Are there any Homework Questions you would like to see on the board?

pp. 161-163 #1cd, 2, 3ac, 4def, 5f, 6de, 9, 11, 13

4e) $2x^2-9x-5=0$ P: -10 S: -9

$2x^2-10x+x-5=0$

$2x(x-5)+1(x-5)=0$

$(x-5)(2x+1)=0$

$x-5=0$ or $2x+1=0$

$x=5$ $2x=-1$

$x=\frac{-1}{2}$

5f) $x^2+3x+10=3x^2-4x-5$

$x^2-3x^2+3x+4x+10+5=0$

$-2x^2+7x+15=0$

$-1(2x^2-7x-15)=0$ P: -30 S: -7

$-1(2x^2-10x+3x-15)=0$

$-1(2x(x-5)+3(x-5))=0$

$-1(x-5)(2x+3)=0$

$x=5$ or $x=\frac{-3}{2}$

6d) $(x+3)(x-1)=2(x-5)(x+3)$

$x^2-x+3x-3=2(x^2+3x-5x-15)$

$x^2+2x-3=2(x^2-2x-15)$

$x^2+2x-3=2x^2-4x-30$

$0=2x^2-x^2-4x-2x-30+3$

$0=x^2-6x-27$

$0=(x-9)(x+3)$

$\therefore x=9$ or $x=-3$

e) $3(x-5)^2=x-5$

$3(x^2-10x+25)=x-5$

$3x^2-30x+75-x+5=0$

$3x^2-31x+80=0$ P: 240 S: -31

$3x^2-15x-16x+80=0$

$3x(x-5)-16(x-5)=0$

$(x-5)(3x-16)=0$

$\therefore x=5$ or $x=\frac{16}{3}$

1	240
2	120
3	80
4	60
5	48
6	40
~~7~~	
8	30
9	?
10	24
15	16

Verify $x=5$

$LS=3(x-5)^2$ $RS=x-5$

$=3((5)-5)^2$ $=(5)-5$

$=3(0)^2$ $=0$

$=0$ $\therefore LS=RS$

$\therefore x=5$ is correct

$LS=3(x-5)^2$ $RS=x-5$

$=3\left(\left(\frac{16}{3}\right)-5\right)^2$ $=\left(\frac{16}{3}\right)-5$

$=3\left(\frac{16}{3}-\frac{15}{3}\right)^2$ $=\frac{16}{3}-\frac{15}{3}$

$=3\left(\frac{1}{3}\right)^2$ $=\frac{1}{3}$

$=\cancel{3}\left(\frac{1}{\cancel{9}_3}\right)$ $\therefore LS=RS$

$=\frac{1}{3}$ $\therefore x=\frac{16}{3}$ is a solution.

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) Select and apply factoring and graphing strategies to solve applications involving quadratics functions

MCF 3MI

3.5 Solving Problems Involving Quadratic Functions

Date: Mar. 21/18

Problems involving Quadratics can be solved using strategies such as:

- » a table of values (t-chart, or T of V)
- » graphing
- » factoring

Recall:

- "a" determines the direction of opening
  - > so it tells us if there is a maximum or minimum value

- draw a sketch of the scenario
- to find the maximum or minimum value:
  - > write the equation in standard form
  - > factor
  - > determine the zeros (aka. x-intercepts)
  - > determine the axis of symmetry
  - > sub the A.of S. into the equation to find the corresponding y-value (this is the max/min value)

Ex.1: A ball is thrown off a cliff.
The height of the ball above the ground after it is thrown is modelled by the function,

$$h(t) = -5t^2 + 10t + 175$$

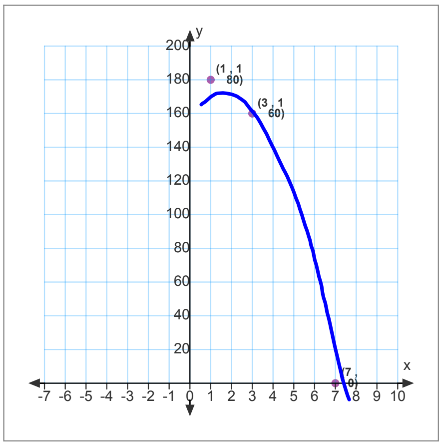
where $h(t)$ is the height in metres and t is the time in seconds.

a) How high is the cliff?
b) When will the ball be 160 m above the ground?
c) When will the ball hit the ground?
d) What is the maximum height that the ball reaches?
e) State the domain and range for this function.

a) how high is the ball when time = 0 (not thrown yet)

$h(0) = -5(0)^2 + 10(0) + 175$
$= 175$

$\therefore$ the height of the cliff is 175 m.



$y = -5t^2 + 10t + 175$

b) let $h(t) = 160$

$160 = -5t^2 + 10t + 175$
$5t^2 - 10t - 175 + 160 = 0$
$5t^2 - 10t - 15 = 0$
$5(t^2 - 2t - 3) = 0$
$5(t+1)(t-3) = 0$
$\therefore t = -1$ or $t = 3$

inadmissible (time ≥ 0)

$\therefore$ the ball will be 160 m above the ground at 3 s.

c) let $h(t) = 0$

$0 = -5t^2 + 10t + 175$
$= -5(t^2 - 2t - 35)$
$= -5(t+5)(t-7)$
$\therefore t = -5$ inadmissible, $t = 7$

$\therefore$ the ball will hit the ground at 7 s.

d) max. height is at the vertex.

A of S. is $\frac{1}{2}$ between the t-intercepts

$\therefore t = \frac{-5+7}{2}$
$= \frac{2}{2}$
$t = 1$

$\therefore h(1) = -5(1)^2 + 10(1) + 175$
$= -5 + 10 + 175$
$= 180$

$\therefore$ the maximum height the ball reaches is 180 m.

e) Domain: $\{t \in \mathbb{R} \mid 0 \leq t \leq 7\}$

Range: $\{h \in \mathbb{R} \mid 0 \leq h \leq 180\}$

Today's Homework: pp. 168-169 #1, 2, 4, 9, 10