Warmup (Quiz Friday on 2.2-2.4)

① What is the maximum product of two numbers that add to give 22. What are the numbers?

Equations/variables

$x + y = 22 \Rightarrow y = 22 - x$

$P = x \cdot y = x \cdot (22 - x)$

$P = 22x - x^2$

Quadratic

↑ Max

⇒ vertex

⇒ Quadratic

$h = \frac{-b}{2a} = \frac{-22}{2(-1)} = 11$

$P = 22x - x^2$

$= 22(11) - (11)^2$

$= 242 - 121$

$= 121$

x is 11

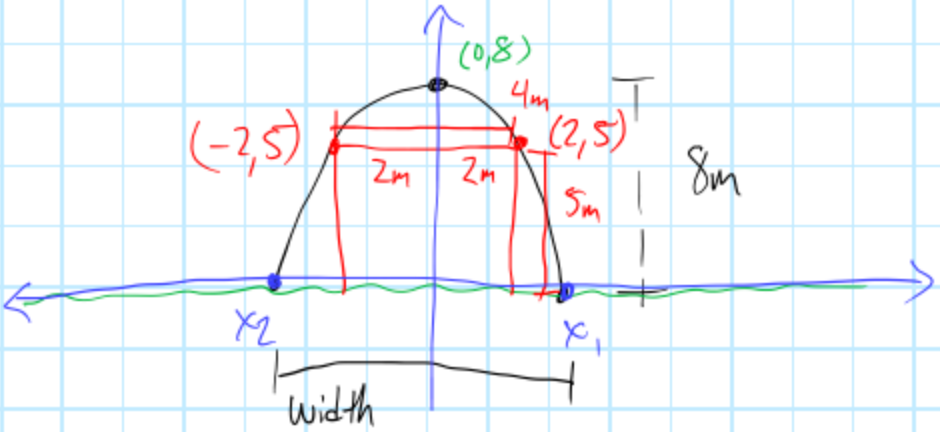
$y = 22 - x = 22 - 11$

$y = 11$

Product 121

(2) A parabolic arch is 8 m tall. If a rectangular truck that is 5m tall and 4m wide must fit through the arch, how wide must the arch be at the bottom? (Answer exactly and to 1 decimal place)

(Hint: draw a picture!)



Arch: $f(x) = a(x-h)^2 + k$

$h = 0 \quad k = 8$

$f(x) = ax^2 + 8$ Point (2,5)

$f(2) = 5 = a(2)^2 + 8$

$5 = 4a + 8$

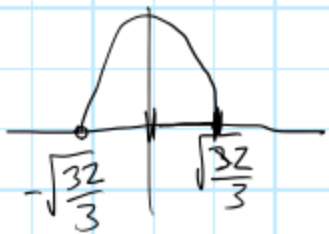
$-3 = 4a \Rightarrow a = -\frac{3}{4}$

$f(x) = -\frac{3}{4}x^2 + 8 = 0$ (x-ints)

$-\frac{4}{3} \cdot -\frac{3}{4}x^2 = -8 \cdot -\frac{4}{3}$

$x^2 = \frac{32}{3}$

$x = \pm\sqrt{\frac{32}{3}}$



width: $2\left(\sqrt{\frac{32}{3}}\right)$

$= \sqrt{\frac{32}{3}} + \sqrt{\frac{32}{3}}$

$= 2\sqrt{\frac{32}{3}} = 6.5$

2.4 Skip #14