17. A manufacturer determines that the number of drills it can sell is given by the formula
$D = -3p^2 + 180p - 285$ where p is the price of the drills in dollars.

a) At what price will the manufacturer sell the maximum number of drills?

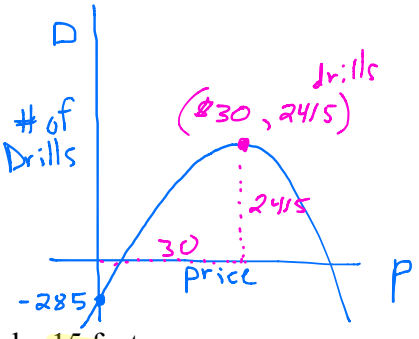
Vertex

$x = \frac{-b}{2a} = \frac{-180}{2(-3)} = \frac{-180}{-6} = 30$

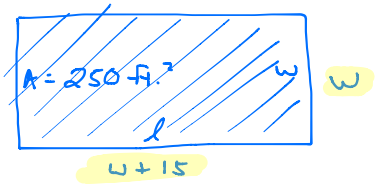
b) What is the maximum number of drills that can be sold?

$f(30) = -3(30)^2 + 180(30) - 285$

$= 2415$ drills @ \$30



18. A town is planning to fence around a new playground that is to be 15 feet longer than the width. The playground equipment calls for an area of 250 square feet. Find the dimensions of the playground.



$A = l \cdot w$

$250 = (w+15)w$

$250 = w^2 + 15w$

$-250 \quad -250$

$0 = w^2 + 15w - 250$

$0 = (w+25)(w-10)$

$w = -25$ $\quad w = 10$

$w = 10$ ft.

$l = (10) + 15$

$l = 25$ ft.

19. The path of a baseball after it has been hit is modeled by the function

$$h = -0.0032d^2 + d + 3$$

initial height

where h is the height in feet of the baseball and d is the distance in feet the baseball is from home plate.

a. What was the height of the ball at initial contact?

3 ft.

b. At what distance does the ball strike the ground?

$0 = -.0032d^2 + d + 3$ ..... use quad. formula or Calculator

Zero or x-intercept

$d = 315.47$ ft.

c. How far away from home plate does the ball reach its maximum height?

Vertex

$x = \frac{-b}{2a} = \frac{-1}{2(-.0032)} = \frac{-1}{-.0064} = 156.25$ ft. away

d. What is the balls maximum height?

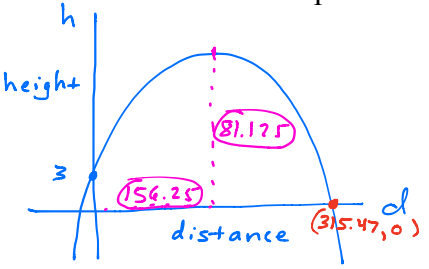
Vertex

$f(156.25) = -.0032(156.25)^2 + (156.25) + 3 = 81.125$ ft. high

e. What is the height of the ball after 200 feet?

$f(200) = -.0032(200)^2 + (200) + 3$

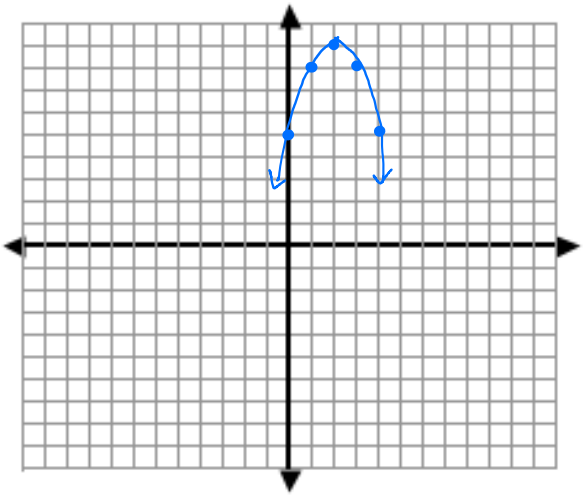
$= 75$ ft. high at 200 ft away from home plate



20. $y = -(x-2)^2 + 9$

a) Graph. **(Graph at least five points)**

x	y
0	5
1	8
2	9
3	8
4	5



b) What is the vertex?

(2, 9)

c) What is the equation for the axis of symmetry?

$x = 2$

d) Is the vertex a min or a max?

MAX

e) List the transformations for the graph

① Reflect over x-axis
② Horizontal shift RIGHT 2
③ Vertical shift UP 9

f) Write the coordinate of the *y*-intercept.

Plug in 0 for x. (0, 5) $y = -(0-2)^2 + 9$, $-(-2)^2 + 9$, $-4 + 9$

g) Write the coordinate(s) of the *x*-intercept(s).

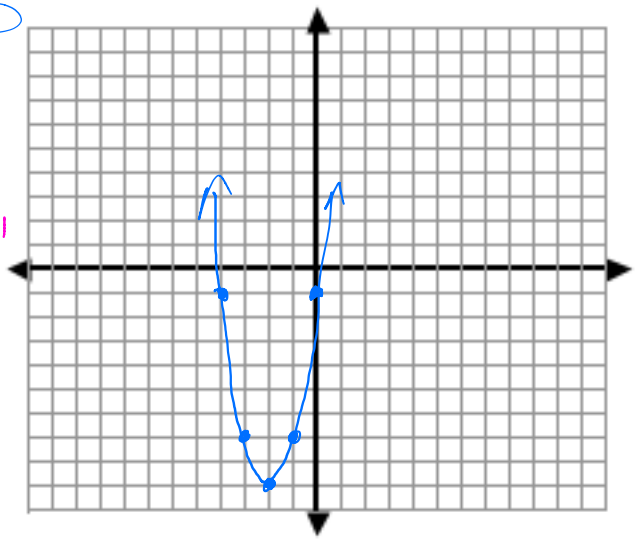
Plug in 0 for y (5, 0) (-1, 0) $0 = -(x-2)^2 + 9$, $-9 = -(x-2)^2$, $\sqrt{9} = \sqrt{(x-2)^2}$, $\pm 3 = x - 2$, $x = 2 \pm 3$ → 5, -1

21. $y = 2x^2 + 8x - 1$

a) Graph. **(Graph at least five points)**

$a = 2$
$b = 8$
$c = -1$

x	y
-4	-1
-3	-7
-2	-9
-1	-7
0	-1



b) What is the vertex? (-2, -9)

$x = \frac{-8}{2(2)} = \frac{-8}{4} = -2$ $f(-2) = 2(-2)^2 + 8(-2) - 1 = -9$

c) What is the equation for the axis of symmetry?

$x = -2$

d) Is the vertex a min or a max?

Minimum

e) List the transformations for the graph

① Vertical stretch by 2 ($a = 2$)
② Horizontal shift LEFT 2
③ Vertical shift DOWN 9

f) Write the coordinate of the *y*-intercept.

Plug in 0 for x. (0, -1) $y = 2(0)^2 + 8(0) - 1$

g) Write the coordinate(s) of the *x*-intercept(s).

Plug in 0 for y (.12, 0) (-4.12, 0) $0 = 2x^2 + 8x - 1$

$x = \frac{-(8) \pm \sqrt{(8)^2 - (4)(2)(-1)}}{2(2)} = \frac{-8 \pm \sqrt{64 + 8}}{4} = \frac{-8 \pm \sqrt{72}}{4}$ → $x \approx .12$, $x \approx -4.12$