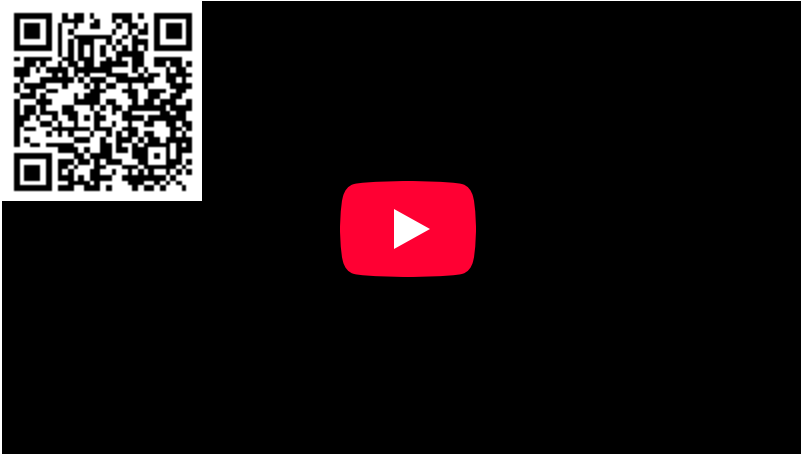


## 4.0: Moving Through Space Introduction

We are all familiar with the concepts of distance, speed, and time. In fact, we use them every day - even if we are not aware of doing so. For example, in the morning, we are awakened by an alarm clock at a certain hour (time), hurry up to get from our house to school or work (speed), as we travel from one place to the other (distance). Yes, this is only one way in which speed, time, and distance are relevant to our world. Everything in the Universe is affected in some way by these three important factors. In this chapter, we will examine the concepts of distance, speed, and time; how they are related; and several ways that they are measured.



### Video Transcript

#### *A New Day Dawns*

*A new day dawns.*

*The ancients perceived the Sun as traversing the sky with deific purpose, unaware that it was they and the Earth beneath their feet spinning about the terrestrial axis that are actually in motion, and that it is this revolving motion of the Earth which gives birth to our days.*

*It is this motion, this axial rotation of the Earth, which led ancient humans to understand and define time, day, night. And as they unknowingly spun around with the planet, they used the position of the Sun and stars to further break down the segments of time: hours, minute, seconds. The night sky appears as a tapestry of lights rotating around the North Star.*

*Yet, not so long ago, humans pulled back the tapestry to reveal that the stars are not at one fixed distance; that they are not merely pinholes in a celestial sphere. Rather, each is like our Sun, though existing at various distances immense by terrestrial standards. And, of the wanderers - the planets who travel their own paths at their own speeds, indifferent to the progression of the background stars - they too rotate around their axes, and as they do they travel their own elegant elliptical causeways around the Sun marking out their own years with each completed cycle, as does the earth every 365.26 days.*

*And while we speed around the Sun, traversing 30 kilometers around our circular orbit each second, nearly a billion kilometers each year, the Sun and our solar system with it are orbiting the center of our Galaxy at over 200 kilometers per second. And despite this amazing mind-boggling speed to complete just one orbit around the galaxy, one galactic year, the journey takes us 240 million years to complete.*

*Such are the motions and times of our universe.*

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