<https://www.khanacademy.org/science/physics/one-dimensional-motion/displacement-velocity-time/v/introduction-to-vectors-and-scalars>

**VECTORS AND SCALARS**

What I want to do in this video is talk about the difference between vectors and scalars. And they might sound like very complicated ideas, but we'll see over the course of the videos that they're actually very simple ideas. So first I'll give you a little bit of a definition. And then I'll give you a bunch of examples, and I think the examples will make things super clear. Hopefully, they'll make things super clear. A vector is something that has a magnitude, or you could kind of view that as a size, and it has a direction. So "and" it has a direction. A scalar only has a magnitude, or size. And if that doesn't make sense to you, it will hopefully make sense to you in a second when I show you an example. For example. Let's say that I have, let's say that that's the ground-- let me do the ground in a more appropriate ground-like color. So this is green right over here. And let's say that I have a brick here. I have a brick on the ground. And I pick up that brick, and I move it over to this place right over here. So I move the brick right over there. And then I take a ruler out, and I say, wow, I've moved the brick 5 meters. So my question to you, is my measurement of 5 meters, is it a vector or a scalar? Well, if I just tell you 5 meters, you just know the size of the movement. You just know the magnitude of the movement. So if someone were to just say 5 meters, this is a scalar quantity. And when we're referring to moving something, or how much something has, I guess, changed its position, and I don't give you the direction, we're talking about distance. And I'm assuming you've heard the word distance. How far of a distance has something traveled? So this is distance. So we could say that this block, or this brick, because of my picking it up and moving it, has moved a distance of 5 meters. But if I didn't show you this picture here, and someone just told you that it moved a distance of 5 meters, you wouldn't know if it moved to the right 5 meters, you wouldn't know if it moved to the left 5 meters, if it moved up or down or in or out, or-- You don't know what direction it moved 5 meters. You just know it moved 5 meters. If you want to specify that, so, we could say that this brick right over here, that it moved 5 meters to the left. Now we have specified a magnitude, right over there. So that is a magnitude. And we have specified a direction, to the left. So you now explicitly know that they went 5 meters to the-- oh, sorry. It should be 5 meters to the right. Let me change that. So, 5 meters to the right is what it got moved. It started here and went 5 meters to the right. So once again, the magnitude is 5 meters, and the direction is to the right. So what I've just described to you right here is a vector quantity. So this, all of this business right over here, this is a vector. And when you talk about the movement, the change in position, and you give its direction, the vector version of distance, I guess you could call it, is displacement. So this right here is displacement. So the correct thing to say, you would say that this brick has been displaced 5 meters to the right, or it has been moved a distance of 5 meters. Distance is a scalar quantity-- I didn't tell you what direction we moved it in. Displacement is a vector quantity. We told you that it is to the right. Now let's explore this if we talk about the actual, well, we'll talk about the speed or velocity of something. So let's say that this 5 meters was traveled and let's say that the change in time-- let me just, because you're probably not familiar with what that means. So let's say that the change in time right here, when I moved this block 5 meters, let's say that it was, I don't know, let's say that the change in time was 2 seconds. So maybe right when the block started moving, maybe on my stopwatch it said 0. And then on my stopwatch when it stopped moving, it said, or when it got to this position, I should say-- when it left from this position, my stopwatch said 0. When it got to this position my stopwatch said 2 seconds. So the change in time, or the duration we're dealing with, is 2 seconds. And this is, for all we know, time only goes in the positive direction. So you could assume that it's, you could pick that as a vector or a scalar quantity, I guess, because there's only one direction for time, as far as we know, or at least in what we're going to deal with for the simple physics. So what is a measure of how fast this thing moved? So, how fast did this thing move? So we could say it moved 5 meters in 2 seconds. Let me write this down. So it moved 5 meters per 2 seconds. Or we could write this as 5/2 of a meter per second. Or 5 divided by 2 is what? 5 divided by 2 is 2.5 meters per second. This right here is just the 5 divided by 2, let me make that clear. That right there is just the 5 divided by the 2. So my question to you. This 2.5 meters per second tells you how far it traveled in a certain amount of time. Is this a vector or a scalar quantity? It is telling you how fast it went, but is it giving you just a size of how fast it went? Or is it also giving you direction? Well, I don't see any direction here. So this is a scalar quantity. And the scalar quantity for how fast something is going is speed. So we could say that the speed of the brick is 2.5 meters per second. Now, if we do the same calculation, and we say it went 5 meters-- I'll just write m for meters-- to the right in 2 seconds, then what do we get? We get 2.5, once again, 2.5 meters per second-- I'll just abbreviate them as meters per second-- to the right. So is this a vector or a scalar quantity? I'm telling you the magnitude of the speed, that's right here. This is the magnitude, 2.5 meters per second. And I'm also telling you the direction, to the right. So this is a vector quantity. This is a vector quantity. And when you specify both the speed and the direction, so the 2.5 meters per second is a scalar, and the direction, you are talking about velocity. You are talking about velocity. So an easy way to think about it, if you're thinking about change in position and you specify the direction of the change in position, you're talking about displacement. If you're not talking about the direction, you want the scalar version, you're talking about distance. If you're talking about how fast something is going, and you give the direction that it's going in, you're talking about velocity. If you don't give the direction you are talking about speed. Hopefully that helps you a little bit. In the next video, we're going to start working with these a little bit to start solving some basic questions about how fast something is going, or how far it might travel, or how long it might take it to get someplace.

