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PSIM
Elective #8
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Elective #8: Tying together Resources w/NGSS Crosscutting Concepts

Both The Physics Classroom website and the Phet Simulations provide almost endless examples of the seven crosscutting concepts developed within the framework of the NGSS. For this elective assignment, I chose to focus my students on the physics concept of net force as shown within these two resources with an emphasis on the CCC of Cause and Effect.

Students will first explore the physics classroom introductory lesson on net force. This lesson begins with a reading portion as well as a small review of Newton's First Law of Motion. It then moves into a PLIX type section allowing users to check their understanding by analyzing various scenarios to determine if there is any net force. Next, students will be shown how to calculate simple net forces and are then asked to calculate net forces on several net force diagrams.

The phet simulation, Forces & Motion: Basics, allows its users to "play" with the concept of net force. In the assignment I wrote, students are asked to create scenarios resulting in three different net forces and to identify what occurs with the speed of the cart as the forces on each side act on it.

Lastly, students are provided with a graphic organizer and instructed to identify how both of these resources provide connections to the CCC of Cause & Effect. Students will determine three examples of this connection for each of the resources used and as an extra credit opportunity, identify similarities in the exhibition of Cause and Effect between the two resources.

Name: _____

Date: _____

Crosscutting Concept & Net Forces

- A. Open www.physicsclassroom.com and search for the tutorial on Newton's Laws.
 - a. Click on "Determining the Net Force" and work through this tutorial
 - b. Complete **Activity 1** below as you learn

- B. Next, go to www.phet.colorado.edu, type in "Forces and Motion: Basics", and click on "Net Forces" to open the simulation
 - a. Explore the simulation for approximately 5 minutes
 - b. Complete **Activity 2** below as you then work with the simulation

- C. Let's make some connections! Complete **Activity 3** below to link the two resources together with one of the 7 Crosscutting Concepts you have been referring to this year in Science class

ACTIVITY 1: PHYSICS CLASSROOM- DETERMINING THE NET FORCE

Complete on your own.

1. What does **Newton's 1st Law of Motion** tell us?

2. Sr. Isaac Newton mentions an **unbalanced force**- what is that?

3. *When* can an unbalanced force exist? What *happens* if there is an unbalanced force on an object?

An unbalanced force causes _____.

4. **Net force is the sum of** _____. Study the diagrams shown. Draw a diagram showing a net force using any objects you choose (□)

5. Take the **Quick Quiz!** How did you do determining whether the objects have a net force greater than zero (acceleration) acting on them?

6. **Check Your Understanding** of Net Force by completing the Net Force Diagrams. How did you fare? Write down any questions you may have.

ACTIVITY 2- PHET SIMULATION- FORCE & MOTION: BASICS, NET FORCE
(Complete with your partner)

1. Check off all parameters (Sum of forces, Values, Speed)
2. Next, add people to each side of the cart to create the following scenarios:

MOTION

Check off when completed

- NET FORCE OF 50N TO THE RIGHT



- NET FORCE OF 150N TO THE LEFT



- NET FORCE OF 0N



3. Explain what happens to the speed of the cart when there IS a net force!

4. **EXPLORE MORE!** Feel free to click on the other 3 tabs (Motion, Friction, & Acceleration) and explore this great simulation on Force and Motion.

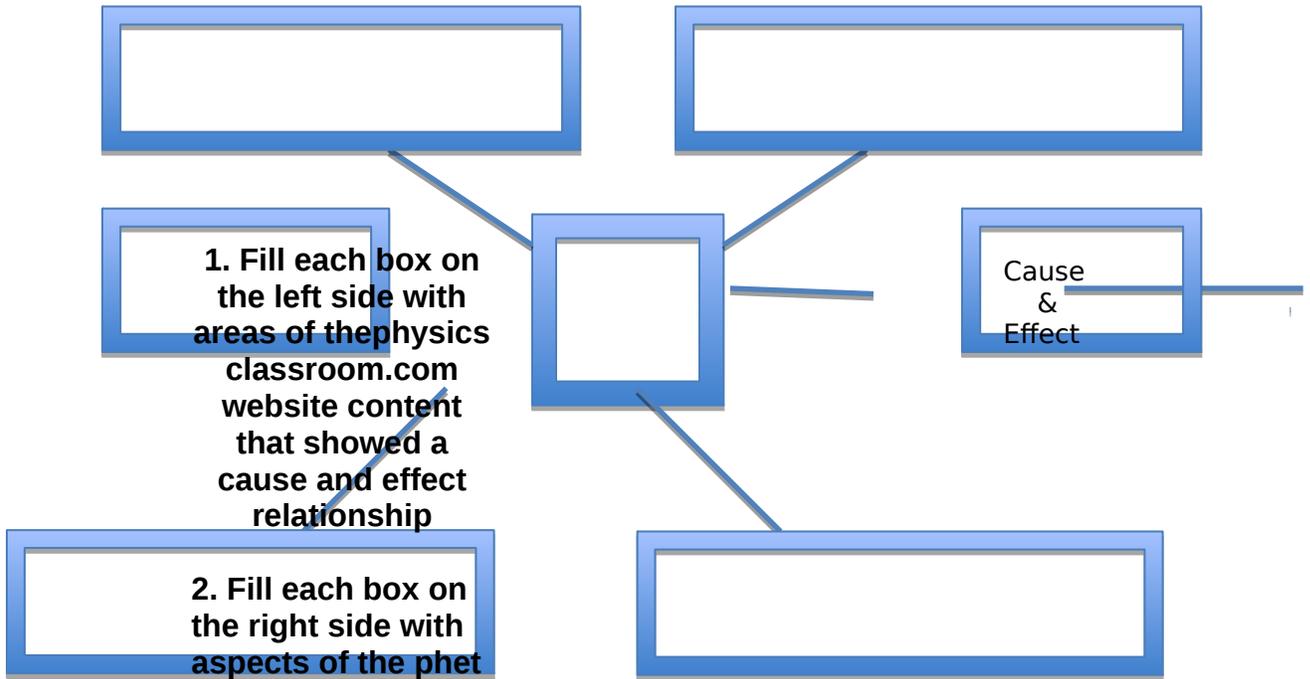
ACTIVITY 3- CONNECTIONS TO CCC: CAUSE & EFFECT!

Fill in the graphic organizer below to exhibit how both the physics classroom website and the phet simulation are unified through the CCC of Cause & Effect.

The Physics Classroom

Phet Simulation

Cause & Effect Examples



1. Fill each box on the left side with areas of the physics classroom.com website content that showed a cause and effect relationship

2. Fill each box on the right side with aspects of the phet simulation: Force and Motion Basics that exhibited the CCC of Cause & Effect.

*** BE SPECIFIC ***

EXTRA CREDIT OPPORTUNITY

DRAW ARROWS BETWEEN AREAS IN BOTH RESOURCES THAT EXHIBIT THE SAME CAUSE AND EFFECT RELATIONSHIP!