Chapter 2 Section 6

MA1032 Data, Functions & Graphs

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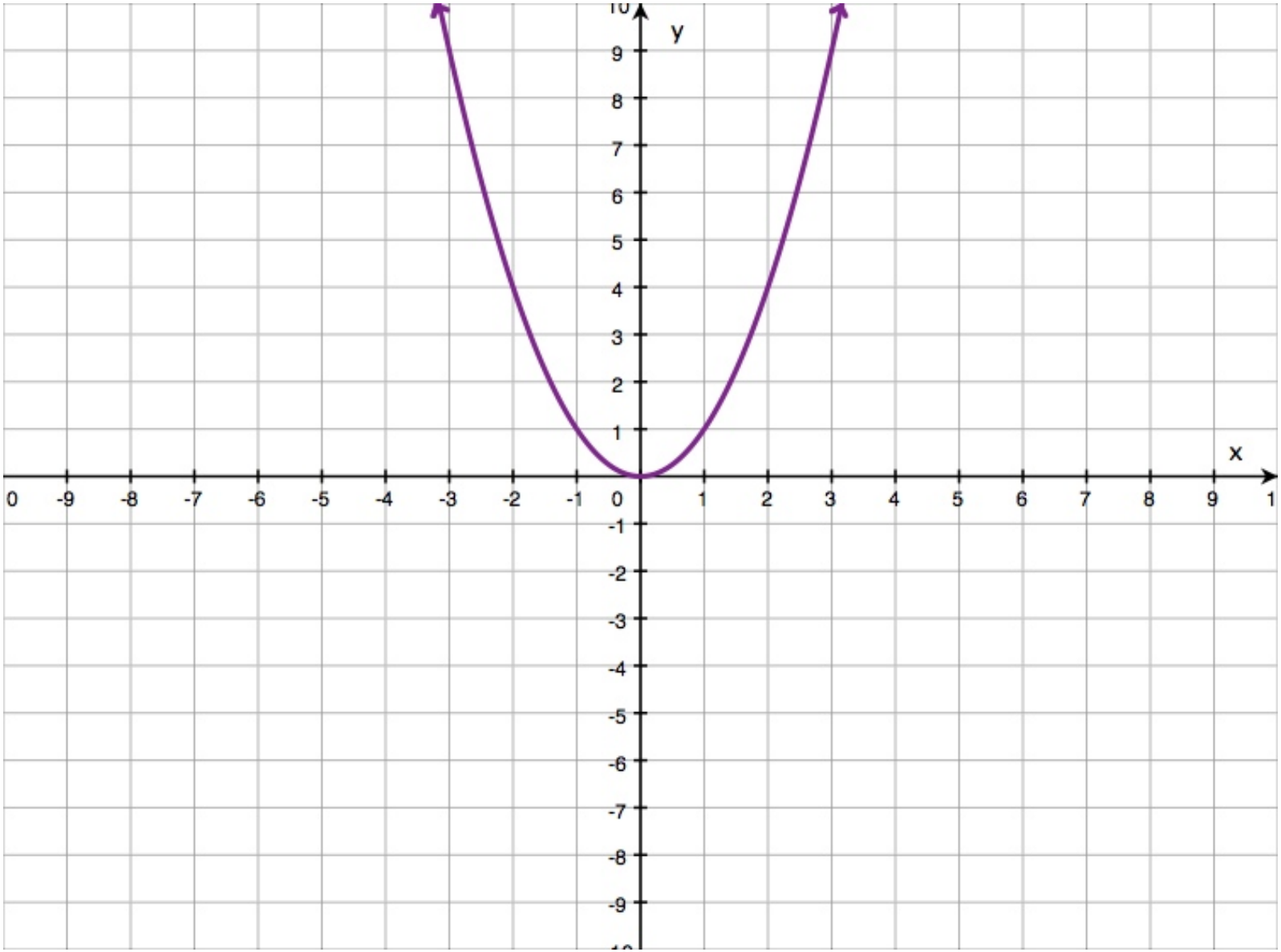
A Familiar Quadratic



