

Name: _____ Class: _____

Quadratic Functions

Given the quadratic equation, determine if the function has a maximum or minimum and then use the calculator to find the maximum or minimum.

1. $f(x) = x^2 - 4x + 2$

Maximum or **Minimum**

Evaluate $f(2) = -2$

2. $f(x) = 2x^2 + 8x$

Maximum or **Minimum**

Evaluate $f(4) = 64$

$x = -2$

$y = -8$

3. $f(x) = -x^2 + 7x - 5$

Maximum or Minimum

Evaluate $f(-3) = -35$

$x = 7/2$

$y = \frac{29}{4}$ or 7.25

4. $f(x) = -16x^2 + 80x - 12$

Maximum or Minimum

Evaluate $f(0) = -12$

$x = 5/2$

$y = 88$

5. $f(x) = 14x^2 - 2x + 18$

Maximum or **Minimum**

Evaluate $f(-3) = 150$

$x = 1/14$

$y = \frac{251}{14}$ or 17.93

6. $f(x) = -5x^2 + 34x + 2$

Maximum or Minimum

Evaluate $f(1) = 31$

$x = 17/5$

$y = \frac{299}{5}$ or 59.8

Application Problems

7. A football ball is thrown straight up, from 3 m above the ground, with a velocity of 14 m/s. The equation for this model is $f(t) = -5t^2 + 14t + 3$. $x = 1.4$

a. Find the maximum: $y = 12.8$

b. At what height is the football after 2 seconds? 11 m

c. How long will it take for the football to be 11 m off the ground on the way down? 2 sec

d. How long will it take for the football to hit the ground? 3 seconds

8. Alan throws a stone off a bridge into a river below. The stone's height (in meters above the water), x seconds after Alan threw it, is modeled by: $f(x) = -5t^2 + 10t + 15$. $x = 1$

a. Find the maximum: $y = 20 \text{ m}$

b. At what height is the stone after 1.5 seconds? 18.75 m

c. How long will it take for the stone to be 15 m off the ground on the way down? 2 sec

d. How long will it take for the stone to hit the ground? 3 seconds

9. A baseball player hits a ball during practice. The ball follows the equation: $f(t) = -16t^2 + 120t + 3$.

a. Find the maximum: $y = 228$

b. At what height is the baseball after 3.2 seconds? 223.16

c. Is the baseball going up or down at this point? up

d. How long will it take for the stone to hit the ground? 7.5 seconds

10. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into the lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by the function $h(t) = -16t^2 + 64t + 80$.

- a. What is the height of the rocket after 1.5 seconds? 140 ft
- b. What is the maximum height reached by the rocket? 144 ft
- c. After how many seconds after it is launched will the rocket hit the lake? 5 seconds

11. A water balloon is catapulted into the air so that its height h , in meters, after t seconds is $h(t) = -4.9t^2 + 27t + 2.4$.

- a. How high is the balloon after 1 second? 24.5 m
- b. What is the maximum height of the balloon? 39.6 m
- c. When will the balloon burst as it hits the ground? 5.6 sec