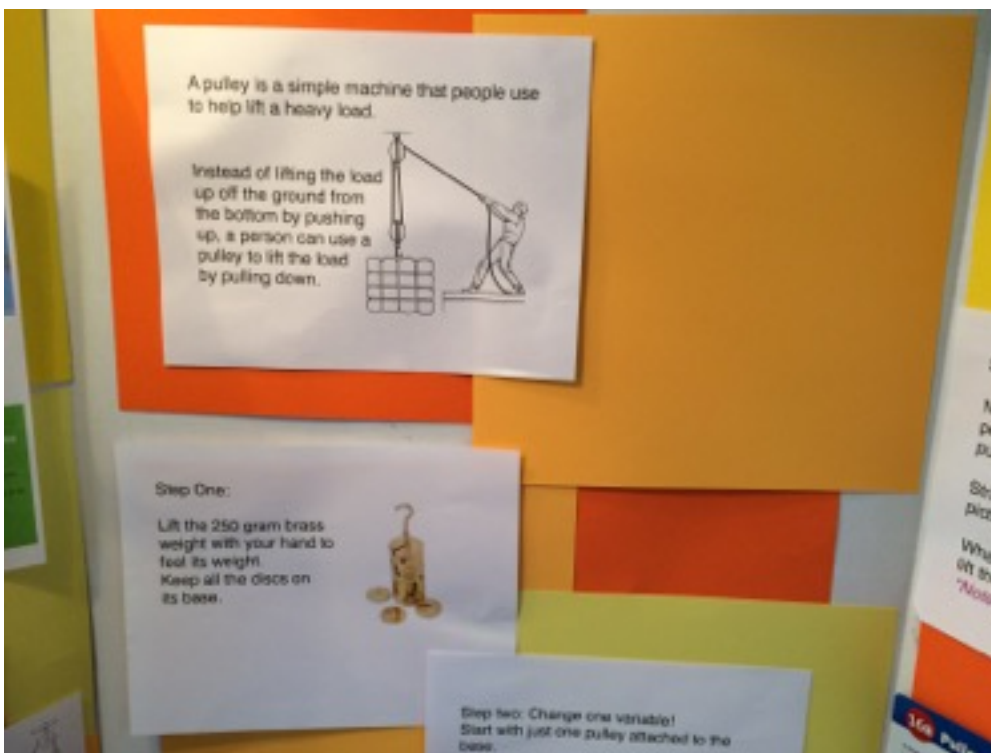
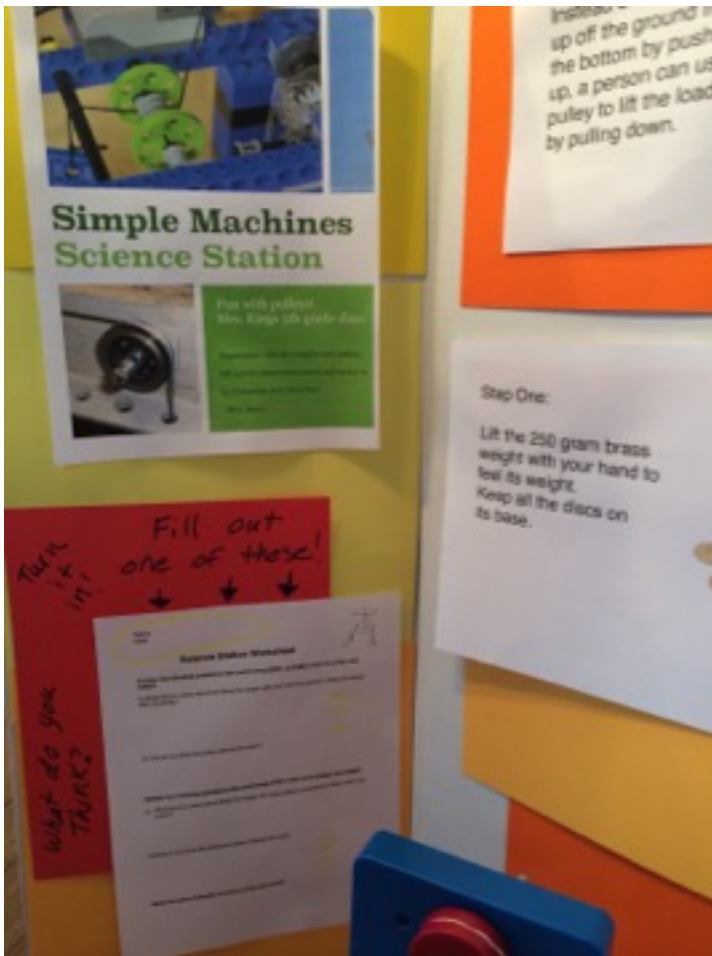
