6d. $9x^2 - 12x - 1 = 0$

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(9)(-1)}}{2(9)}$$

$$x = \frac{12 \pm \sqrt{144+36}}{18} = \frac{12 \pm \sqrt{180}}{18}$$

7.8 Solving Problems Using Quadratic Models

WORD PROBLEMS

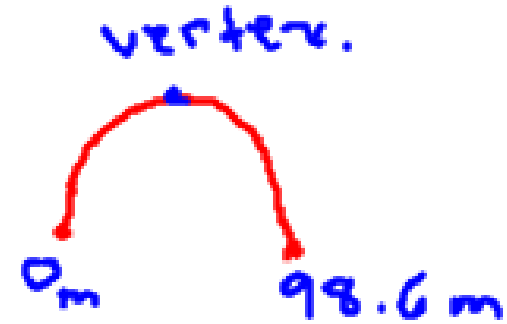
p.431

The function that describes the arch is

$$h(x) = -0.005\,061x^2 + 0.499\,015x$$

where $h(x)$ is the height, in metres, of the arch above the ice at any distance, x, in metres, from one end of the bridge.

a) Determine the distance between the bases of the arch. b) Then determine the maximum height of the arch, to the nearest tenth of a metre.



$0 = -0.005061x^2 + 0.499015x$

$0 = (x)(-0.005061x + 0.499015)$

$x = 0$ $\quad -0.005061x + 0.499015 = 0$

$-0.005061x = -0.499015$

$x = 98.6$

a) The distance is 98.6 m

b) $x = \frac{0 + 98.6}{2} = 49.3$ ← x-value of vertex!

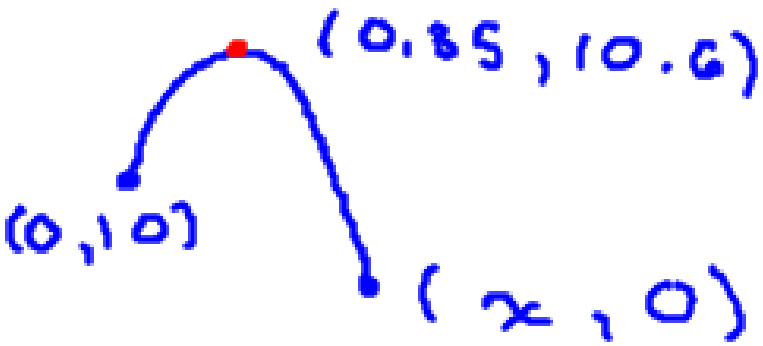
y-value → plug $x = 49.3$ into eq'n

b) $y = 19.3$ m

Synchronized divers perform matching dives from opposite sides of a platform that is 10 m high. If two divers reached their maximum height of 0.6 m above the platform after 0.35 s, how long did it take them to reach the water?

p. 434

$x = t = ?$



$y = a(x-h)^2 + k$

$y = a(x - .35)^2 + 10.6$

$10 = a(0 - .35)^2 + 10.6$

$10 = a(-.35)^2 + 10.6$

$-0.6 = 0.1225a$

$a = -4.9$

$\rightarrow y = -4.9(x - .35)^2 + 10.6$

$y_1 = -4.9(x - .35)^2 + 10.6$

zeros....

$x = 1.82$

1.82 seconds

p. 433

$x, x+2, x+4$

$(x+4)(x+4)$

Determine three consecutive odd integers, if the square of the largest integer is 33 less than the sum of the squares of the two smaller integers.

$$(x+4)^2 = (x)^2 + (x+2)^2 - 33$$

$$x^2 + 8x + 16 = \cancel{x^2} + x^2 + 4x + 4 - 33$$

$$-x^2 \quad -8x \quad -16 \qquad -\cancel{x^2} \qquad -8x \qquad -16$$

$$0 = x^2 - 4x - 45$$

$$0 = (x-9)(x+5)$$

$x = 9$ | $x = -5$

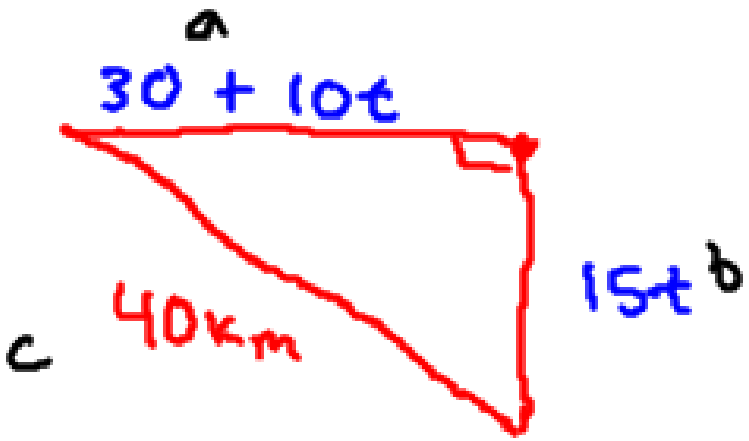
9, 11, 13 OR $-5, -3, -1$

At noon, a sailboat leaves a harbour on Vancouver Island and travels due west at 10 km/h. Three hours later, another sailboat leaves the same harbour and travels due south at 15 km/h. At what time, to the nearest minute, will the sailboats be 40 km apart?

p. 455

$d = v \cdot t$

3:49



$c^2 = a^2 + b^2$

$(40)^2 = (30 + 10t)^2 + (15t)^2$

$1600 = 100t^2 + 600t + 900 + 225t^2$

$0 = 325t^2 + 600t - 700$

$0 = 25(13t^2 + 24t - 28)$

$t = \dfrac{-24 \pm \sqrt{24^2 - 4(13)(-28)}}{2(13)}$ .... $t = 0.81$ $\quad t = -\cancel{2.66}$

49 min.

p. 436-438 - #3-9