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8.01 Physics I: Classical Mechanics, Fall 1999
Transcript – Lecture 3

The bad news today is that there will be quite a bit of math.

But the good news is that we will only do it once and it will only take something like half-hour.

There are quantities in physics which are determined uniquely by one number.

Mass is one of them.

Temperature is one of them.

Speed is one of them.

We call those scalars.

There are others where you need more than one number for instance, on a one-dimensional motion, velocity it has a certain magnitude--

that's the speed--

but you also have to know whether it goes this way or that way.

So there has to be a direction.

Velocity is a vector and acceleration is a vector and today we're going to learn how to work with these vectors.

A vector has a length and a vector has a direction and that's why we actually represent it by an arrow.

We all have seen...

this is a vector.

Remember this--

this is a vector.

If you look at the vector head-on, you see a dot.

If you look at the vector from behind, you see a cross.
This is a vector and that will be our representation of vectors.

Imagine that I am standing on the table in 26.100.

This is the table and I am standing, say, at point O and I move along a straight line from O to point P so I move like so.

That's why I am on the table and that's where you will see me when you look from 26.100.

It just so happens that someone is also going to move the table--

in that same amount of time--

from here to there.

So that means that the table will have moved down and so my point P will have moved down exactly the same way and so you will see me now at point S.

You will see me at point S in 26.100 although I am still standing at the same location on the table.

The table has moved.

This is now the position of the table.

See, the whole table has shifted.

Now, if these two motions take place simultaneously then what you will see from where you are sitting...

you will see me move in 26.100 from O straight line to S and this holds the secret behind the adding of vectors.

We say here that the vector OS--

we'll put an arrow over it--

is the vector OP, with an arrow over it, plus PS.

This defines how we add vectors.

There are various ways that you can add vectors.

Suppose I have here vector A and I have here vector B.

Then you can do it this way which I call the "head-tail" technique.

I take B and I bring it to the head of A.

So this is B, this is a vector and then the net result is A plus B.

This vector C equals A plus B.

That's one way of doing it.