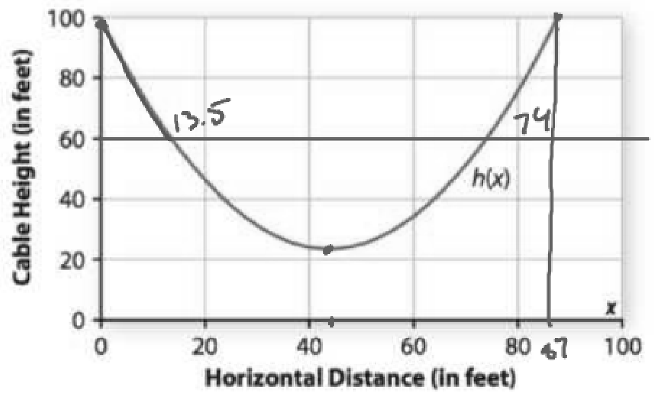
3. The next graph shows the height of the main support cable on a suspension bridge. The function defining the curve is $h(x) = 0.04x^2 - 3.5x + 100$, where x is horizontal distance (in feet) from the left end of the bridge and *h(x)* is the height (in feet) of the cable above the bridge surface.

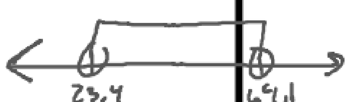


For questions in Parts a-d:

- 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?

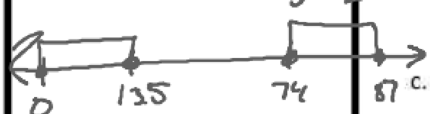
- $.04x^2 - 3.5x + 100 < 40$
- $23.4 + 64.1$
- $23.4 < x < 64.1$ $\quad (23.4, 64.1)$



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

- $0.04x^2 - 3.5x + 100 \geq 60$
- $13.5 + 74$
- $0 \leq x \leq 13.5$ or $74 \leq x \leq 87$

$[0, 13.5] \cup [74, 87]$



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

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

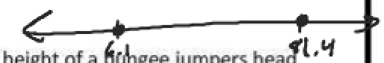
$= 23.5$

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

$.\ 6.1 + 81.4$ $\quad x = 6.1 \quad X = 81.4$

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

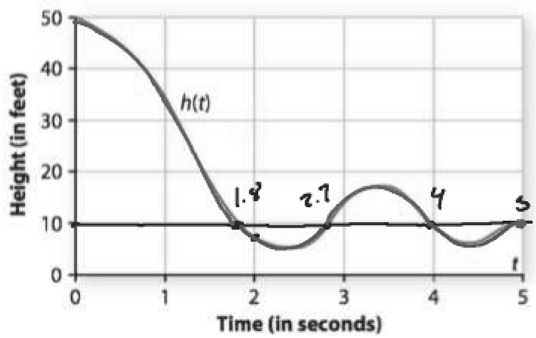
$[6.1] \cup [81.4]$



h(t)

h of t

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)*.

Find the height of Bungee jumpers head after 2 sec.

$h(2) = 8$

$[1.8] \cup [2.8] \cup [4] \cup [5]$

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

At what time(s) is the jumpers head 10ft off the ground.

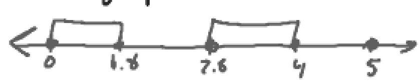
$t = 1.8, 2.8, 4, 5$

$[0, 1.8] \cup [2.8, 4] \cup [5]$

$0 \le t \le 1.8$ or $2.8 \le t \le 4$ or $t = 5$

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

At what times is the jumpers head at least 10 ft off the ground.

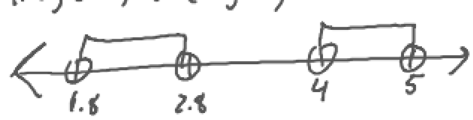


d. Solve $h(t) < 10$.

At what times is the jumpers head less than 10' off the ground.

$1.8 < t < 2.8$ or $4 < t < 5$

$(1.8, 2.8) \cup (4, 5)$



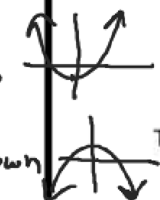
What you will learn about:
Quadratic Inequalities

Parabola
Graphing Quadratics

Opens

$a>0$ opens up (min)

$a<0$ opens Down (max)



Vertex (Max/Min)

$f(x)=ax^2+bx+c$

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

Find $y \to$ Plug x into Function

X-Intercepts

Set $f(x)=0$ or Factor

Y-intercepts

Let $x=0$

$c \to$ value

Axis of Symmetry

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

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.

$a=1 \quad b=-4 \quad c=-5$

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

open up (min value)

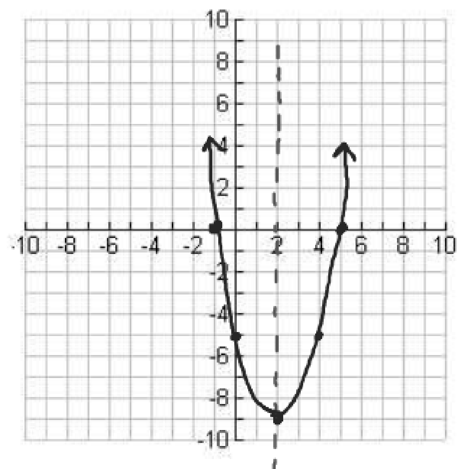
$x=\frac{-b}{2a}$

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

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

$4-8-5$

$v(2,-9)$



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

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

$x-5=0 \quad x+1=0$

$x=5 \quad x=-1$

y-intercept

$(0,-5)$

Opens up

$x = \frac{-b}{2a} = \frac{-6}{2(1)}$

$= -3$

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

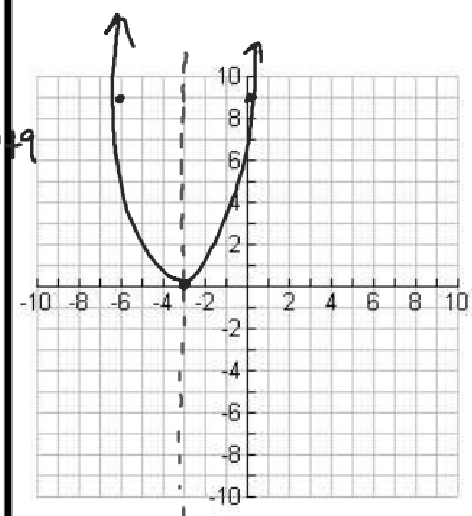
$9 - 18 + 9$

0

$(-3, 0)$

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

$a = 1 \quad b = 6 \quad c = 9$



X-intercepts

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

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

$x+3=0 \quad x+3=0$

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

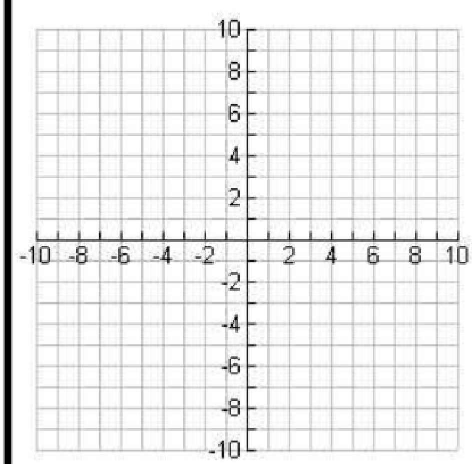
Y-intercept

$(0, 9)$

A.O.S

$x = -3$

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



$h(1) = -(1)^2 + 2(1) + 8$

$-1 + 2 + 8$

9