

We consider the work done by a gravitational force, which was path-independent.

Now let's generalize that to any force between two points, i , and another point, f , that if the work done going from the initial point to the final point-- this is path-independent-- then we call this force a conservative force.

There are many conservative forces that we'll analyze in this class.

Examples will be the inverse square, electric force, or the gravitational force.

We've already seen gravitational force.

Near the surface of the Earth is conservative.

Spring forces are other examples of conservative forces.

But let's look a little bit in detail.

Suppose we call this path 1 and we consider a second path, path 2.

Then a property of conservative forces is that the work done is independent of that path.

So if we total up the work from the initial to final on path 1 of $f \cdot ds$.

And then we go from the final point to the initial point on path 2 of $f \cdot ds$.

Then because these intervals are independent of the path, and all we've done is shifted the endpoints, we get 0.

And that's the statement.

And we'll write w conservative here for conservative forces.

So we're going to call this force conservative if it's path-independent.

So what we have here is the statement that the work done by a conservative force.

Now what we'll do here, is indicate a circle by a closed path.

The work done by conservative force on a closed path is zero.

What does a closed path look like?

Well, remember, what we did was we went from 1, but then instead of going in this direction, we came back on

path to, from the final, to the initial point.

And if the force is conservative, the work done around a closed path is 0.