

SOLVING PROBLEMS USING QUADRATIC EQUATIONS

LEARNING GOALS

Students will:

- Review the methods used to solve problems involving quadratic equations.

METHODS

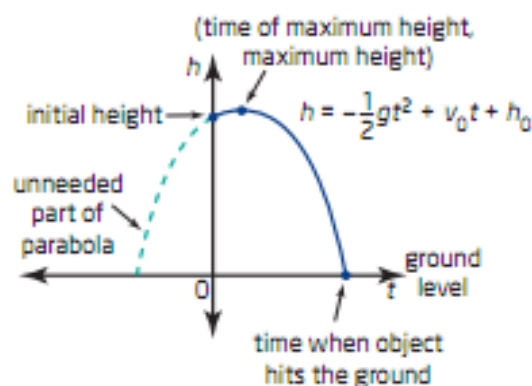
Which methods have we used so far to solve quadratic equations?

Now you need to know when to use these different methods.

EXAMPLE 1: MODEL THE PATH OF A TOY ROCKET

The formula $h = -\frac{1}{2}gt^2 + v_0t + h_0$ can be used to model the height of a projectile, where g is the acceleration due to gravity, which is 9.8 m/s^2 on Earth, v_0 is the initial vertical velocity, in metres per second, and h_0 is the initial height, in metres.

- a) Create a model for the height of a toy rocket launched upward at 60 m/s from the top of a 3-m platform.



- b) How long would the rocket take to fall to Earth, rounded to the nearest hundredth of a second?

- c) What is the maximum height of the rocket, rounded to the nearest metre?

- d) Over what time interval is the height of the toy rocket greater than 150 m? Round to the nearest hundredth of a second.

EXAMPLE 2: WIDTH OF A PATH

A rectangular park measures 100 m by 60 m. A path of constant width is to be paved around the perimeter. The mayor wants to be sure that the path does not reduce the area of grass by more than 10%. What is the maximum allowable width of the path, rounded to the nearest tenth of a metre? [Hint: Start with a diagram.]

EXAMPLE 3: CONSECUTIVE NUMBERS

The product of two consecutive numbers is 5624. What are the numbers?

EXAMPLE 4: RIGHT TRIANGLE

One length of a right triangle is 1 cm longer than the other length. The length of the hypotenuse is 9 cm greater than that of the shorter length. Find the length of the three sides.