Name: _____ Class: _____

SIMPLE MACHINES – THE PULLEY

A) Watch the video "Eureka! Episode 15 – The Pulley" in Youtube (http://www.youtube.com/watch?v=HRukrI6RZMA) and answer the following questions:

1.- What is the video about?

2.- What is the spanish translation for that word?

3.- What is the purpose of this simple machine?

B) Watch the video again and fill in the blanks in the text bellow as the speaker explains us how the pulleys work.

Eureka! Episode 15 – The Pulley

The story so far…

There are only two basic _____, the inclined plane and the _____. All other machines are variations of these. A screw is simply a twisted incline plane. A wheel is simply a circular lever whose fulcrum has become an axle. And now, the pulley.

The pail of water that Jack and Jill had to fetch was not on top of the hill at all. It was actually at the bottom of a well. Unfortunately, it was too heavy for either of them to pull out. What they needed was a simple machine to give them a _____ advantage.

No, the inclined plane doesn't help, nor does the lever, nor the screw. What other sorts of machines are there? Ah yes, the _____. But what's Jill doing with it? She is arranging the wheel so that it will revolve on an axle stuck in that post.

Very good. Jill's just rediscovered another sort of simple machine. A wheel that, instead of being all of a piece with its _____, can revolve freely around an axle. Since this type of wheel is used mainly for pulling things, it's called a pulley. And Jill can hitch the _____ around it and use it to pull.

No, Jack can use it to *try* and pull the pail of water up. That's funny. He needs just as much force to try to pull the pail of water up this way as he did trying to pull it up the other way. Hmm. I wonder if there's a better way of rigging the _____. Amazing. How did Jill manage it? Both she and Jack only had one pulley to work with. And yet Jill was able to pull up the pail with half the _____ that Jack needed.

Well, when a pulley is set up like this, it's called a **single fixed pulley**. All it does is change the _____ of your pull but it doesn't reduce the force you need. But when a pulley is arranged like this, it's called a **single moveable pulley**. And it has the force you must exert because the pail of water is now in effect being _____ by two ropes instead of one. It's as if two people were lifting the pail, and it looks as if we're getting something from nothing again, doesn't it? But of course we're not.

If we compare the distance that Jill raised the pail with the amount of rope she pulled, we see that it's the same old story. What's she's gaining on the force she's loosing on the _____.

The distance that she pulls the rope is _____ the distance that she raises the pail. But the way Jill used the pulley is still twice as effective as the way Jack used it. There are lots of other ways of combining pulleys. And it's simple to figure out the mechanical _____ of each system.

All you do is count the number of ropes supporting the _____. The single fixed pulley has one piece of rope supporting the weight of 600 newtons. Input force, 600 newtons; output force, 600 newtons. And the mechanical advantage is therefore won. There isn't any mechanical advantage, in other words.

This single, moveable pulley has two ropes supporting the weight. _____ force, 300 newtons; output force, 600 newtons. Mechanical advantage, 2.

Here's a system with three supporting ropes. Input force, 200 newtons; _____ force, 600 newtons; mechanical advantage, 3. This one also has a mechanical advantage of 3 and is, in fact, the pulley system that Jill finally rigged up for herself.

Although she had to pull the rope 3 meters for every meter that she raised the pail of water, she only needed 200 newtons of force to do it. In a sense, she'd become 3 times as _____ as Jack. And now you know why Jack fell down and broke his crown.

C) Working in pairs, answer the following questions about the video:

1.- Give the name of the four simple machines that are mentioned in the video.

2.- Where does the name "pulley" come from?

3.- How many types of pulleys exists? What are their names?

4.- What is the mechanical advantage? Can you give a formula to calculate it in a pulley?

5.- What is the purpose of having a single pulley in a well if there is not a mechanical advantage?

6.- Give at least 5 examples where pulleys are used around us.