Let's consider a very simple example of a runner in which our position function x of t is given as a quadratic function in time.

It will be a constant b times t squared.

Here, b is a constant.

Now it's always important in SI units to consider what the units of this constant is.

Because a position function is measured in meters and time is measured in seconds, b is a constant and it has units of meters per second squared.

And there's an example of a runner-- and let's make a plot of that position function.

So we're going to plot x of t as a function of time.

b here-- let's make b a positive constant.

And so our function looks something like that.

Now, the velocity-- component of the velocity-- remember v of t is given by dx dt of this function.

And the derivative of a polynomial t squared is very simple.

That's just simply 2b times t.

Again, let's look at our units.

Because b has the units of meters per second squared, and when multiplying that by second, we have the units of velocity in SI units as meters per second.

Now let's plot that function.

Notice this is a linear function.

And so if I plotted underneath here, the velocity as a function of time, it starts off with a zero slope.

Remember we're looking-- our velocity at any given time corresponds to the slope of a tangent line to the position function.

And you can see that slope is increasing.

Now you wouldn't know it from this graph, but if you did plot t squared, it's increasing linearly.

And so our velocity function-- the initial slope is 0 at t equal 0, and it's increasing linearly in time.

So we'll just draw that as some linear function.

And the slope here of this function will be now the acceleration.

So a of t is the derivative of the component of the velocity function as a function of time.

And this derivative is quite easy.

It's just simply 2 b.

Now notice those have the units of meters per second squared, which are units for acceleration.

When we, again, look at the slope, notice that at every single point, the slope of the velocity as a function of time is a constant.

The slope here is just equal to 2b.

And so now if we plotted our acceleration function, we have this point 2 b, and every single point has the same value of acceleration.

So here the acceleration is an example of constant acceleration.

And this is our simplest case.

Notice we started with the position function.

We differentiate to get the component of the velocity and to get the component of the acceleration.

So this is a very simple model for a runner whose increasing speed linearly, accelerating at a constant rate.