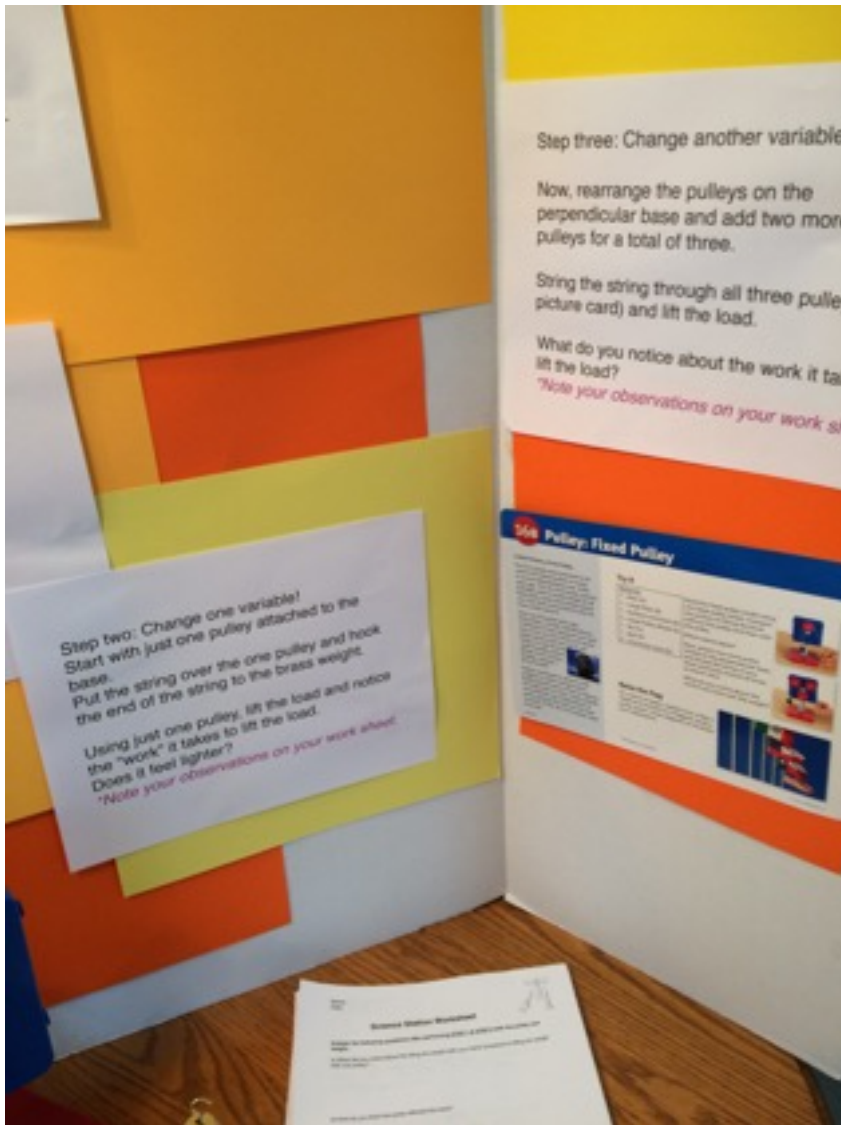