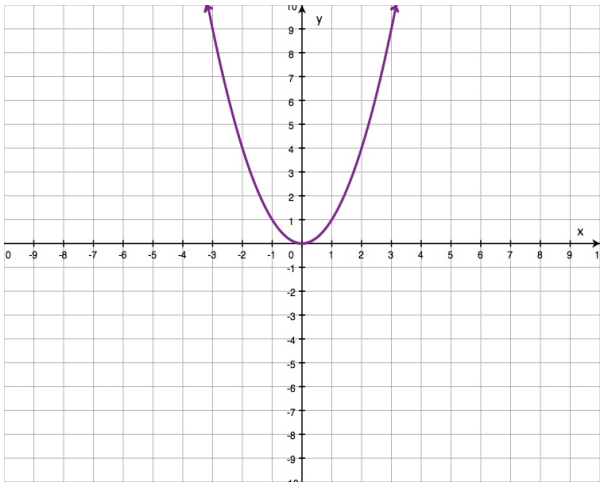
General Form

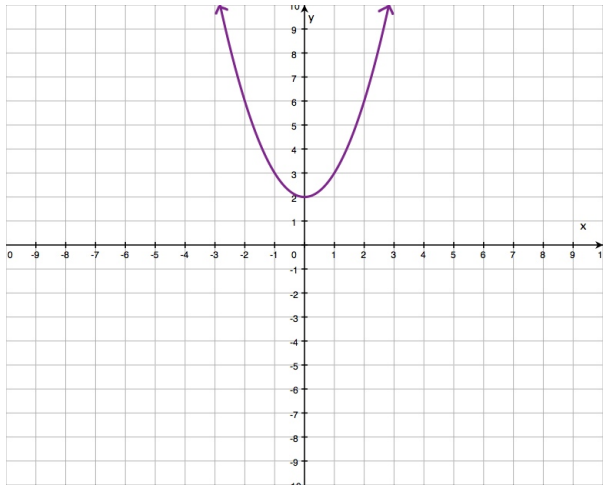
$$y = f(x) = ax^2 + bx + c$$

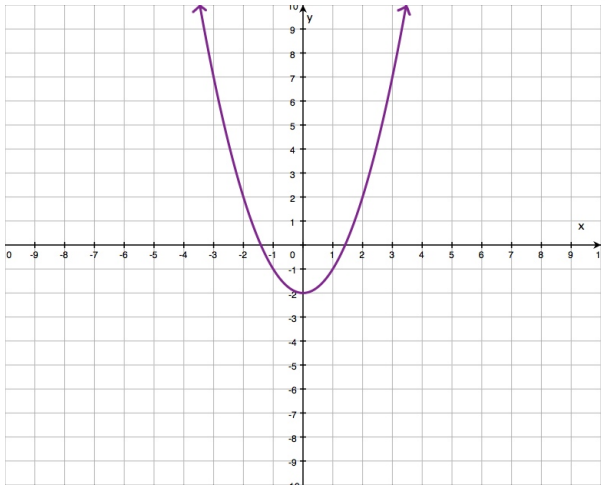
An Interesting Characteristic

Definition

The zeros of a quadratic function are the input values which make the output zero.







Examples

Find the zeros of

$$x = f(y) = 3y^2 + 5y - 2.$$

Find the zeros of

$$Q(x) = 5x - x^2 + 3.$$

Examples in Physics

Consider a ball which is thrown upward from a bridge and is allowed to fall past the bridge all the way to the ground. For example, let $h(t) = -16t^2 + 48t + 120$ denote the height of the ball in feet above the ground t seconds after being released.

1. How high is the ball when it is released? How high is the bridge?
2. When does the ball hit the ground? There are two answers. Are they both valid?
3. Sketch a graph of the function h, showing the domain and range. Find a window on your graphing calculator that shows the height of the ball from the time it is thrown until it hits the ground.

An important Feature

Consider an object falling under the influence of gravity. Let $d(t) = 16t^2$ be the distance in feet that an object has fallen after t seconds.

Compute the average speed of the object over each of the time intervals $0 \leq t \leq 1$, $1 \leq t \leq 2$, $2 \leq t \leq 3$, and $3 \leq t \leq 4$.

Summary

1. General formula for quadratic functions
2. Zeros
3. Applications
4. Concavity