Gulfport School District

Integrated Science I

Curriculum and Pacing Guide

2011-2012

Content Strands: Inquiry (I) and Physical Science (P)			
QTR	**Competency/Objective**		**QTR**
	Scientific Thinking in Experimental Settings		
1	1a	Identify and define experimental variables prior to investigation. (DOK1)	
1	1b	Design and conduct an investigation that includes predicting outcomes, using experimental controls, and making inferences about relationships that exist. (DOK3)	
1	1c	Distinguish between qualitative and quantitative observations and make inferences based on observations. (DOK3)	
1	1d	Utilize analog and digital equipment to collect, compare, and analyze data. (DOK2)	
1	1e	Report numerical data following the rules of significant digits and the accuracy limits of the measurement devices.(DOK2)	
1	1f	Construct manual and digital graphs of data that include a title, axes labels and units, correct scaling, and plotted points. (DOK 2)	
1	1g	Create test plots on digital graphs to linearize data for analysis. (DOK3)	
1	1h	Create a mathematical expression from graphical data to express the relationship between plotted variables. (DOK3)	
1	1i	Analyze data collected from a scientific investigation to construct explanations and draw conclusions about the relationships present in the investigation. (DOK3)	
1	1j	Present oral and written conclusions using multiple representations of the investigated relationship and use data to support findings. (DOK3)	
1	1k	Account for the causes of precision and accuracy errors revealed by the graph. (DOK3)	
1	1l	Define the new quantity revealed in the investigation by the slope of the graph. (DOK2)	
1	1m	Communicate scientific procedures and final conclusions of investigation in a written lab report. (DOK3)	

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	PARTICLE MOVING WITH CONSTANT VELOCITY		
1	2a	Explain how all motion is relative using reference frames. (DOK 1)	
1	2b	Perform laboratory investigations to discover speed is the slope of a position vs. time graph. (DOK3)	
1	2c	Describe the differences between speed, instantaneous speed, and average speed. (DOK 1)	
1	2d	Describe the difference between distance, position, and displacement. (DOK 1)	
1	2e	Compare speed to velocity using the concept of displacement. (DOK 1)	
1	2f	Describe the difference between constant and changing velocity. (DOK 1)	
1	2g	Explain acceleration in terms of velocity and displacement. (DOK 2)	
1	2h	Identify motion concepts in terms of scalars and vectors. (DOK 1)	
1	2i	Represent the position and velocity of an object in time by stacking graphs. (DOK3)	
1	2j	Recreate stacked position and velocity graphs given only one. (DOK3)	
1	2k	Represent the motion of an object pictorially using a motion map. (DOK3)	
1	2l	Analyze the area under a velocity graph to find an object's position. (DOK2)	
1	2m	Use formulas to solve distance vs. time and velocity vs. time problems. (DOK 3)	
1	2n	Utilize dimensional analysis methods when solving mathematical problems. (DOK2)	
	UNIFORMLY ACCELERATING PARTICLE MODEL		
1	3a	Perform laboratory ingestions to discover acceleration is represented by the slope of a velocity vs. time graph. (DOK3)	
1	3b	Represent the position, velocity, and acceleration of an object in time by stacking graphs. (DOK3)	
1	3c	Recreate stacked position, velocity, and acceleration graphs given only one. (DOK3)	
1	3d	Define the concepts of acceleration, average vs instantaneous velocity. (DOK1)	
1	3e	Compare and contrast graphs of objects undergoing constant velocity and constant acceleration. (DOK2)	
1	3f	Define instantaneous velocity using the slope of tangent to curve in x vs t graph. (DOK2)	
1	3g	Use formulas to solve problems involving velocity, displacement, acceleration, and time. (DOK 3)	
1	3h	Perform laboratory investigations to discover the value for the acceleration due to gravity. (DOK3)	
1	3i	Describe how Galileo used inclined planes to study the acceleration due to gravity. (DOK1)	
1	3j	Define the concept of free fall in terms of unbalanced forces. (DOK1)	

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	UNIFORMLY ACCELERATING PARTICLE MODEL		
1	3k	Use simplified formulas to mentally calculate how far and how fast an object free falls in a given time when dropped and thrown upward. (DOK2)	
1	3l	Derive the following relationships from x vs t and v vs t graphs. (DOK3) $\vec{\bar{a}} \equiv \frac{\Delta \vec{v}}{\Delta t}$ Eq. 1 definition of average acceleration $\vec{v} = \vec{v}_0 + \vec{a}t$ Eq. 2 linear equation for a v-t graph $\vec{v}_f = \vec{v}_i + \vec{a}\Delta t$ Eq. 3 generalized equation for any t_i to t_f interval $\vec{x} = \vec{x}_0 + \vec{v}_0 t + \frac{1}{2}\vec{a}t^2$ Eq. 4 parabolic equation for an x-t graph $\vec{x}_f = \vec{x}_i + \vec{v}_i \Delta t + \frac{1}{2}\vec{a}\Delta t^2$ Eq. 5 generalized equation for any t_i to t_f interval $\vec{v}_f^2 = \vec{v}_i^2 + 2\vec{a}\Delta\vec{x}$ Eq. 6 algebraic combination of equations 3 and 5	
1	3m	Use constant acceleration equations to solve vertical motion problems. (DOK 3)	
	FREE PARTICLE MODEL INERTIA AND INTERACTIONS		
1	4a	Explain the ideas that Aristotle, Copernicus, and Galileo had about motion. (DOK 3)	
1	4b	Describe Galileo's experiments with inclined planes. (DOK 2)	
1	4c	State Newton's First Law of motion. (DOK 1)	
1	4d	Apply Newton's First Law of motion conceptually to everyday situations. (DOK 2)	
1	4e	Explain the difference between inertia and mass and weight. (DOK 2)	
1	4f	Apply the idea of net force to a stationary object. (DOK 2)	
1	4g	State and apply the Equilibrium Rule in terms of stationary and moving objects. (DOK 2)	
1	4h	Explain what the normal force in and correctly draw it in simple force diagrams. (DOK 2)	
1	4i	Describe the problem of the moving Earth and explain why it is not a problem. (DOK 2)	
2	4j	Define inertial reference frame. (DOK 1)	

