# Warm-Up

1. What is a projectile? Give 3 examples that include a drawing.

Football

rocket ↓

badminton
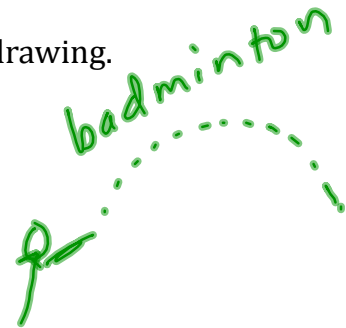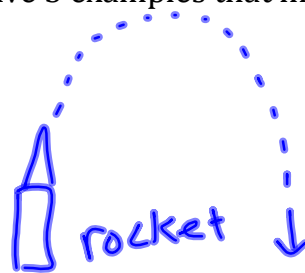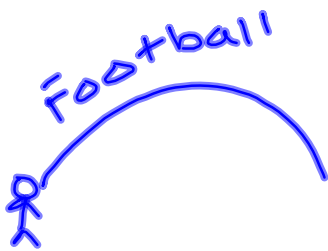
2. A quadratic equation must have an _____ = _____ symbol and a variable to the second power. 2 different examples of quadratic equations are $y = x^2 + 5$ and $y = x^2 + 2x - 3$

**3.** The equation $h = -.025x^2 + x + 6$ describes a football being thrown. "h" represents height and x represents the yards traveled. (Use the graph on page 568.)

**a.** A receiver is 40 yards down the field. How high is the football?

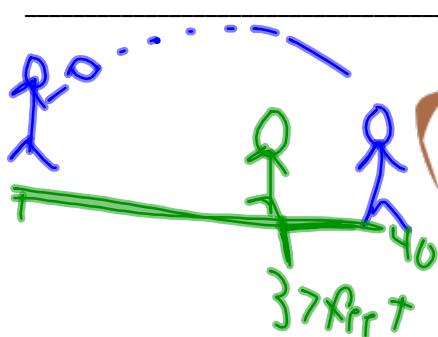$$h = -.025(40)^2 + 40 + 6 = 6 \text{ feet}$$

6 feet

**b.** At what two times is the ball 9 feet in the air?

Graph $\quad 9 = -.025x^2 + x + 6$

x = 36 yds

x = 3.4 yds

**c.** A defender is 3 yards in front of the receiver. Can the defender deflect that ball? Why or why not?

yes since the ball is only 8.8 ft in the air.

$$h = (-.025)(37)^2 + 37 + 6$$
$$h = 8.8 \text{ feet}$$

40

37 frr t

## Algebra 9-4:  Applications for Quadratics

**Examples**

1.  A formula relating speed x (in mph) of some cars and the stopping distance d (in feet) is $d = .05x^2 + x.$

    a.  If a car is traveling 55 mph, what is the expected stopping distance? $206.25$ feet
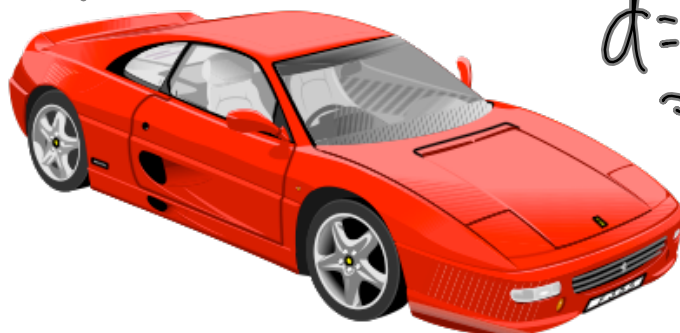
    $$d = .05(55)^2 + 55$$

    X or d
    ??

    b.  If a car is traveling 25 mph, what is the expected stopping distance? $56.25$ feet

    X = 25
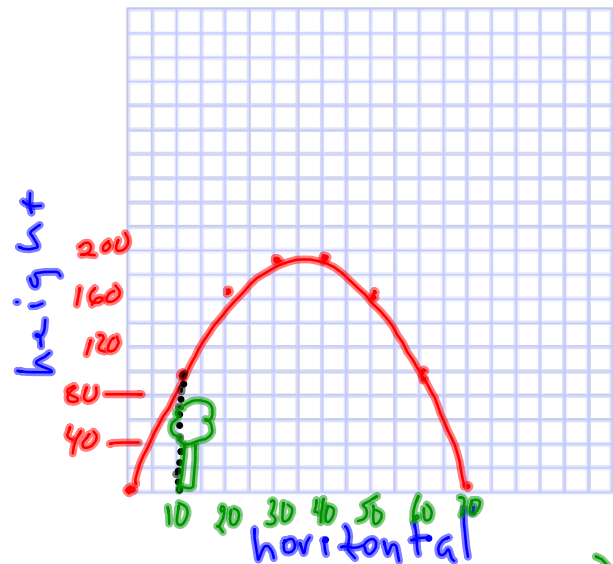
    $$d = .05(25)^2 + (25)$$
    $$= 56.25 \text{ feet}$$

2. A model rocket is shot at an angle into the air from the launch pad. The ~~height, h,~~ of the rocket when it has traveled ~~horizontally x feet~~ from the launch pad is given by

$$h = -.163x^2 + 11.43x.$$

**a.** Graph this equation.

| x | h |
|---|---|
| 0 | 0 |
| 10 | 98 |
| 20 | 163.4 |
| 30 | 196.2 |
| 40 | 196.4 |
| 50 | 164 |
| 60 | 99 |
| 70 | 1.4 |

$X = 10$

**b.** A 75-foot tree, 10 feet from the launch pad, is in the path of the rocket. Will the rocket clear the top of the tree? Why or why not?

The rocket went 98 feet high. So it went over the 75 foot tree.

$-.163(10)^2 + 11.43(10)$
$= \boxed{98}$

**c.** Estimate the maximum height that the rocket will reach. $\approx \underline{196 \text{ feet}}$

height → (vertical axis)
200
160
120
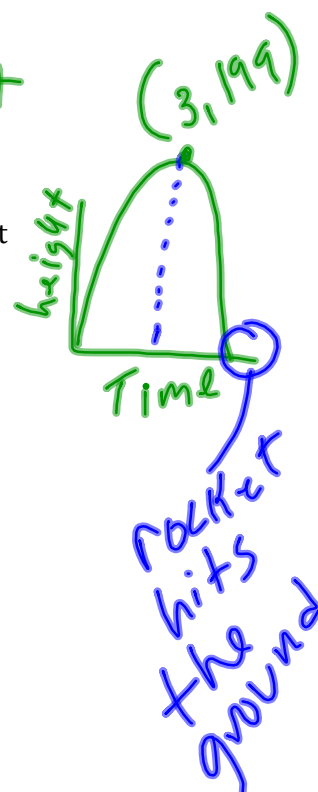80
40
10 20 30 40 50 60 70
horizontal

**3.** The rocket's height h at t seconds after launch is given by **h = -22.2t² + 133t.**

  **a.** Graph this equation. (Use graphing calculator to save time.)

  **b.** How high is the rocket at 2 seconds? ___177.2 feet___

$$-22.2(2)^2 + 133(2) = 177.2$$

  **c.** Use the graph to estimate how many seconds it will take for the rocket to reach its maximum height. ___3 seconds___

  **d.** How many seconds will it take for the rocket to hit the ground? ___6 seconds___

(3, 199)

height

Time

rocket hits the ground

**Assignment:  9-4 #'s 1, 4-22, 2 graphs**