Trick #1

a. If $f(x) = \sqrt{x}$, find $Df(x)$ and rationalize the *numerator*.

b. Compute $\lim\limits_{h \to 0} Df(x)$.

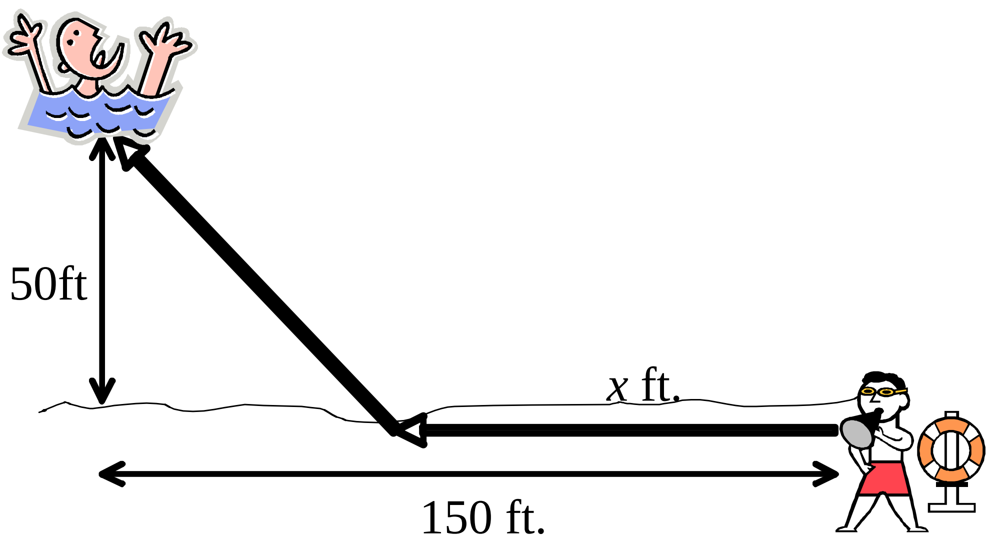
Treat #1

a. $Df(x) = \dfrac{1}{\sqrt{x+h} + \sqrt{x}}$

b. $\lim\limits_{h \to 0} Df(x) = \dfrac{1}{2\sqrt{x}}$

Trick #2

James is swimming in the lake when he figures out the answer to #13; in shock, he takes on water and starts to drown. It's up to lifeguard Grant to save him. His strategy is to run down the beach, then dive in and swim over to James.



If Grant runs x feet along the shore before diving in, find his total distance in terms of x.

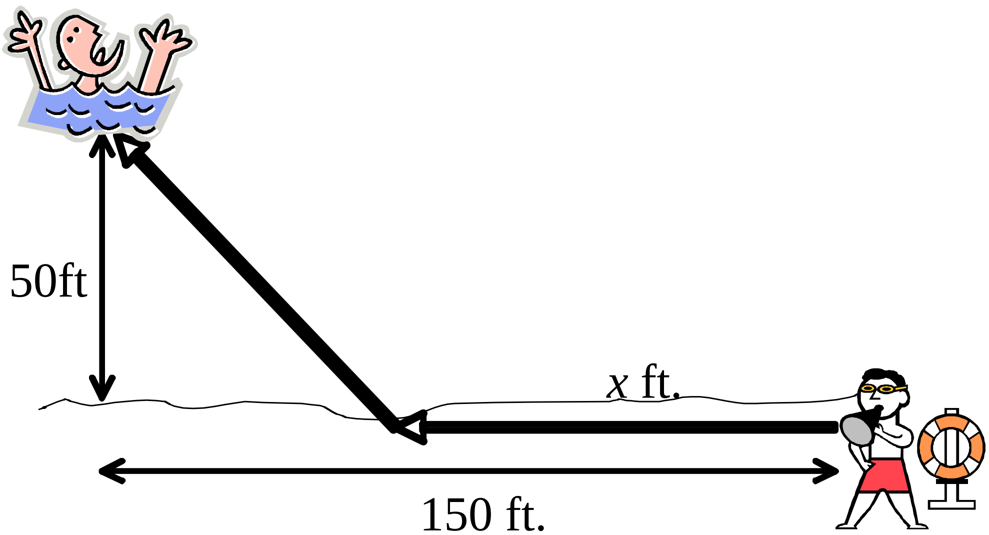
Treat #2

$$x + \sqrt{50^2 + (150 - x)^2}$$

Trick #3

If you haven't done Trick #2, go back!

