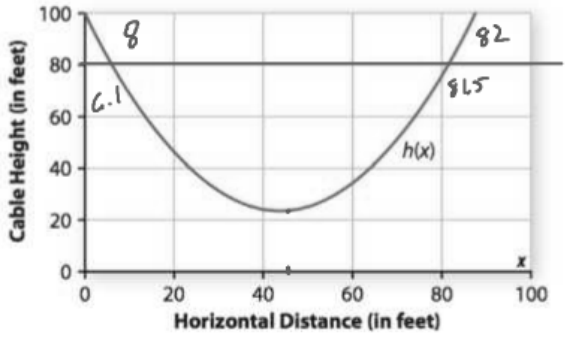
3. The next graph shows the height of the main support cable on a suspension bridge. The function defining the curve is $h(x) = 0.04x^2 - 3.5x + 100$, where x is horizontal distance (in feet) from the left end of the bridge and *h(x)* is the height (in feet) of the cable above the bridge surface.



For questions in Parts a-d:

- Write an algebraic calculation, equation, or inequality whose solution will provide an answer to the question.
- Then use the graph above to estimate the solution and calculator tables and graphs of *h(x)* to sharpen the accuracy to the nearest tenth.
- Express your answer with a symbolic expression and (where appropriate) a number line graph.

a. Where is the bridge cable less than 40 feet above the bridge surface?

b. Where is the bridge cable at least 60 feet above the bridge surface?

$h(x) = .04x^2 - 3.5x + 100$

c. How far is the cable above the bridge surface at a point 45 feet from the left end?

- $h(45) = .04(45)^2 - 3.5(45) + 100$
- $h(45) = 23.5$ ft

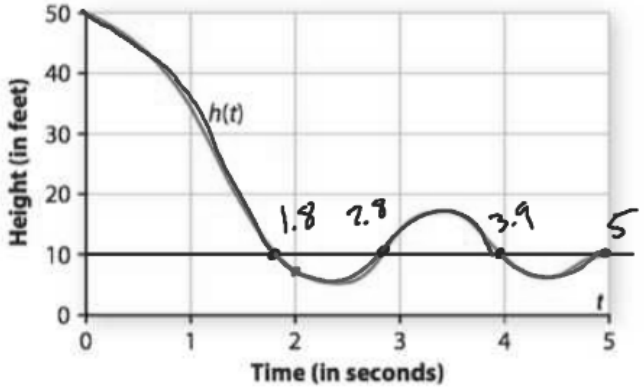
m

$h(x) = 0.04x^2 - 3.5x + 100$

d. Where is the cable 80 feet above the bridge surface?

- $.04x^2 - 3.5x + 100 = 80$
- $x = 6.1, 81.5$

4. The graph below shows the height of a bungee jumpers head above the ground at various times during ride on the elastic bungee cord. Suppose that $h(t)$ gives height in feet as a function of time in seconds.



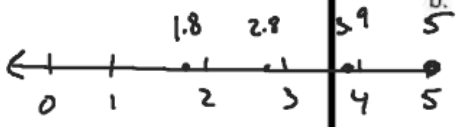
For each part a-d:

- Write a question about the bungee jump that can be answered by the indicated mathematical operation.
- Use the graph to estimate the answer.
- Express your answer (where appropriate) with a number line graph.

a. Evaluate $h(2)$.

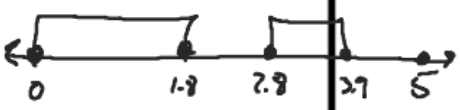
- What is the height of the bungee jumper's head after 2 sec?
- $h(2) = 8$ ft

b. Solve $h(t) = 10$.



- At what times is the bungee jumper's head 10 ft above the ground?
- $t = 1.9, 2.9, 3.9, 5$

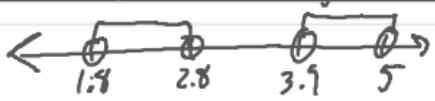
c. Solve $h(t) \geq 10$.

