



Grade 8 Science Instructional Component 1, Content Standard Group 1

Content Standard Group	Analyzed Standard	Futures Channel Digital Video Resource Library Resources
1a	<ul style="list-style-type: none">Students differentiate the position of an object by assigning a negative or positive sign to the displacement of the object relevant to the reference point	<p>#2011, Voyage of the Ventana 1 A marine research institution uses a remotely operated vehicle to explore the inhospitable environment of the deep sea.</p> <p>Prompt: If a position 100 meters above sea level is represented by +100 meters, how would you represent a position 100 meters <u>below</u> sea level?</p>
	<ul style="list-style-type: none">Students illustrate the motion of an object in a two dimensional (x,y) coordinate system	<p>#3002, Tornado Chase Tornado-chasing meteorologists do research in the path of the storm's edge as they strive to better understand tornados for more accurate, faster forecasting.</p> <p>See Tornado Chase Movie Guide, activity #7.</p>



Grade 8 Science Instructional Component 1, Content Standard Group 2

Content Standard Group	Analyzed Standard	Futures Channel Digital Video Resource Library Resources
1b, 1c	<ul style="list-style-type: none"> Students measure the total distance of an object's motion relevant to a reference point as well as the time it took for the object to travel that distance (1b) 	<p>#1001, Solar Powered Cars Using the energy it takes to run a hair dryer, this solar-powered car travels 200 miles at speeds of 50 to 65 mph.</p> <p>#1004, Maglev Trains Gliding on a wave of electromagnetic force, a MagLev (magnetic levitation) train could travel at 300 miles per hour or faster. Designer-engineers Gordon Danby and James Powell describe the mechanics and future benefits of such superconductor trains.</p> <p>#1008, Roller Coasters Designing safe roller coasters requires an understanding of forces.</p> <p>Prompt (for any of the above movies): What variables would be used to describe the motion of this vehicle?</p> <p>See also: Solar Powered Cars Movie Guide, Activities #10 and #11; Maglev Trains Movie Guide, Activities #1 and #3.</p>
	<ul style="list-style-type: none"> Students calculate the average speed of the object's motion by using the algebraic expression: $v=d/t$ (1b) 	
	<ul style="list-style-type: none"> Students solve speed problems using the algebraic expression: $d=rt$; given any two of these quantities (variables), students can calculate the third quantity (variable) using: $d=rt$, $t=d/r$, $r=d/t$ (1c) 	



Grade 8 Science Instructional Component 1, Content Standard Group 3

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1d, 1e	<ul style="list-style-type: none"> Students describe the velocity of an object's motion by specifying speed and direction (vector) (1d) 	<p>#1008, Roller Coasters</p> <p>Designing safe roller coasters requires an understanding of forces.</p> <p>Prompt: Think about your last roller coaster ride and describe some examples of when the velocity of the roller coaster changed.</p>
	<ul style="list-style-type: none"> Students describe a change in velocity as a change in speed, direction or both (1e) 	
	<ul style="list-style-type: none"> Students describe acceleration as the rate at which [an object's] velocity changes with time (1e) 	<p>#1001, Solar Powered Cars</p> <p>Using the energy it takes to run a hair dryer, this solar-powered car travels 200 miles at speeds of 50 to 65 mph.</p> <p>#1004, Maglev Trains</p> <p>Gliding on a wave of electromagnetic force, a MagLev (magnetic levitation) train could travel at 300 miles per hour or faster. Designer-engineers Gordon Danby and James Powell describe the mechanics and future benefits of such superconductor trains.</p> <p>#1008, Roller Coasters</p> <p>Designing safe roller coasters requires an understanding of forces.</p> <p>Prompt (students would view at least two of the above movies): Which of these vehicles do you think has a higher acceleration, and why? How would you find out?</p>



