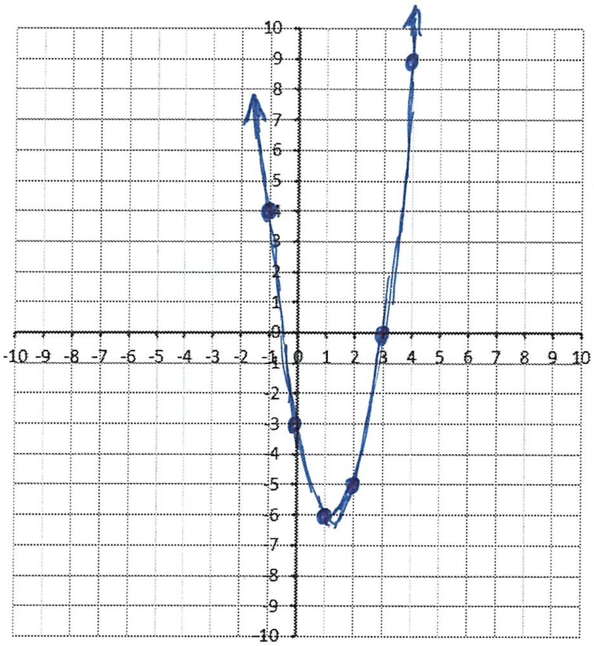
KEY

L21 – Worksheet

## Math 20-2: Solving Quadratic Equations by Graphing

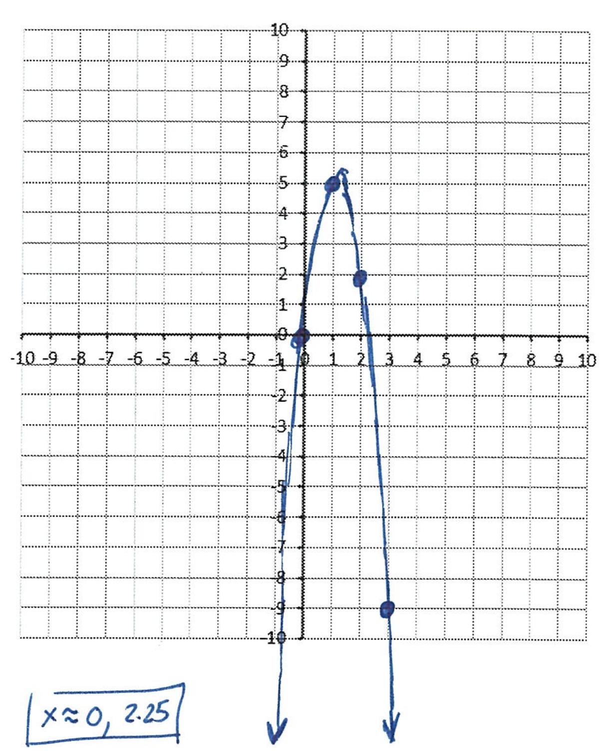
**Pg402 #1ab:** Solve each equation by graphing the corresponding function and determining the zeroes.

