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. $f\left(x\right)=x^{2}-4x+2$ 2. $f\left(x\right)=2x^{2}+8x$ 3. $f\left(x\right)=-x^{2}+7x-5$

Maximum or Minimum Maximum or Minimum Maximum or Minimum

Evaluate $f(2)$ = \_\_\_\_\_\_\_\_\_\_ Evaluate $f(4)$ = \_\_\_\_\_\_\_\_\_\_ Evaluate $f(-3)$ = \_\_\_\_\_\_\_\_\_\_

4. $f\left(x\right)=-16x^{2}+80x-12$ 5. $f\left(x\right)=14x^{2}-2x+18$ 6. $f\left(x\right)=-5x^{2}+34x+2$

Maximum or Minimum Maximum or Minimum Maximum or Minimum

Evaluate $f(0)$ = \_\_\_\_\_\_\_\_\_\_ Evaluate $f(-3)$ = \_\_\_\_\_\_\_\_\_\_ Evaluate $f(1)$ = \_\_\_\_\_\_\_\_\_\_

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 $f\left(t\right)= -5t^{2}+14t+3$.

a. Find the maximum: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. At what height is the football after 2 seconds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

d. How long will it take for the football to hit the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\left(x\right)= -5t^{2}+10t+15 $.

a. Find the maximum: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. At what height is the stone after 1.5 seconds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

d. How long will it take for the stone to hit the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

a. Find the maximum: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

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

d. How long will it take for the stone to hit the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What is the maximum height reached by the rocket? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. After how many seconds after it is launched will the rocket hit the lake? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

a. How high is the balloon after 1 second? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. What is the maximum height of the balloon? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. When will the balloon burst as it hits the ground? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_