Grade 8 Science Instructional Component 1, Content Standard Group 4

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1f	<ul style="list-style-type: none"> • Students create and interpret graphs of distance vs. time in order to examine the velocity of an object 	<p>#1001, Solar Powered Cars Using the energy it takes to run a hair dryer, this solar-powered car travels 200 miles at speeds of 50 to 65 mph.</p> <p>#1004, Maglev Trains Gliding on a wave of electromagnetic force, a MagLev (magnetic levitation) train could travel at 300 miles per hour or faster. Designer-engineers Gordon Danby and James Powell describe the mechanics and future benefits of such superconductor trains.</p> <p>#1008, Roller Coasters Designing safe roller coasters requires an understanding of forces.</p> <p><i>Prompt (for any of the above movies): Make a graph that shows how you think the distance traveled relates to the amount of time elapsed for this vehicle. Find the average speed of the vehicle between two points on your graph, and then again, between two different points. Is the speed always the same? When the velocity is changing, how would that be represented on your graph?</i></p>
	<ul style="list-style-type: none"> • Students determine whether an object is speeding up, slowing down, moving towards or away from the point or origin by analyzing the slope of the line in a distance vs. time graph. 	
	<ul style="list-style-type: none"> • Students create and interpret graphs of speed vs. time in order to examine the changes in velocity (acceleration) of an object's motion. 	



Grade 8 Science Instructional Component 1, Content Standard Group 7

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2c, 2e	<ul style="list-style-type: none">Students deduce that the velocity of an object (speed and direction) will remain unchanged if the net force from all forces acting on an object is equal to zero (2c)	<p>#1003, Flights of Imagination Aeronautical Inventor Paul MacCready describes how he built a human-powered airplane.</p> <p>#1004, Maglev Trains Gliding on a wave of electromagnetic force, a MagLev (magnetic levitation) train could travel at 300 miles per hour or faster. Designer-engineers Gordon Danby and James Powell describe the mechanics and future benefits of such superconductor trains.</p> <p>#1008, Roller Coasters Designing safe roller coasters requires an understanding of forces.</p>
	<ul style="list-style-type: none">Students predict how an object's velocity will change if the net force from all forces acting on the object is not equal to zero (2e)	<p>#1011, Windsails Windsail designer Trevor Baylis develops the shape of a sail on his computer, builds it in his shop, and tests it out on the waves.</p> <p>Prompt: Draw a diagram that shows the forces that are acting on an airplane, train, roller coaster or windsail when it is in motion (depending on what movie you have shown).</p>



Grade 8 Science Instructional Component 1 Content Standard Group 10

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8c, 8d	<ul style="list-style-type: none">Students explain that the buoyant force acting on an object, immersed in a fluid, is an upward force equal to the weight of the fluid displaced by the object. (8c)	<p>#2014, Voyage of the Ventana Chapter 4</p> <p>A marine research institution uses a remotely operated vehicle to explore the inhospitable environment of the deep sea.</p> <p><i>Prompt: Why do you think the Ventana does not immediately sink to the bottom of the ocean when it's placed in the water?</i></p>



Grade 8 Science Instructional Component 3, Content Standard Group 3

Content Standard Group	Analyzed Standard	Futures Channel Digital Video Resource Library Resources
2g 4e, 4c	<ul style="list-style-type: none">Students distinguish between the relative sizes, composition and appearance of the planets	<p>#3001, Searching for Water on Mars If we can find water on Mars, then astronauts won't have to take it with them. But how do you find the water before you send a manned mission?</p> <p><i>Prompt: Name all of the similarities and differences between earth and Mars that you can think of.</i></p>



Grade 8 Science Instructional Component 3, Content Standard Group 4

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4d, 4b, 4a	<ul style="list-style-type: none">Students explain how nuclear fusion produces light from stars	<p>#3004, Space Weather With solar flares 200,000 miles across releasing the equivalent of all the energy ever produced on the Earth at one time, space weather forecasters will become an important feature on the future news.</p> <p>Prompt: It takes a lot of energy to make solar flares. Where do you think that energy comes from?</p>
	<ul style="list-style-type: none">Students describe distances between stars in light years; how far light travels in one year, approximately 6 trillion miles	<p>#3005, Eyes on the Universe Chapter 1 Astronomers think of telescopes as "bigger eyes" that allow them to look, not only deep into space, but back into time.</p> <p>Prompt: The nearest star other than the sun is so far away that it takes a little more than 4 years for light to travel from here to there. If someone at that distance were pointing a very powerful telescope at the Earth right now and could see everything that was happening in this room, what do you think they would see? Explain your answer.</p>