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Assessment Rubric

Force

Student's Name: _____ Assignment: _____ Level: _____

	Level 1	Level 2	Level 3	Level 4
Understanding Concepts	Demonstrates a limited understanding of concepts. Requires teacher intervention.	Demonstrates a basic understanding of concepts. Requires little teacher intervention.	Demonstrates a good understanding of concepts. Requires no teacher intervention.	Demonstrates a thorough understanding of concepts. Requires no teacher intervention.
Analysis and Application of Key Concepts	Limited application and interpretation in activity responses	Basic application and interpretation in activity responses	Good application and interpretation in activity responses	Strong application and interpretation in activity responses
Creativity and Imagination	Limited creativity and imagination applied in projects and activities	Some creativity and imagination applied in projects and activities	Satisfactory level of creativity and imagination applied in projects and activities	Beyond expected creativity and imagination applied in projects and activities
Application of Own Interests	Limited application of own interests in independent or group environment	Basic application of own interests in independent or group environment	Good application of own interests in independent or group environment	Strong application of own interests in independent or group environment

STRENGTHS:

WEAKNESSES:

NEXT STEPS:



More Than One Force

When more than one force acts on something, we can add the forces together to get one force. The result is called the **net force**. When we combine the forces, we have to think about the direction in which each force pushes or pulls. If two forces push or pull in **opposite** directions, the net force will be the smaller force subtracted from the larger force.



In the picture ten men are having a tug of war. Five men are pulling one way and five men are pulling the other way. Each man pulls with a force of 100 pounds.

Remember we said we can show a force as an arrow. The arrow points in the direction the force is acting, and the length of the arrow shows the amount of force. The force arrows for the tug of war would look like this:



Arrows pointing in opposite directions **cancel** each other, so the net force on the rope is zero. Even though the men are exerting a total force of 1,000 pounds, the rope is not moving because there is a 500-pound force to the left and a 500-pound force to the right. 500 minus 500 equals zero ($500 - 500 = 0$).

But wait! A man on the left has just slipped on the grass and dropped the rope! Now the arrows look like this:



And the net force is: \longrightarrow Now the rope moves to the right because the net force is 100 pounds to the right. That is because 500 pounds to the right minus 400 pounds to the left equals 100 pounds to the right ($500 - 400 = 100$).



Other Forces That Act Without Touching

1. Tell which force goes with each sentence. In the spaces to the left, write **G** if it is about GRAVITY. Write **M** if it is about MAGNETIC force. Write **E** if it is about ELECTROSTATIC force.

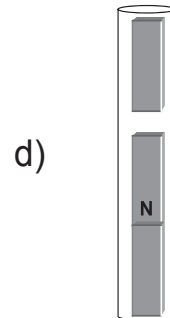
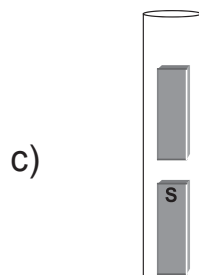
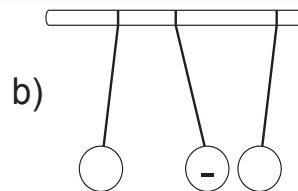
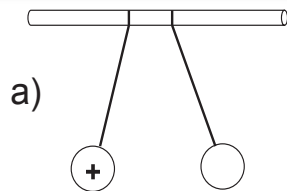
- a)
- b)
- c)
- d)
- e)

- A north pole is attracted to a south pole.
- It pulls, but it can't push.
- This could be used to separate pins from toothpicks.
- Plus repels plus, and minus repels minus.
- It makes all falling objects speed up.

2. In the pictures below the balls on strings have **electrical charges**. The bars are **magnets** that have been dropped into glass tubes.

Write the sign for the charges on the balls that are blank. Write **+** for a POSITIVE charge. Write **-** for a NEGATIVE charge.

Show the names of the magnet **poles** that are not already shown. Write **N** on the NORTH POLE ends of the magnets. Write **S** on the SOUTH POLE ends of the magnets.



Galileo Galilei and The Leaning Tower of Pisa



It has been said Galileo discovered how objects fall by dropping balls of different masses from the Leaning Tower of Pisa. Actually he rolled balls down a ramp.