Pulley Science Center



This is the science center I designed for my fifth grade practicum classroom.



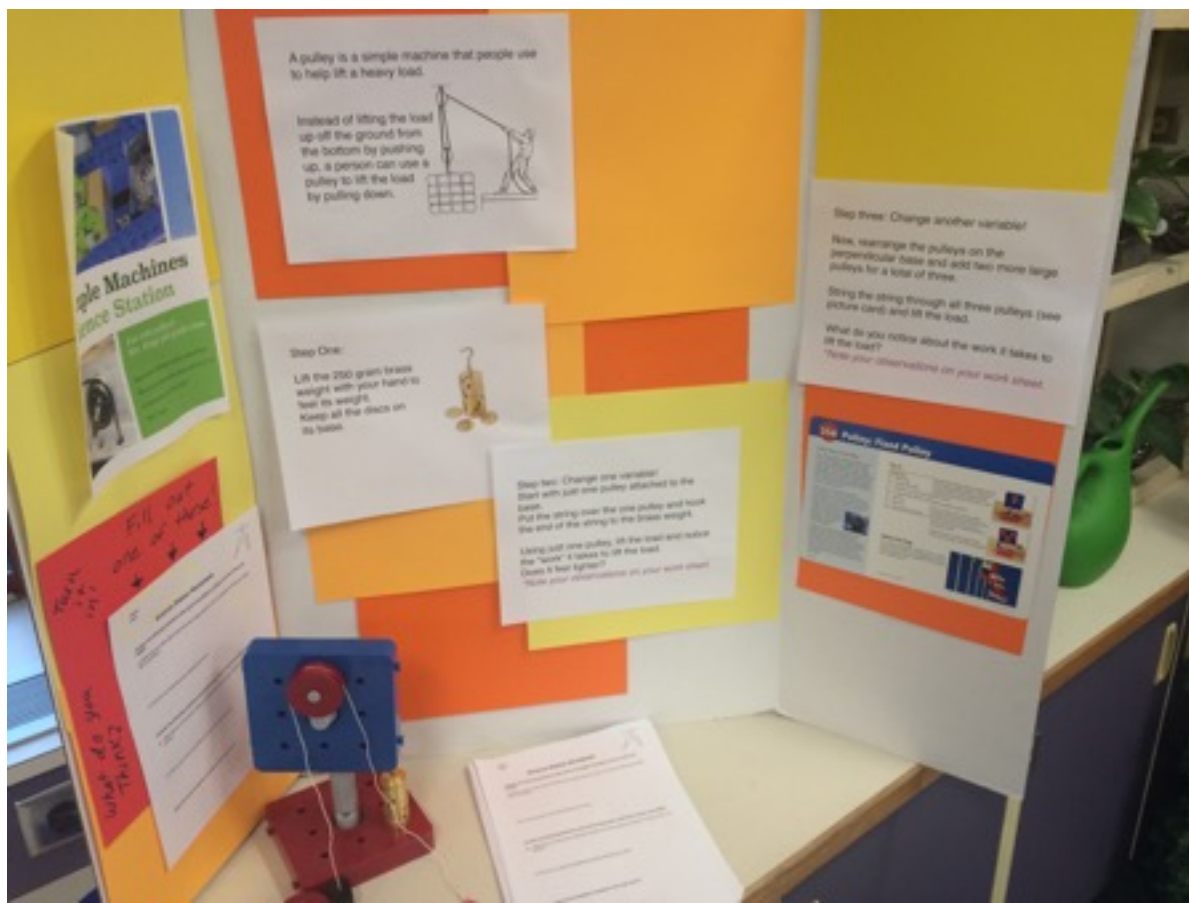
After my lesson on pulleys using the Explore Learning simulator, I thought it would be fun to take the idea a step further and add a hands-on experimental component to it. Just because we could change the number of *virtual* pulleys and the number of *virtual* people to do *virtual* work, didn't necessarily mean the kids could tell for themselves what using pulleys feels like. Not that the simulation wasn't valuable because it really was, but I wanted them to feel the difference firsthand. I found this small Simple Machines science kit on [amazon.com](https://www.amazon.com) and I decided it was worth the \$35 investment for my own kids to play with and for my future classroom as well.



The kit allows for exploration of pulleys, levers, wedges, wheel and axels, and an inclined plane. I had to buy the brass weight set separately but it wasn't that expensive and I'll also be able to use that in my classroom later.

