

Force and Motion Activities-Idea Matrix

Idea	U1C1 Beginnings	U1C1 Exploration 1	U1C1 Exploration 2	U1C1 Application	U1C2-Beginnings	U1C2-Exploration 1	U1C2- Exploration 2	U1C2-Exploration 3	U1C2-Application	U1C3-Extension 1	U1C3-Extension 2	U1C3-Extension 3	U2C1-Beginnings	U2C1- Exploration 1	U2C1- Exploration 2	U2C1- Exploration 3	U2C1- Exploration 4	U2C1-Application	U2C2-Beginnings	U2C2-Exploration 1	U2C2-Exploration 2	U2C2-Application 1	U2C2-Application 2	*U2C3-Extension 1	*U2C3-Extension 2	*U2C3-Extension 3	*U3C1 Beginnings	*U3C1 Exploration 1	*U3C1 Exploration 2	*U3C1 Exploration 3
I. An object’s position can be described by locating the object relative to other objects or a background	x	x	x	x																										
I.A. To locate one object relative to another (reference) object, one must give the distance between them.	x	x	x	x																										
I.B. One must specify the direction from the reference to the object. The direction may be given in the form of a compass heading or other terms such as up/down, left/right, forward/backward.	x	x	x	x																										
II. An object is in motion when its position is changing					x		x			x	x	x																		
II.A. An object’s motion can be described by its speed and the direction in which it is moving.					x					x	x	x																		
II.A.1. The motion of an object can be represented using graphs of its position versus time and speed versus time.											x	x																		
II.A.2. The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far.							x																							
III. A change in the motion of an object is a change in its speed or its direction or both.						x																								
III.A. Changes in motion can vary in size and rate.								x			x	x																		
IV. The motion of an object can be changed by pushing or pulling.						x		x	x				x	x																
IV.A. Pushes or pulls can cause an object to start moving, or move faster.						x		x	x							x														
IV.B. Pushes or pulls can cause an object to stop moving, or move slower.						x										x														
IV.C. Pushes or pulls can change the direction of an object’s motion.						x		x																						
V. A force is a push or pull exerted on one object by another object when they interact with one another.									x				x	x	x		x													
V.A. Forces can vary in strength.																	x													
V.B. Forces have direction.													x																	
V.C. Forces are interactions. A force on an object implies that it is interacting with something else.													x	x																
V.D. The force of friction acts to oppose the relative motion of two objects in contact.																	x													
V.E. Earth pulls down on all objects with a force called gravity.									x						x															
V.C.1. Some forces between objects act when the objects are in																														

Idea	U1C1 Beginnings	U1C1 Exploration 1	U1C1 Exploration 2	U1C1 Application	U1C2-Beginnings	U1C2-Exploration 1	U1C2- Exploration 2	U1C2-Exploration 3	U1C2-Application	U1C3-Extension 1	U1C3-Extension 2	U1C3-Extension 3	U2C1-Beginnings	U2C1- Exploration 1	U2C1- Exploration 2	U2C1- Exploration 3	U2C1- Exploration 4	U2C1-Application	U2C2-Beginnings	U2C2-Exploration 1	U2C2-Exploration 2	U2C2-Application 1	U2C2-Application 2	*U2C3-Extension 1	*U2C3-Extension 2	*U2C3-Extension 3	*U3C1 Beginnings	*U3C1 Exploration 1	*U3C1 Exploration 2	*U3C1 Exploration 3	
<i>direct contact; others act when objects are not touching</i>															x																
VI. Forces can be added. The net force on an object is the sum of all the forces acting on the object.																					x										
<i>VI.A. There may be more than one force acting on an object at the same time.</i>																			x	x											
VII. A zero net (balanced) force does not change an object's motion.																		x	x		x	x	x								
<i>VII.A. Supporting objects, such as hands, tables, and shelves, exert upward forces on objects on top of them. These supporting forces exactly balance the downward pull of gravity and so these objects do not fall.</i>																		x				x									
<i>VII.B. When an object does not move in response to a push or pull, it is because another push or pull is being applied by the environment.</i>																			x			x									
<i>VII.C. When equal strength forces act on an object in opposite directions, they cancel each other out.</i>																			x			x									
VIII. The rate of change in an object's motion is proportional to the size of the net force acting on it and inversely proportional to the object's mass.								x													x			x	x	x					
<i>VIII. A. A non-zero net (unbalanced) force on an object changes the object's motion; that is, the object's speed and/or direction of motion changes.</i>																			x	x		x	x								
<i>VIII.A.1. A net force acting in the opposite direction as an object's motion will cause its speed to decrease.</i>																					x	x	x								
<i>VIII.A.2. A net force acting in the same direction as an object's motion will cause its speed to increase.</i>																					x	x	x								
IX. Whenever one object applies a force to a second object, the second object applies a force, equal in strength, and opposite in direction, to the first object.																												x	x	x	x

Key:

Green: AIM Student Idea

Red: AIM Teacher Idea

* These investigations are intended for use in teacher professional development settings.
Ideas in italics align with NGSS in Force and Motion for Elementary School (3rd grade)