Name_____ Class_____ Date_____

4-3 Practice

Form K

Find an equation in standard form of the parabola passing through the points.

1. (2, –20), (–2, –4), (0, –8)

2. (1, –3), (2, 0), (3, 9)

3. (2, –8), (3, –8), (6, 4)

4. (–1, –12), (2, –6), (4, –12)

5. A player hits a tennis ball across the court and records the height of the ball at different times, as shown in the table.

a. Find a quadratic model for the data.

b. Use the model to estimate the height of the ball at 4 seconds.

c. What is the ball's maximum height?

Time(s)	Height (ft)
0	5.5
1	6.0
2	5.5
3	4.0

6. Reasoning Explain why the quadratic model only works up to 4.5 seconds — that height measurements made after 4.5 seconds are not valid. (Remember this is a discrete, real situation.)

7. The table at the right shows the height of the tides measured at the Santa Monica Municipal Pier in California. Hours are measured from 0.00 at midnight.

a. Find a quadratic model for this data using quadratic regression.

b. Use the model to predict the lowest tide height.

c. When does the lowest tide occur?

Time	Tide Height (ft)
0.33	3.9
3.30	2.7
11.11	4.6

SOURCE: www.tidesandcurrents.noaa.gov

8. The table at the right shows in thousands how many people in the U.S. subscribe to a cellular telephone.

a. Find a quadratic model for the data. Let x = the number of years since 1985.

b. Use the model to estimate the number of subscribers in 1995.

c. Describe a reasonable domain and range for this situation.

Year	U.S Cellular Telephone Subscribership (in thousands)
1985	340
1990	5283
2000	109,478
2004	182,140

SOURCE: CTIA Semi-Annual Wireless Industry

1. Jason jumped off of a cliff into the ocean in Acapulco while vacationing with some friends. His height as a function of time could be modeled by the $h(t) = -16t^2 + 16t + 480$ where t is the time in seconds and h is the height in feet.

a. How long did it take for Jason to reach his maximum height?

b. What was the highest point that Jason reached?

c. Jason hit the water after how many seconds?

2. If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height *h* after *t* seconds is given by the $h(t) = -16t^2 + 128t$ (if air resistance is neglected).

a. How long will it take for the rocket to return to the ground?

b. After how many seconds will the rocket be 112 feet above the ground?

c. How long will it take the rocket to hit its maximum height?

d. What is the maximum height?

3. You and a friend are hiking in the mountains. You want to climb to a ledge that is 20 ft. above you. The height of the grappling hook you throw is given by the function $h(t) = -16t^2 - 32t + 5$.

a. What is the maximum height of the grappling hook?

b. Can you throw it high enough to reach the ledge?

4. You are trying to dunk a basketball. You need to jump 2.5 ft. in the air to dunk the ball. The height that your feet are above the ground is given by the function $h(t) = -16t^2 + 12t$.

a. What is the maximum height your feet will be above the ground?

b. Will you be able to dunk the basketball?

5. A diver is standing on a platform 24 ft. above the pool. He jumps from the platform with an initial upward velocity of 8 ft/s. Use the formula $h(t) = -16t^2 + vt + s$, where h is his height above the water, t is the time, v is his starting upward velocity, and s is his starting height. How long will it take for him to hit the water?

6. A trebuchet launches a projectile on a parabolic arc at a velocity of 35 ft/s. Using the function $h(t) = -16t^2 + vt + h_0$, determine when the projectile will first reach a height of 80 ft., and how many seconds later will it again be 80 feet.

7. During World War I, mortars were fired from trenches 3 feet down. The mortars had a velocity of 150 ft/s. Using the function $h(t) = -16t^2 + vt + h_0$ determine how long it will take for the mortar shell to strike its target.