Hopefully you can see the step by step procedures on my display board. The worksheet I made corresponded with the steps in my center. (see below)

The kids all got a chance throughout the week to experiment with the pulleys and the weight but they didn't have very much time. It was squeezed in here and there but they at least got to engage with the center and feel for themselves the difference in work to lift the weight using a pulley and multiple pulleys. The responses to their experiments showed they generally got the idea and could genuinely tell a difference. (see below)



Installed in the classroom for the kids to explore and hypothesize. There are two more pulleys that attach to the blue top base but they got cut out of the picture. Students reconfigured the pulleys on the base and added two more to test the weight using three pulleys and compare that to using only one and none.


Along with teaching the simple machine my host teacher wanted me to pre-teach the idea of variables since that is the next big unit of instruction. I told them about the weight and the pulleys being different variables in their experimenting and that if they had time they could alter the weight by removing some of the brass discs and varying the number of pulleys they used to lift the weight. I'm not sure they had time to do that part though. I think they only had time to experiment and make their observations with the weights, one pulley, and three pulleys.

I was a little disappointed in their responses to the worksheet but it's because I thought I worded my questions carefully enough that they would understand what I meant. It could be that I didn't formulate my questions for a fifth grade mind or that the concepts were still too new for the kids to really know how to answer the questions. I guess the point of the center was for them to explore and think about what was going on and they definitely did that so it wasn't a total loss.

I've attached my Science Center directions at the end in case they are difficult to read in the pictures. I printed them in landscape orientation for the center but they are in portrait in this document.

Student Work

Name *Alison*
Date *10-28-15*



Science Station Worksheet

Answer the following questions after performing STEP 1 & STEP 2 with the pulley and weight.

a) What did you notice about the lifting the weight with your hand compared to lifting the weight with one pulley? *It felt a little bit heavy but the pulley felt a little bit lighter than when I held it.*

b) How do you think the pulley effected the work?
The pulley made it easier than without a type of machine system.


Answer the following questions after performing STEP 3 with three pulleys and weight.

a) What did you notice about lifting the weight with three pulleys compared to lifting it with one pulley? *Well it's much lighter than usual.*

b) How do you think the additional pulleys effected the work?

What are some examples of pulleys in the real world?
In the real world, they're bigger, some are for lifting furniture or other things. It's just like the toy version we have. It could be an elevator. Not like how it's lifting people.

Name *Quinn*
Date



Science Station Worksheet

Answer the following questions after performing STEP 1 & STEP 2 with the pulley and weight.

a) What did you notice about the lifting the weight with your hand compared to lifting the weight with one pulley?
The pulley helped me bring the 250 grams up!

b) How do you think the pulley effected the work?
The pulley made it lighter and easier.

Answer the following questions after performing STEP 3 with three pulleys and weight.

a) What did you notice about lifting the weight with three pulleys compared to lifting it with one pulley?
3 pulleys made the "work" much easier than 1 pulley!

b) How do you think the additional pulleys effected the work?
If you hire 6 people it will need only 1 or 2 pulleys the if you hire 3 people it will need 3 pulleys, so 3 pulleys are much easier than 6 people.

What are some examples of pulleys in the real world?
Moving tables or chairs, lifting a roof off a house or barn,

Multiple choice question:

According to Alison, the questions on her science center worksheet were:

- perfectly crafted.
- were so difficult the students couldn't answer them.
- made no sense.
- revealed that at least the students explored the center and thought about what was happening.

Name Brianna K.
Date 10-28-15



Science Station Worksheet

Answer the following questions after performing STEP 1 & STEP 2 with the pulley and weight.

a) What did you notice about the lifting the weight with your hand compared to lifting the weight with one pulley?
I noticed that in my hand it was a lot heavier than on the pulley because

b) How do you think the pulley effected the work?
It made human work a lot easier they pulley is doing the work for you.

Answer the following questions after performing STEP 3 with three pulleys and weight.

a) What did you notice about lifting the weight with three pulleys compared to lifting it with one pulley?

b) How do you think the additional pulleys effected the work?
I think the more pulleys there is the less work you have to do but more work the pulley has to do.