$2x^2 - 5x - 3 = 0$



$\boxed{x \approx -0.5, 3}$

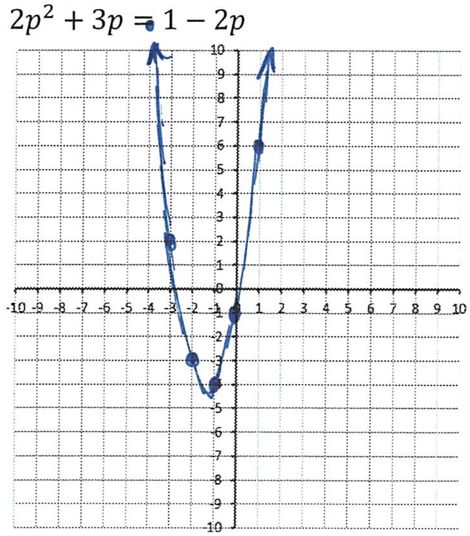
$9x - 4x^2 = 0$



$\boxed{x \approx 0, 2.25}$

**Pg402 #3b:** Rewrite each equation in standard form. Then solve the equation in standard form by graphing.

$2p^2 + 3p = 1 - 2p$



$\boxed{p \approx -2.7, 0.2}$

$2p^2 + 3p = 1 - 2p$

$+2p - 1 \quad -1 \quad +2p$

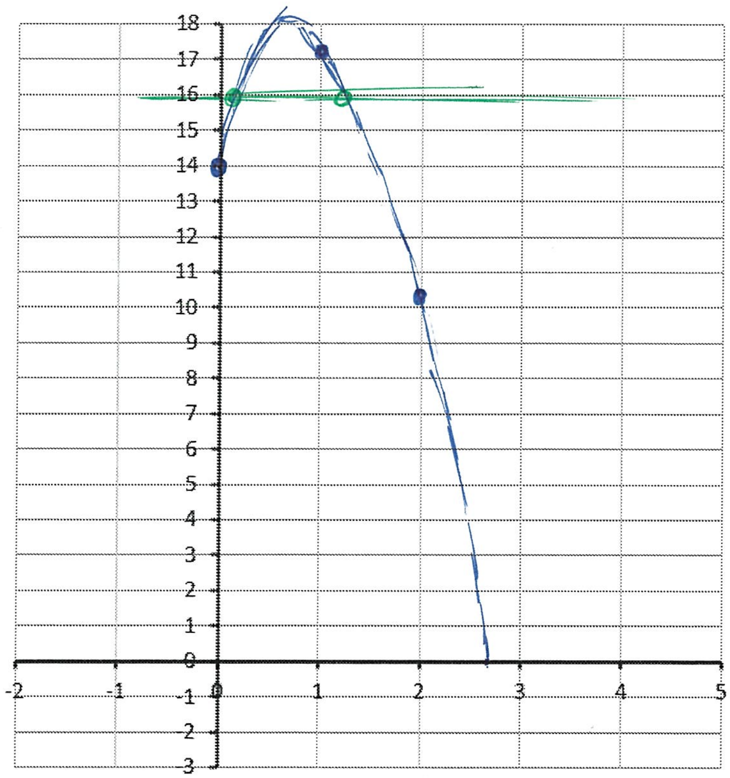
$2p^2 + 5p - 1 = 0$

| x | y |
|---|---|
| -4 | 11 |
| -3 | 2 |
| -2 | -3 |
| -1 | -4 |
| 0 | -1 |
| 1 | 6 |
| 2 | 17 |

KEY

**Pg403 #7ad:** A ball is thrown into the air from a bridge that is 14m above a river. The function that models the height, *h(t)*, in meters, of the ball over time, *t*, in seconds is

$$h(t) = -4.9t^2 + 8t + 14$$




| t | h(t) |
|---|---|
| 0 | 14 |
| 1 | 17.1 |
| 2 | 10.4 |
| 3 | -6.1 |
| 4 | |
| 5 | |

a. When is the ball 16m above the water?

$\approx 0.3$ sec, $1.3$ sec

d. When does the ball hit the water?

$\approx 2.7$ sec

KEY

## Math 20-1: Solving Quadratic Equations by Graphing

**Pg 215 #6:** Two numbers have a sum of 9 and a product of 20.

a. What single-variable quadratic equation in the form $ax^2 + bx + c = 0$ can be used to represent the product of the two numbers?

$x+y=9 \Rightarrow y=9-x$

$(x)(y)=20 \Rightarrow (x)(9-x)=20$

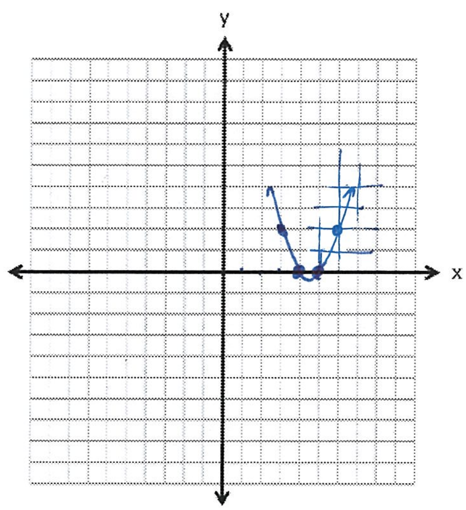
$-x^2+9x=20$

$\boxed{0=x^2-9x+20}$ or $\boxed{-x^2+9x-20=0}$

Despite opening in different directions, both have the same x-intercepts (zeroes).

b. Determine the two numbers by graphing the corresponding quadratic function.

| x | y |
|---|---|
| 3 | 2 |
| 4 | 0 |
| 4.5 | -0.25 |
| 5 | 0 |




... but I'd rather do it by putting it in factored form...

$0=(x-4)(x-5)$

$x-4=0$ $\quad$ $x-5=0$

$x=4$ $\quad$ $x=5$

$y=0$ when $x=4$ and $x=5$

So (A) If $x=4$, $y=5$
(B) If $x=5$, $y=4$
} Soln to original question.