**VOCABULARY:**

to talk about: bir şey hakkında konuşmak, bahsetmek

difference: fark

to differ: farketmek, farklı olmak

sound: ses, gibi gelmek (they may sound like very complicated ideas: onlar çok karmaşık fikirler gibi gelebilir, çok karmaşık fikirler hissini verebilir)

complicated: Karmaşık, karışık

to complicate: karmaşık hale getirmek

over the course of the videos; videoların akışı müddetinde

actually: gerçekte, hakikatte

a little bit of: birşeyin birazı, azıcığı

definition: tarif, tanım

to define: tarif etmek, tanımlamak ( ama yol tarifi vermek, etmek: to give directions)

bunch: demet, küme, salkım

example: örnek,misal

magnitude: büyüklül

size: boy (shoe size: ayakkabı boyu)

direction: yön, istikamet

to make sense

appropriate: uygun, müsait

brick; tuğla

ruler: cetvel

to rule: yönetmek, idare etmek

ruled notebook: çizgili defter

ruling: hüküm

measurement: ölçü

to measure: ölçmek

movement: hareket

to move: hareket etmek, ettirmek

quantity: miktar,nicelik

quality: kalite, nitelik

refer to: kastetmek, ima etmek, bahsetmek, atfetmek

distance: mesafe, uzaklık

to assume: farzetmek, varsaymak

assumption: faraziye, varsayım, kabul

to travel: seyahat etmek

because of. ….den dolayı, …nın yüzünden ( I was late to work because of you: senin yüzünden işe geç kaldım)

picking it up: yerden almak

to get moved: hareket ettirilmek

to get somewhere: bir yere varmak, gitmek (How can I get to the airport? Havalimanına nasıl gidebilirim?)

to describe: tasvir etmek, tarif etmek

description: tasvir, tanım, tarif

just: Henüz, biraz önce, sadece ( Ijust finished my homework. Evödevimi, yeni (az önce) bitirdim.)

business: iş

displacement: yer değiştirme, kaydırım

to displace: yerini değiştirmek, kaydırmak

explore: araştırmak, muayene etmek

exploration: keşif, araştırma

probably : muhtemelen

probable: muhtemel, mümkün

to be familiar with: ……..ile tanışık olmak, bildik olmak

to mean: demek istemek, kastetmek

mean: ortalama (mean value: ortalama değer)

mean: alçak , süfli

maybe: belki

duration: süre, müddet

durable: dayanıklı, sürekli, uzun ömürlü

to deal with: birşeyle uğraşmak, muamelede bulunmak

to guess: tahmin etmek

guess: tahmin (Make a guess!: Bir tahminde bulun!)

as far as we know: bildiğimiz kadarıyla

at least: en az, en azından, hiç olmazsa, bari

at most: en çok, en fazla, olsa olsa

speed: sürat

to speed up: süratlenmek

velocity: hız

to abbreviate: bir yazıyı kısaltmak

abbreviation: kısaltma (What does the abbreviation YTÜ stand for? YTÜ kısaltması ne manaya gelir?)

to specify: bir şeyin özelliklerini belirtmek

specification: özellik, hususiyet

to solve: çözmek, halletmek

solution: çözüm, hal

solution manual: çözüm kitabı

to be going to: bir şey ……cek (Today we are going to discuss Lesson 1: Bugün Ders 1’i işleyeceğiz, I’m going to see you in a week: Seni bir hafta sonra göreceğim.))