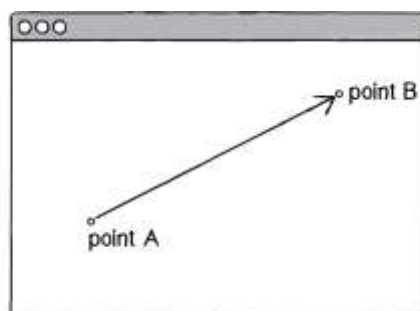


# Intro to vectors

This course is all about looking at the world around us and coming up with clever ways to simulate that world with code. We will start by looking at basic physics—how an apple falls from a tree, how a pendulum swings in the air, how the earth revolves around the sun, etc. Everything that we'll discuss here requires the use of the most basic building block for programming motion—the **vector**. And so this is where we begin our story.

Now, the word vector can mean a lot of different things. Vector is the name of a New Wave rock band formed in Sacramento, CA in the early 1980s. It's the name of a breakfast cereal manufactured by Kellogg's Canada. In the field of epidemiology, a vector is used to describe an organism that transmits infection from one host to another. In the C++ programming language, a vector (`std::vector`) is an implementation of a dynamically resizable array data structure. While all these definitions are interesting, they're not what we're looking for. What we want is called a **Euclidean vector** (named for the Greek mathematician Euclid and also known as a geometric vector). When you see the term “vector” in this course, you can assume it refers to a Euclidean vector, defined as *an entity that has both magnitude and direction*.

A vector is typically drawn as a arrow; the direction is indicated by where the arrow is pointing, and the magnitude by the length of the arrow itself.



A diagram of a vector with magnitude and direction

Figure 1.1: A vector (drawn as an arrow) has magnitude (length of arrow) and direction (which way it is pointing).

In the above illustration, the vector is drawn as an arrow from point A to point B and serves as an instruction for how to travel from A to B.