What are some examples of pulleys in the real world?

maybe in the real world there's an elevator or maybe a rope on a tree branch could be considered a pulley.

~~Name:~~ Name: Caitlyn
Date: 10-29-15
Science Station Worksheet



Answer the following questions after performing STEP 1 & STEP 2 with the pulley and weight.

a) What did you notice about the lifting the weight with your hand compared to lifting the weight with one pulley?

① It is heavier the
② It will take about 3 pulleys.
5 or 6 people.

b) How do you think the pulley effected the work?

① Pulley even out the weight

Answer the following questions after performing STEP 3 with three pulleys and weight.

a) What did you notice about lifting the weight with three pulleys compared to lifting it with one pulley?

① I was very hard to lift it without the pulley with the pulley it

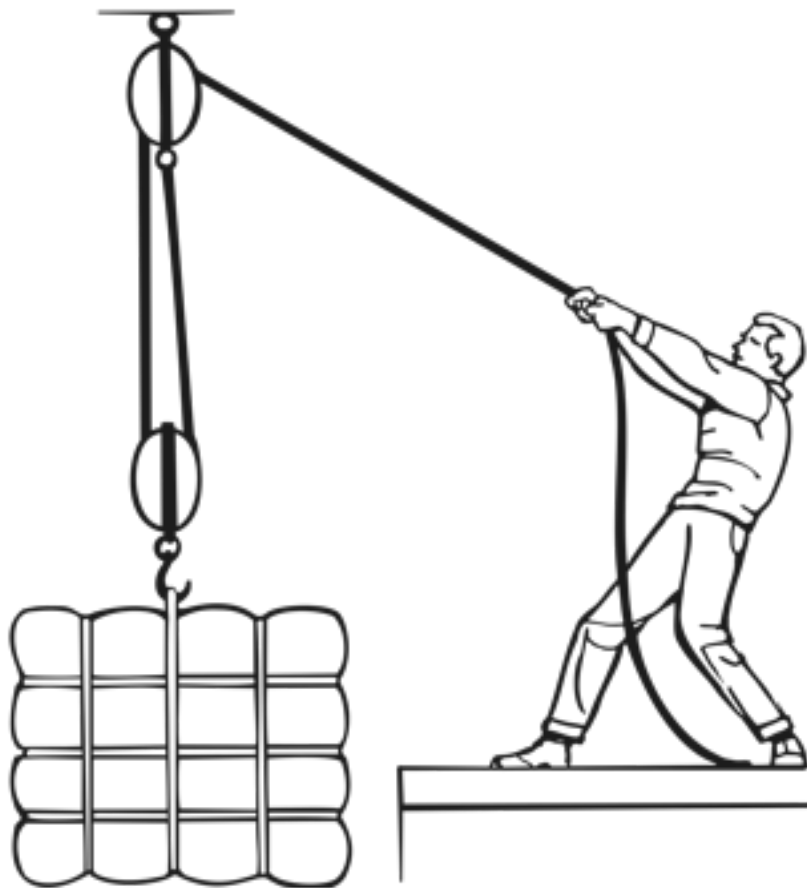
b) How do you think the additional pulleys effected the work?

it effect it by is much easier the pulley with to much weight it could break.

What are some examples of pulleys in the real world?

① First of all it would be easier to it to be light weights
② It should be hard to do →

A pulley is a simple machine that people use to help lift a heavy load. Instead of lifting the load up off the ground from the bottom by pushing up, a person can use a pulley to lift the load by pulling down.



Step One:

Lift the 250 gram brass weight with your hand to feel its weight. Keep all the discs on its base.



**Note your observations on your work sheet.*

Step two: Change one variable!
Start with just one pulley
attached to the base.

Put the string over the one pulley
and hook the end of the string to
the brass weight.

Using just one pulley, lift the load
and notice the “work” it takes to
lift the load.

Does it feel lighter?

**Note your observations on your
work sheet.*

Step three: Change another variable!

Now, rearrange the pulleys on the perpendicular base and add two more large pulleys for a total of three.

String the string through all three pulleys (see picture card) and lift the load.

What do you notice about the work it takes to lift the load?

**Note your observations on your work sheet.*