

PULLEY SEAT

Objectives:

The students will understand:

- How to collect data and determine varying outcomes reliant upon the input of information
- That models can be representatives of something else
- Anyone can be a scientist and test hypotheses
- The varying speeds at which objects travel and the affect gravity has on objects
- That individuals that weigh more typically will have a more difficult time pulling themselves up versus individuals that are lighter
- If muscles are used more, then they typically can perform better
- That for every action, there is an equal and opposite reaction
- The direction of the force vector is the same as the direction of the acceleration vector
- That every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it, and that gravity acts as an external force

Standards Assessed:

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| • Scientific Method | • Force and Motion |
| • Collecting Data | • Muscular System |
| • Scientific Inquiry | • Safety Procedures |
| • Testing Hypothesis | • Simple Machines |
| • Models for Representation | • Newton's Laws |
| • Effects of Gravity | |
| • Understanding a push/pull can move an object | |

New York Standards:

K: S1.1a, S1.2.3, S1.3, S1.3.2, PS5.1a, PS5.1b, PS5.1c, PS5.1d, PS5.1f, PE1a, PE1b
1st: S1.1a, S1.2.3, S1.3, S1.3.2, PS5.1a, PS5.1b, PS5.1c, PS5.1d, PS5.1f, PE1a, PE1b
2nd: S1.1a, S1.2.3, S1.3, S1.3.2, PS5.1a, PS5.1b, PS5.1c, PS5.1d, PS5.1f, PE1a, PE1b
3rd: S1.1a, S1.2.3, S1.3, S1.3.2, PS5.1a, PS5.1b, PS5.1c, PS5.1d, PS5.1f, PE1a, PE1b
4th: S1.1a, S1.2.3, S1.3, S1.3.2, PS5.1a, PS5.1b, PS5.1c, PS5.1d, PS5.1f, PE1a, PE1b
5th: S1.1.2, S1.2a, S1.2b, S2.2b, PS5.1b, PS5.1c, PS5.1d, PS5.1e, PS5.2a, PE1a, PE1b

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6th: S1.1.2, S1.2a, S1.2b, S2.2b, PS5.1b, PS5.1c, PS5.1d, PS5.1e, PS5.2a, PE1a, PE1b

7th: S1.1.2, S1.2a, S1.2b, S2.2b, PS5.1b, PS5.1c, PS5.1d, PS5.1e, PS5.2a, PE1a, PE1b

8th: S1.1.2, S1.2a, S1.2b, S2.2b, PS5.1b, PS5.1c, PS5.1d, PS5.1e, PS5.2a, PE1a, PE1b

Materials:

- Pulley Seat Exhibit

Procedures:

The student will try to pull themselves up on two different pulley seats. It is important for the teacher to point out to the students that the complexity of the process is variant upon the number of pulleys. Once back in the classroom the discussion needs to include why some students have an easier time pulling themselves up than others based. Is it due to their size or athletic ability? What would happen if students practiced pulling themselves up everyday - would it make it easier to pull themselves up on this exhibit? There are also certain safety procedures that need to be followed when participating in this exhibit. Students need to ensure that they are buckled in before they begin pulling. If we lived on a planet without any gravitational pull, what would be the result if a person tried to pull themselves up? In addition, how much force has to be exerted to be able to pull themselves up? How accurate is this exhibit as a model for representing how it would be to pull yourself up when climbing or when trying to do a pull-up in PE class. Also, what other factors would come into play when trying to pull yourself up from a standing position instead of sitting. Would the results be the same?

Independent Practice:

The students need to attempt to pull themselves up, however, they may need some assistance buckling themselves in.

Assessment:

- Observation of the students with the exhibit
- Teacher observation of participation in classroom discussion
- Score on WonderWorks test

Modifications (Special Education Students):

Special education students may need assistance with pulling themselves up and buckling themselves in.

Extensions (Gifted Students):

Gifted students can attempt to design a 4-pulley system using weights and string..

Generalization to Other Subjects:

Muscular system discussion can generalize to Physical Education classes.