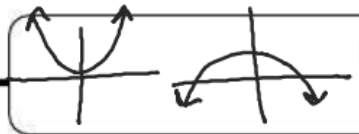


- At what times is the Bungee Jumper's head At least 10 ft above the ground?
- $[0, 1.8] \cup [2.8, 3.9] \cup [5]$

d. Solve $h(t) < 10$.

- At what times is the bungee jumper's head less than 10 ft above the ground?
- $(1.8, 2.8) \cup (3.9, 5)$





What you will learn about:
Quadratic Inequalities

$y = ax^2 + bx + c$

Graphing Quadratics
parabola

Opens
a>0 opens up
Vertex min

a<0 opens down
Vertex max

Vertex (Max/Min)
Step 1 $x = \frac{-b}{2a}$

Find y.
Plug the answer from step 1 into the function

X-Intercepts
Let y or f(x) equal zero.
Factor!

Y-intercept
Let x=0
(0, c)

Axis of Symmetry
Line
$x = \frac{-b}{2a}$

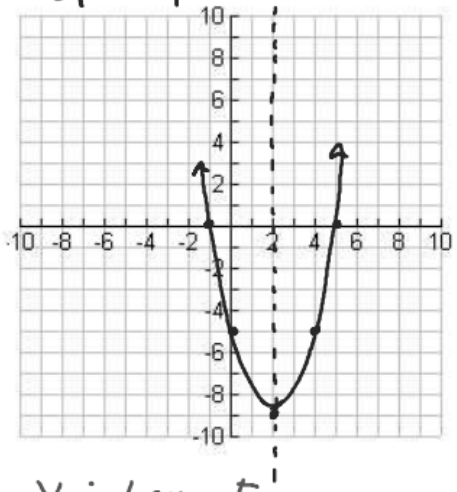
5. For each Quadratic function determine the following:
   - Whether the graph has a Maximum or Minimum point
   - Find the Vertex (Maximum or Minimum point).
   - Axis of Symmetry
   - The y-intercept
   - The x-intercept(s)

   Then graph the Function.

a = 1 b = -4 c = -5

a. $f(x) = x^2 - 4x - 5$

open up min value



y-intercept
(0, -5)

A.O.S
x = 2

Vertex (2, -9)

$x = \frac{-b}{2a}$

$= \frac{4}{2(1)} = 2$

$f(2) = 2^2 - 4(2) - 5$

$4 - 8 - 5$

-9

x-intercept

$x^2 - 4x - 5 = 0$

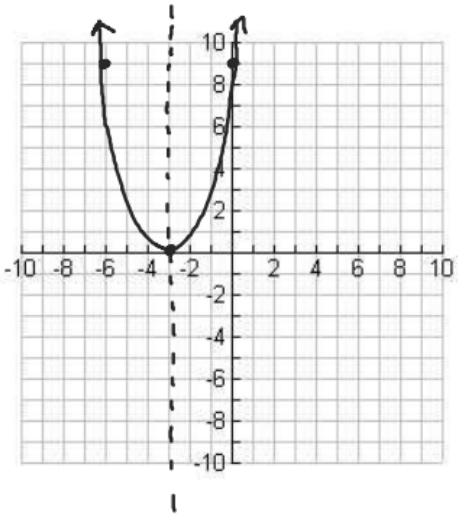
$(x - 5)(x + 1) = 0$

$x = 5 \quad x = -1$

b. $g(x) = x^2 + 6x + 9$

opens up

min



$x = \frac{-b}{2a}$ (-30)

$= \frac{-6}{2(1)} = -3$

$g(-3) = (-3)^2 + 6(-3) + 9$

$9 - 18 + 9$

0

$x^2 + 6x + 9 = 0$

$(x+3)(x+3) = 0$

$x = -3 \quad x = -3$

$(0, 9)$

A.O.S $x = -3$

c. $h(x) = -x^2 + 2x + 8$