

Quadratics – Technology Extra Practice

Key

I can model real-life problems with quadratic regression.

- 1) The table below shows the relationship between speed, measured in miles per hour, and the fuel economy, measured in miles per gallon, for a new car.

Speed	15	20	25	30	35	45	55	60	70
Fuel Economy	22.3	25.5	27.5	29	28.8	29.9	30.4	28.8	25.3

Define Variables:

$x = \text{speed (mph)}$

$y = \text{Fuel Economy (mpg)}$

- a) Find a quadratic function to model the data.

$$y = -0.008x^2 + 0.759x + 13.285$$

- b) Predict the fuel economy of a car that travels at a speed of 65 miles per hour.

about 28.82 mpg

- c) If you found the fuel economy of a car was 24 miles per gallon predict the speed that the car is traveling at.

17.3 mph OR 77.6 mph

- 2) The table below shows the relationship between the age and blood pressure for a group of people who recently donated blood.

Age	24	26	34	35	37	41	48	50	55
Blood Pressure	108	104	119	128	121	132	140	135	146

Define Variables:

$x = \text{age (years)}$

$y = \text{blood pressure}$

- a) Find a quadratic function to model the data.

$$y = -0.014x^2 + 2.404x + 55.555$$

- b) Predict the blood pressure of a 15 year old.

about 88.465

- c) If a person has a blood pressure of 130, predict their age.

40.5 years old OR 131 years old

I can describe characteristics of real-life quadratic functions.

3) A juggler throws a ball into the air from the ground. The relation between its height, h , in feet and the time from launch, t , in seconds can be described by the equation $h = -16t^2 + 15t$.

Define Variables: $x = \text{time (seconds)}$ $y = \text{height (feet)}$

a) What is the maximum height that the ball will reach?

3.52 feet

b) At what time will the ball reach the maximum height?

0.469 seconds

c) How long is the ball in the air for?

0.938 seconds

d) What is a reasonable domain and range for this model?

Domain: $[0, 0.938]$ Range: $[0, 3.52]$

4) The Empire State Building is 1250 feet tall. If an object is thrown upward from the top of the building at an initial velocity of 38 feet per second, its height s seconds after it is thrown is given by the equation $h = -16s^2 + 38s + 1250$.

Define Variables: $x = \text{time (seconds)}$ $y = \text{height (feet)}$

a) What is the maximum height that the object will reach?

1270 feet

b) After how many seconds will the object reach the maximum height?

1.19 seconds

c) How long is the object in the air for?

10.1 seconds

d) What is a reasonable domain and range for this model?

Domain: $[0, 10.1]$

Range: $[0, 1270]$