Math 20-2

KEY

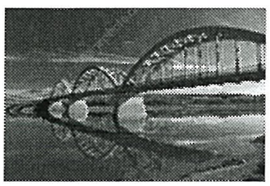
**Pg 215 #12:** Matthew is investigating the old Borden Bridge, which spans the North Saskatchewan River about 50km west of Saskatoon. The three parabolic arches of the bridge can be modelled using quadratic functions, where *h* is the height of the arch above the bridge deck and *x* is the horizontal distance of the bridge deck from the beginning of the first arch, both in meters.

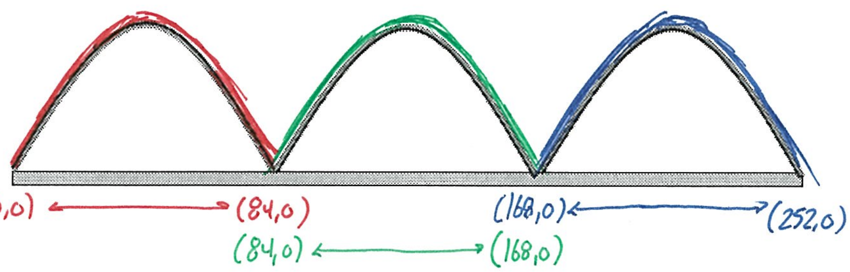
First arch: $h(x) = -0.01x^2 + 0.84x$

Second arch: $h(x) = -0.01x^2 + 2.52x - 141.12$

Third arch: $h(x) = -0.01x^2 + 4.2x - 423.36$

a. What are the zeroes of each quadratic function?
b. What is the significance of the zeroes in this situation?
c. What is the total span of the Borden Bridge?






Ⓐ The zeroes are

First arch: (0,0) and (84,0)
Second arch: (84,0) and (168,0)
Third arch: (168,0) and (252,0)

} Calculated using a T.I. Calculator

Ⓑ The zeroes represent where the arches attach to the bridge.

Ⓒ The total span is 252m

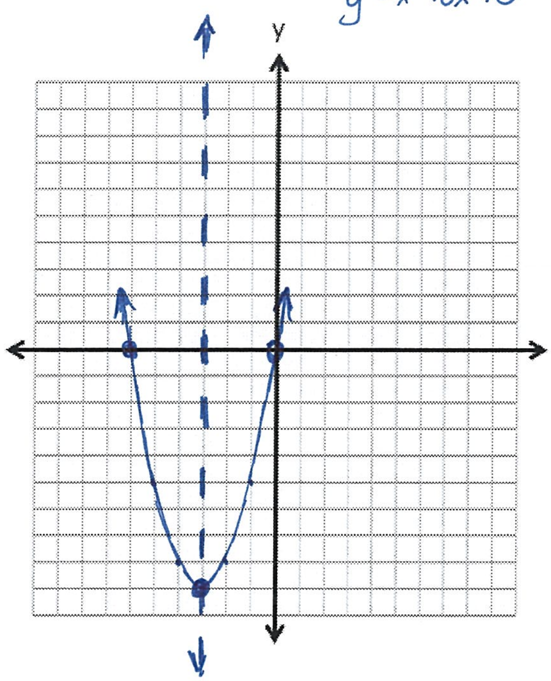
KEY

**Pg 215 #13:** For what values of $k$ does the equation $x^2 + 6x + k = 0$ have

shifts up/down.
y-intercept.

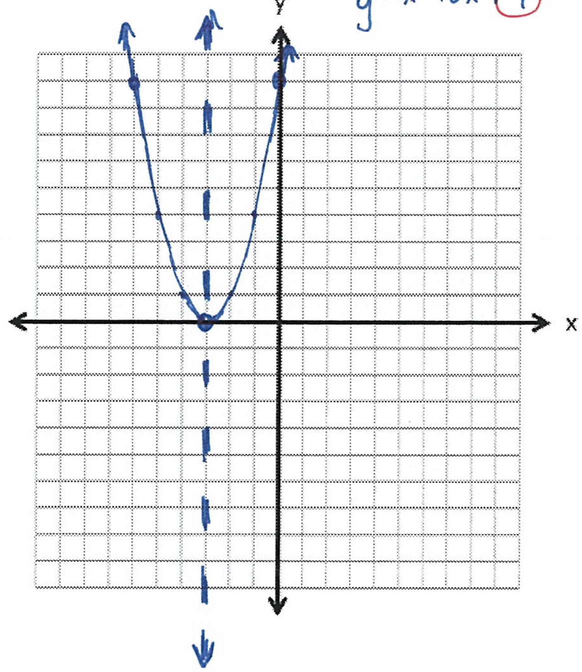
a. One real root?
b. Two distinct real roots?
c. No real roots?

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




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

Shifted 9 units up




(A) If $k = 9$, only 1 real root.
(B) If $k < 9$, 2 real roots.
(C) If $k > 9$, no real roots.