Integrated Science Name:_____ Period_____

Forces and Motion

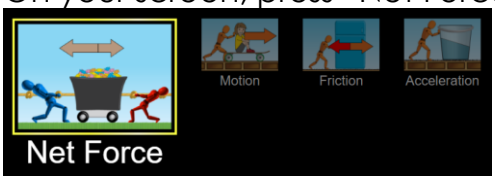
INTRODUCTION:

GETTING STARTED

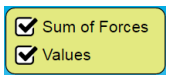
1. Click here for the link: https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

NET FORCE

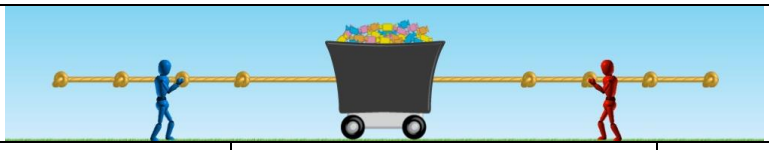
2. On your screen, press "Net Force"



3. Check the following boxes as shown to the right. Drag some blue and red people on the rope and notice how the Sum of Forces changes.



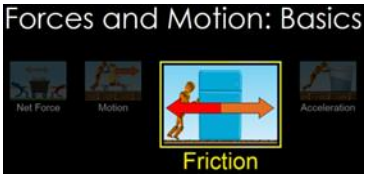
4. Drag the correct red and blue people to the correct spot on the rope to match the following images below. Fill in the left force, sum of forces, and right force below each picture. Then hit Go! and describe what happens to the cart in the space provided.

1			
	Left Force:	Sum of Forces:	Right Force
	What happens when you hit GO?		
2			
	Left Force:	Sum of Forces:	Right Force
	What happens when you hit GO?		
3			
	Left Force:	Sum of Forces:	Right Force
	What happens when you hit GO?		
4			
	Left Force:	Sum of Forces:	Right Force
	What happens when you hit GO?		

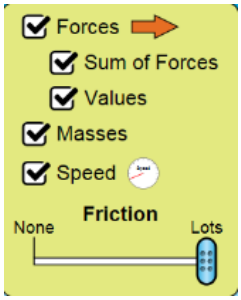
5. Answer the following questions:
   a. Which of the following images above is/are an example of an unbalanced force? _____
   b. Which of the following images above is/are an example of a balanced force? _____
   c. True or False? Balanced forces cause a change in motion. _____
   d. True or False? Unbalanced forces cause a change in motion _____
   e. What is the sum of forces (net force) of a balanced force? _____
   f. If the cart was moving to the left, what could you do to cause the cart to move to the right? _____

FRICTION

1. Click here for the link: https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html
2. On your screen, hit "motion".



3. Check the following boxes and move the friction slider to "lots".
4. Use the following weights to complete the following tables. Increase the applied force 50 N at a time. Make sure if you reset, you reclick the boxes and slide the friction to lots!



Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 40 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 50 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 80 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 +  90 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 100 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 200 kg				

Mass (kg)	Applied Force	Friction Force	Sum of Forces	Did the object move?
 ??? kg				

5. Answer the following questions below:
   a. What is friction? _____

      _____

   b. What are the four types of friction? _____

      _____

   c. Place rolling friction, static friction, and sliding friction in order from those that require the most force to those that require the least.

      _____

   d. Some of the masses would NOT move with a 500 N force. Which ones and why?

      _____

      _____

   e. What frictional force must you overcome in order to get the object moving?

      _____

   f. What frictional force are you observing as the object moves across the ground?

      _____

   g. Based on what you saw in the simulation, what is the mass of the mystery mass? (in kg!) _____

   h. For the object that did NOT move with a 500 N force, what could you do to help the object move easier? _____

   i. Change the friction meter to none. 

Now try to push 200 kg fridge with 500 N of force. Was it harder or easier to push the fridge? _____

      _____