Grant is trying to save drowning Mike. Grant runs at 8 feet per second but swims at only 2 feet per second.



If Grant runs x feet along the shore before diving in, find the total amount of *time* it takes Grant to get to Mike as a function of x.

What value of x minimizes that time?

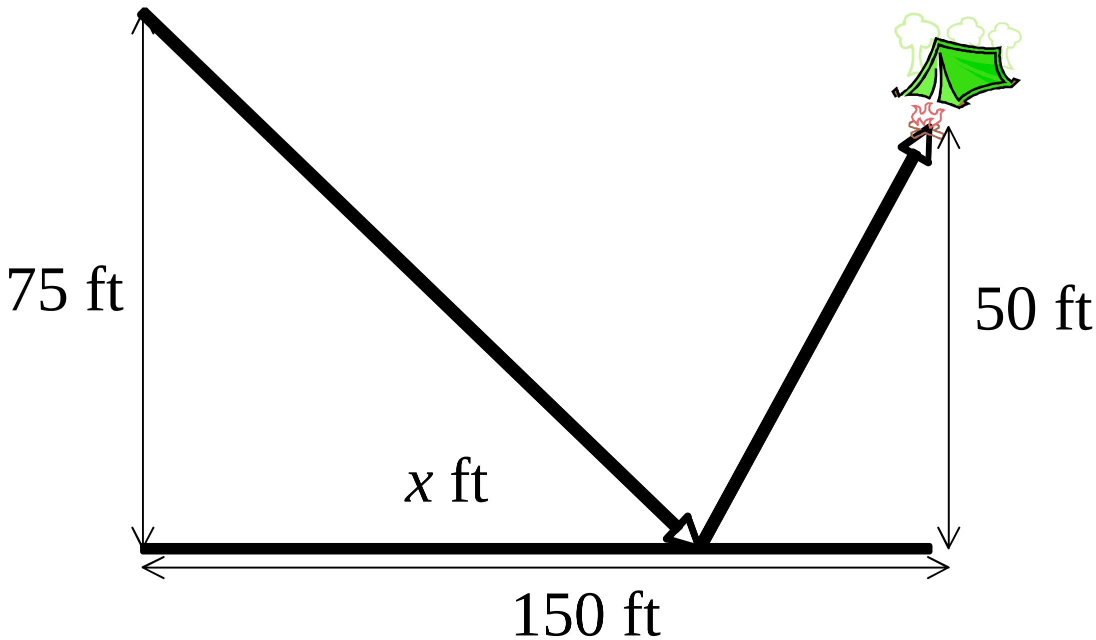
Treat #3

Time: $\frac{x}{8}+\frac{\sqrt{50^2+(150-x)^2}}{2}$

Minimum Value at $x \approx 137.1$
Minimum Time $\approx$ 42.96 seconds

Trick #4

Amy is camping and needs to hike back to the river before going to camp, as shown below. To the nearest 0.01, what value of *x* makes her total distance 225 feet?



What is the minimum distance?

Treat #4

Distance = $\sqrt{x^2 + 75^2} + \sqrt{(150 - x)^2 + 50^2}$

Exactly 225 @ $x \approx 9.17$ feet.

Minimum @ $x = 90$ feet.

Trick #5

What transformations to the graph of $y = \sqrt{x}$, in what order, give the graph of each function below?

a. $y = \sqrt{2x + 4}$

b. $y = 2\sqrt{x - 3}$

c. $y = \sqrt{-\frac{1}{2}x} + 6$

d. $y = \sqrt{-\frac{1}{2}x + 6}$

Treat #5

a. Stretch horizontally by ½ and shift left 2.

b. Shift right 3 and stretch vertically by 2.

c. Stretch horizontally by 2, reflect over *y*-axis, and translate up 6.

d. Stretch horizontally by 2, reflect over *y*-axis, and shift right 12.