Algebra

Chapter 10: Quadratic Equations

**10f: Quadratic Projectiles**

1) Abrahms Tank

An Abrahms tank has 120mm turret. At an angle of 10 degrees, the path of the round can be described by the equation: h=-0.0000005625d^2+0.00425d+2

h: height in meters, d: distance in meters

1. What will be the height of the tank round at a distance of 1000 meters?
2. What is the maximum height the projectile? At what distance?
3. What is the distance from the tank the shell will hit its target?

2) Football

A quarterback throws a football to a receiver 40 yards downfield. The equation modeling this situation is h=-0.025x^2+x+6, where h is the height above the ground (in feet) and x is the distance from the quarterback (in yards).

1. At what height was the ball thrown from?
2. If the receiver will catch the ball at 6 feet, how far will the ball travel?

c) Suppose a defender is 3 ft in front of the receiver (37 yards from the QB). Will he be able to deflect or catch the ball?

3) Baseball

Suppose a baseball player hits a high pop-up with an initial upwards velocity of 32 meters per second. Suppose also that the ball was hit at 1.5 meters above the ground.

1. Write a quadratic model that would model this situation.
2. How much time would a player on the opposing team have to get under the ball to catch it before it hits the ground?

4) Cliff Diver

A cliff diver stands on a cliff overlooking water. To approximate his height above the water, he drops a pebble and times its fall. If the pebble takes about 3 seconds to strike the water, approximately how high is the diver about the water? Use the model h(t) = -4.9t^2 +c, where h is the pebbles height in meters above the ground, t is the time in seconds, and c is the height of the cliff in meters.

5) The output, in megawatts, of a geothermal power plant between midnight and noon is approximated by P = 4h^2+-69h+750, where h is the hour of the day on a 24-hour clock. At what time will the output be 670 megawatts?

6) The owner of a small business decided to find a relationship between the selling price, x, and the number of items sold, n(x), and between the selling price, x, and the income, I(x). give students the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| x | 1 | 2 | 3 | 4 | 5 |
| n(x) | 90 | 80 | 70 | 60 | 50 |
| I(x) | 90 | 160 | 210 | 240 | 250 |



1. Make a scatter plot of the points (x, n(x)). What type of function would model this data well?
2. How could you tell from the table without graphing?
3. Now make a scatter plot of the points (x, I(x)) – using the same graph. What type of function would model this data well?
4. How can you tell from the table without graphing?

7) Football

A ball is thrown from a height of 6 feet with an initial upward velocity of 32 feet per second.

1. Create an equation modeling this situation.
2. How high will the ball be a half second after it is thrown?
3. What is the maximum height the ball reaches?
4. When will the ball be 12 feet high?