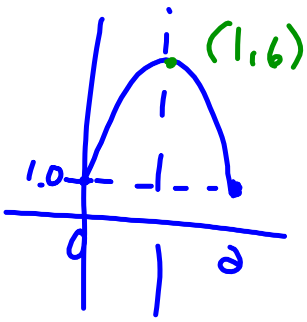
Last Day's Work: pp. 176-179 #1a, 3b, 4c, 7, 10
READ p. 181

Today's Work: pp. 182-183 # 1 – 4, 6 – 8
p. 184 # 1 – 8 [9, 10]

Time (s)	Height (m)
0	1.0
0.5	4.5
1.0	6.0
1.5	4.5
2.0	1.0

7. The height, at a given time, of a child above the ground when the child is on a trampoline is shown in the table. Determine an algebraic model for the data. Then use the model to predict when the child will reach a height of 3 m.

~~$y = a(x-r)(x-s)$~~



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

$y = a(x-1)^2 + 6$ $v(1, 6)$

$1 = a(2-1)^2 + 6$ use $(2, 1)$ (x, y)

$1 = a(1)^2 + 6$

$1 = a + 6$

$1 - 6 = a$

$\therefore a = -5$

$\therefore$ the equation is $y = -5(x-1)^2 + 6$

MCF 3MI Lesson 3_R1

Unit 3 - REVIEW 1

Date: Mar. 23/18

Recall:	Form	Advantage
Standard form:	$f(x)=ax^2+bx+c$	"c" is the y-intercept
Vertex form:	$f(x)=a(x-h)^2+k$	vertex (h, k)
Factored form:	$f(x)=a(x-r)(x-s)$	r + s are the x-intercepts

1a) Write $f(x)=(3x-4)(2x-1)$ in standard form.

$= 6x^2-3x-8x+4$

$= 6x^2-11x+4$

b) Write $f(x)=8x^2-2x-21$ in factored form.

P: 168
S: -2
12 -14

$= 8x^2+12x-14x-21$

$= 4x(2x+3)-7(2x+3)$

$= (2x+3)(4x-7)$

2. Determine the zeros, the axis of symmetry, and the maximum or minimum value for $f(x)=x^2+6x-40$. Show your work.

$0=(x-4)(x+10)$

$x=4$ or $x=-10$

A of S:

$x=\frac{4+(-10)}{2}$

$=\frac{-6}{2}$

$=-3$

$f(-3)=(-3-4)(-3+10)$

$=(-7)(7)$

$=-49$

Zeros:
4, -10
Axis of Symmetry:
$x=-3$
Max/Min value:
-49

3. Solve

a) $2x^2-3x=9$

$2x^2-3x-9=0$

P: -18
S: -3

1 18
2 9
+3 -6

$2x^2+3x-6x-9=0$

$x(2x+3)-3(2x+3)=0$

$(2x+3)(x-3)=0$

$2x+3=0$ $\quad$ $x=3$

$\frac{2x}{2}=\frac{-3}{2}$

$x=-\frac{3}{2}$

b) $x^2=13x-30$

$x^2-13x+30=0$

$(x-10)(x-3)=0$

$\therefore x=10$ or $x=3$

4. Can all quadratic equations be solved by factoring?

No; Not all quadratics can be factored.

5. A ball is thrown from a cliff.
The height of the ball above the ground after it is thrown is modelled by the function $h(t) = -4t^2 + 8t + 192$, where $h(t)$ is the height in metres, and t is the time in seconds.

a) How high is the cliff?
b) When will the ball be 27 m above the ground?
c) What is the maximum height that the ball reaches?

a) let $t=0$ (ball not thrown yet)

$h(0) = -4(0)^2 + 8(0) + 192$
$= 192$

$\therefore$ the cliff is 192 m.

c) max. height is at vertex

$h(t) = -4t^2 + 8t + 192$
$= -4(t^2 - 2t) + 192$
$= -4(\underbrace{t^2 - 2t + 1} - 1) + 192$
$= -4(t-1)^2 - 4(-1) + 192$
$= -4(t-1)^2 + 4 + 192$
$= -4(t-1)^2 + 196$ $\therefore$ the max height is 196 m.

from b) $t = -5.5 + 7.5$
or AoS: $t = \frac{-5.5 + 7.5}{2}$
$= \frac{2}{2}$
$= 1$

b) let $h(t) = 27$

$27 = -4t^2 + 8t + 192$
$0 = -4t^2 + 8t + 192 - 27$
$= -4t^2 + 8t + 165$
$= -1(4t^2 - 8t - 165)$
$= -1(4t^2 + 22t - 30t - 165)$
$= -1(2t(2t+11) - 15(2t+11))$
$= -1(2t+11)(2t-15)$

$\therefore 2t + 11 = 0$ or $2t - 15 = 0$

$\frac{2t}{2} = \frac{-11}{2}$ $\quad$ $\frac{2t}{2} = \frac{15}{2}$
$t = -5.5$ inadmissible $\quad$ $t = 7.5$

$\therefore$ at 7.5 seconds the ball is 27 m off the ground

6. The population of a town $P(t)$ is modelled by the function $P(t) = 6t^2 - 75t + 2100$, where t is time in years. NOTE: $t = 0$ represents the year 2000. According to the model,

a) When will the population reach 3000?

