Hi welcome to Module 2 of An Introduction Into Engineering Mechanics. Here are the learning outcomes for today's module. First, we're going to describe and list examples of scalar quantities. And then we're going to look at vector qualities and do the same thing. This will be followed by looking at the concept of a force, and explaining what a force is. And then finally we'll learn how to properly label a force to completely describe its characteristics.

So let's start out with an exercise that you'll do. I'd like you to take some pieces a piece of paper or maybe on your computer and write down, what is meant by a scalar quantity. And you can research this you can go to Google or textbook, if you will. Try to figure out what a scalar is, and then list a few examples of scalar quantities.

Okay. Now that you've answered that question let's look at what a scalar quantity is. A scalar quantity is just a value and I've put down a, a mass, the, the letter m is, is a typical scalar value and that's how we, we would describe it. It has a magnitude. Mass would have a magnitude of kilograms but it has no associated direction. Some other examples are listed at the bottom of the screen. You've got volume time in seconds, volume maybe feets cubed or meters cubed. And then speed speed's a good example of, of, of a scalar we can take this This truck again, this cherry picker truck, it would have a speed of say 30 miles an hour, okay. So that's the magnitude, it's actually the magnitude of the velocity. We're going to talk about the velocity as a vector on the next screen. Density is also a, a scalar quantity and temperature could be in degrees Fahrenheit, degrees Celsius, degrees Kelvin but it's just a value.

So next, I'd like you to go ahead and, and describe what is benpire vector and also give me some examples of vector quantities and then when you finish that you can start back up again. Okay. Lets go ahead and look at, at vector quantities. A typical vector quantity which we're going to talk a lot about in this course is Force, often given the symbol F. We put a line above the force that's designates it as being a vector. A, a vector has magnitude just like a scalar does, but it also has direction. And some examples are force or a moment, and we'll use those a lot in this course and learn a lot more about them. I just used my my truck here my.

To show speed or you may have also a direction associated with the speed. And so, this is a typical Cartesian coordinate system x, y, z. And my truck may be going 30 mph, to the right or to in the x direction. And so now, the truck has a speed, and now, it has a direction so its considered a velocity, and that's a vector quantity. And then finally, acceleration would also be a vector quantity. Next, I'd like you to take some time and think about what is a force, or reseach, what is a force and is force a scalar or a vector quantity? It should be pretty obvious it's a vector quantity, since I just had it on my last slide. But why is it a vector quantity? Okay. Now that you've answered that question, a force is just typically a push or simple as a push or a pull on a body. So if I push on this desk or pull on this desk, the action is, is, is a force. And so that's the concept of a force and it is a vector as I said, because if I push it has a magnitude and a direction I'm associate with it, or were pulling for that case. So here's how we would completely describe force. This is an example of a golf ball a golf ball typically gets about 8 sometimes 10 kilometer's a force at impact. So I've drawn an 8 kilonewton force here. It's acting to the right and I have

my Cartesian coordinate system i and j. And so the force can be described as 8 kilonewtons to the right or 8 kilonewtons in the i direction. So I have my magnitude, I have my direction and the other thing you want to also include always, is the units themselves so we know that it's in kilonewtons and that's the SI system, rather than pounds.

So that concludes today's module.