Physics A: Velocity Problem Example 1

Scene #	Description	Narration
1	A velocity problem is on the screen and the narrator is reading it out loud.	In order to better understand velocity, let's do a velocity problem together. Let's look at this problem. "Peter is riding his motorcycle on a straight road. In 2.0 minutes, he travels 820 meters south. What is his velocity? What is his speed?"
	He underlines the time, distance and direction in the story problem in red.	Alright the first thing we're going to want to do is see what information the problem gives us. Right off the bat, we see the time is 2.0 minutes, the distance is 820 meters, and the direction is south.
	The narrator writes the velocity equation in blue underneath the story problem.	The velocity equation is "velocity is equal to the displacement divided by the change in time." Now, we're going to want our velocity to be in meters per second. Our distance in given in meters, but our time, right now, is written in minutes. So, before we go any further in this problem, we're going to need to convert that.
	The narrator converts 2.0 minutes to seconds by writing the equation in blue.	To do that, we write 2.0 minutes, our original value, and we need to multiply this by a conversion factor that has minutes in the denominator (so it will cancel out there), and the units we want - which is seconds, in the numerator . Fortunately, this is an easy conversion, because it is sixty seconds for every one minute. Minutes cancel with minutes, and we get 2.0 times 60 equals 120 seconds. And that value we can use in our velocity equation.
	The narrator records the steps to solving velocity in blue.	So, entering our values into our velocity equation, velocity is equal to the displacement, which is 820 meters, but because it's south, we going to make that negative 820 meters. Because this is a vector, it does have direction. Divided by "delta t," which we just solved as 120 seconds. So let's write that down, 120 seconds.

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		Negative 820 divided by 120 gives us negative 6.833 meters per second. But, because in our problem each of these values only has two significant figures, this has too many significant figures, so we're going to have our final answer be velocity is equal to negative 6.8 meters per second.
	The narrator records the solution for solving for speed in green.	Now let's do the same thing, but with speed instead of velocity. So the speed equation is "v is equal to d divided by delta t." V, speed, is what we are solving for. D, distance, is 820 meters, and because this is just a scalar, we don't need to put a sign there. It doesn't matter that he's going south. So we're just going to put 820 meters again divided by 120 seconds. And that gives us speed is equal to 6.8 meters per second.
2	A new problem is showing on the screen. The narrator reads the problem out loud. He underlines the direction and the velocity in red. In red underneath the question he writes delta t.	Now let's look at a similar problem, but where we're finding something different. "Frances is aboard a train that will travel 340 km north along a straight path. The train's average velocity is 87 kilometers per hour north. How long will the trip take?" Again, let's look at what information we're given. We have the distance it's going to go, 340 kilometers, the direction, north, the velocity is 87 kilometers per hour, and the direction of the velocity is also north. And we're trying to find how long the trip will take, which is "delta t."
	As the narrator describes how to solve the problem he writes the equation and steps to solving in blue.	Alright, let's go ahead and put this into our velocity equation, which again, is "velocity is equal to displacement divided by delta t. Our velocity we have as 87 kilometers per hour. Our displacement is 340 kilometers north. Because the velocity and the displacement are in the north direction, they are both going to be positive. Divide this by the time, which is what we are trying to solve for, delta t. We can't quite solve this yet, so let's multiply both sides of the equation by delta t, and we get delta t times 87 kilometers per hour is equal

		to 340 kilometers. To get delta t by itself, let's divide both sides of the equation by 87 kilometers per hour. You get "delta t is equal to 340 kilometers over 87 kilometers per hour. Kilometers divided by kilometers per hour gives us units of hours. We get "delta t is equal to 340 divided by 87, equal to about 3.908 hours. But again, this has too many significant figures for the number of significant figures in the original problem, so our final answer is going to be "delta t is equal to about 3.9 hours."