$3000 = 6t^2 - 75t + 2100$
$0 = 6t^2 - 75t + 2100 - 3000$
$= 6t^2 - 75t - 900$
$= 3(2t^2 - 25t - 300)$
$= 3(2t^2 - 40t + 15t - 300)$
$= 3(2t(t-20) + 15(t-20))$
$= 3(t-20)(2t+15)$

$t = 20$ or $t = \frac{-15}{2}$
$= -7.5$ inadmissible

$\therefore$ the year will be 2020.

P: -600
S: -25

1	600
2	300
3	200
4	150
5	120
6	100
~~7~~	
8	75
10	60
12	50
14	
$\boxed{15}$	$\boxed{40}$

b) What will the population be in 2035?

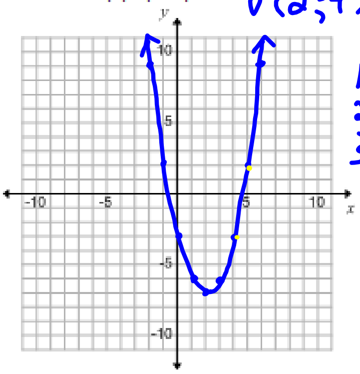
$t = 2035 - 2000$
$= 35$

$\therefore h(35) = 6(35)^2 - 75(35) + 2100$
$= 6(1225) -$

7a) Sketch $f(x)=(x-2)^2-7$

$v(2,-7)$

MG
1 1
2 4
3 9



b) Write $f(x)=(x-2)^2-7$ in standard form.

$=(x-2)(x-2)-7$

$=x^2-2x-2x+4-7$

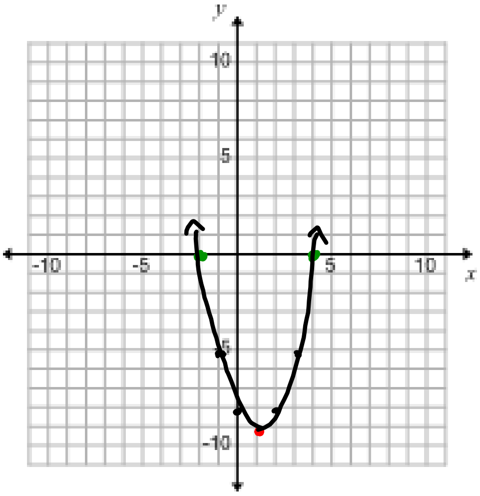
$=x^2-4x-3$

c) Can $f(x)=x^2-4x-3$ be written in factored form?

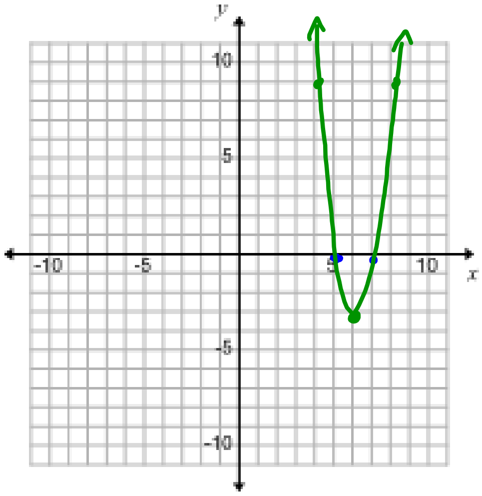
P: -3
S: -4 1, 3

No, there are no numbers that multiply to -3 and add to -4.

8a) Sketch $f(x)=(x-4)(x+2)$



b) Sketch $g(x)=3(x-5)(x-7)$



8a) Sketch $f(x)=(x-4)(x+2)$

$0=(x-4)(x+2)$

$x=4$ or $x=-2$

AofS: $x=\frac{4+(-2)}{2}$

$=\frac{2}{2}$

$x=1$

a = 1
∴ MG
1 1
2 4
3 9

if $x=1$, $y=(1-4)(1+2)$

$=(-3)(3)$

$=-9$

∴ $v(1,-9)$

b) Sketch $g(x)=3(x-5)(x-7)$

$0=3(x-5)(x-7)$

$x=5$ or $x=7$

AofS: $x=\frac{5+7}{2}$

$=6$

$y=3(6-5)(6-7)$

$=3(1)(-1)$

$=-3$ ∴ $v(6,-3)$

MG a = 3
1 1 → 3
2 4 → 12
3 9 → 27