Content Strands: Inquiry (I) and Physical Science (P)			
QTR	**Competency/Objective**		**QTR**
	FREE PARTICLE MODEL INERTIA AND INTERACTIONS		
2	4k	State Newton's Third Law of motion. (DOK1)	
2	4l	Identify action and reaction forces on various masses. (DOK1)	
2	4m	Answer theoretical questions involving Newton's Third Law. (DOK2)	
2	4n	Draw free body diagrams and label all vector forces involved. (DOK2)	
2	4o	Correctly define the system involved in the force diagrams. (DOK3)	
2	4p	Explain the effects of action/reaction forces on the two masses involved in the interaction. (DOK2)	
2	4q	Use vectors to show forces and velocities on various objects by drawing simple force diagrams. (DOK1)	
	CONSTANT FORCE PARTICLE MODEL		
2	5a	Explain the cause of acceleration. (DOK1)	
2	5b	Describe the various causes of surface friction. (DOK1)	
2	5c	Explain the difference between static and kinetic friction. (DOK1)	
2	5d	Explain how surface friction is affected by surface area and speed. (DOK2)	
2	5e	Explain how fluid friction is affected by surface area and speed. (DOK1)	
2	5f	Explain the effect of friction on the motion of objects. (DOK1)	
2	5g	Differentiate between mass and weight. (DOK1)	
2	5f	State the relationship between mass and acceleration. (DOK1)	
2	5g	State Newton's Second Law of motion. (DOK1)	
2	5h	Apply Newton's Second Law to various situations conceptually. (DOK2)	
2	5i	Solve problems involving Newton's Second Law. (DOK2)	
2	5j	Explain free fall in terms of Newton's Second Law. (DOK2)	
2	5k	Explain how the ratio of weight to mass is the same for objects of differing mass in free fall. (DOK2)	
2	5l	Explain why objects of differing mass fall at different rates in the presence of air resistance. (DOK2)	
2	5m	Use Newton's Second Law to explain how an object achieves terminal velocity in the presence of air resistance. (DOK2)	
2	5n	**Demo**: *Air Resistance* demonstration lab to observe the effect of air resistance on falling objects. (DOK1)	

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	DEMONSTRATE AN UNDERSTANDING OF THE NATURE OF MATTER.		
2	6a	Define the concept of mass as the measure of atomic particles and contrast this with the concept of volume.	
2	6b	Apply developed concepts of mass and volume to explain the density of objects and show differences between them from experimental data. Apply this concept to qualitative problems.	
2	6c	Develop, from experimental evidence, the law of conservation of system mass and constant composition.	
2	6d	Describe the phases of matter. Use differences in density of solids, liquids and gases as evidence for differences in the structure of matter in these phases.	
2	6e	Relate observations of diffusion and the addition of energy to particle motion and collision in both liquid and gas phases. Explain, at the particle level, how a thermometer measures the temperature of the system using the Celsius temperature scale.	
2	6f	State the basic tenets of Kinetic Molecular Theory (KMT) as they relate to gases: The pressure of a gas is related to the frequency and impact of the collisions of the gas particles with the sides of the container in which they are enclosed. Explain the interrelationship of pressure, volume and temperature.	
2	6g	Explain (in terms of the collisions of particles) why the change has the effect you predicted.	
2	6h	Explain the basis for the Kelvin scale. Keep in mind that one must use the absolute temperature scale to solve gas problems.	
2	6i	Relate observations regarding the addition of energy by warming to increased particle motion.	
2	6j	Describe the characteristics of solids, liquids and gases in terms of particles and their arrangement: use particle diagrams to account for motion and density differences.	
2	6k	Describe the process of how the arrangement of matter particles changes during phase changes.	
2	6l	Explain the necessity of an attractive force between particles at close range from observations of differences in cohesiveness of the three phases.	
2	6m	Recognize energy as a conserved, substance-like quantity that is always involved when a system undergoes change.	
2	6n	Recognize that ways energy is stored in an object or system.	
2	6o	Describe the ways that energy is transferred between the system and the surroundings.	
2	6p	Draw energy bar graphs to account for energy storage and transfer in all sorts of changes. Make up a sample situation and sketch the bar graph. Create and use a heating/cooling curve for a substance, identify what phase(s) is/are present in the various portions of the curve, and what the melting and freezing temperatures for the substance are.	