Name: _____

Video: Simple Machines

1. Simple machines change size and direction of _____.
2. A _____ can change the direction of a force.
3. The part of a lever around which it moves is called the _____.
4. A catapult is a type of _____.
5. Name 2 examples of levers. _____ _____
6. A lever that rotates around a fulcrum is called a _____.
7. Gears are wheels with _____.
8. A _____ allows you to easily achieve a certain height but you must walk a longer distance.
9. Stairways are a form of a _____.
10. A spiral staircase is a lot like a _____.
11. A screw is a _____ wrapped around a rod.
12. The distance between the threads of a screw is called the _____.
13. A prothesis is an _____ _____ _____.
14. A crane uses _____ to lift heavy loads.
15. With a pulley system, you can use more rope (distance) but less _____ to lift a load.
16. What originally pulled the trolley cars in San Francisco? _____
17. A sailboat uses _____ to raise the sails.

Link 1: https://sciencetrek.org/sciencetrek/topics/simple_machines/facts.cfm

Answer the questions below and fill in the chart.

1. What is a simple machine defined as?

2. What is work defined as?

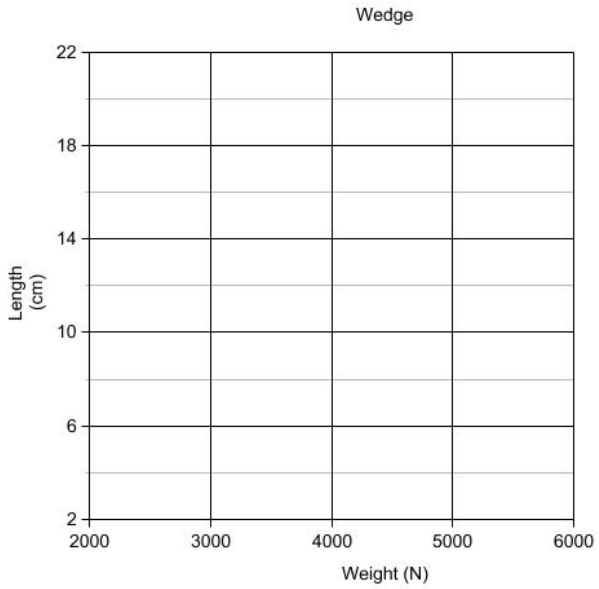
3. Name, define and draw a simple picture of the 6 basic simple machines.

Simple Machine	Definition	Picture
Lever		
Wheel & Axle		
Inclined Plane		
Wedge		
Pulley		
Screw		

Link 2- The Wedge http://aspire.cosmic-ray.org/Labs/Machines/act1a/lab1.html

Select a length for your wedge. Click "add mass". Record the length (cm) of your first wedge and the weight (N) that was applied. Repeat this using 5 different lengths. Make a graph showing the weight required for all the wedges you tested.

Weight (N)	Length (cm)



1. What patterns did you find to help you predict how much weight will break the stone?

2. Which length of wedges would you say work most efficiently (best)?

Link 3- The Lever http://aspire.cosmic-ray.org/Labs/Machines/act1a/lab2.html

Select a placement for the fulcrum (grey stone). Click "lift." Record force and the distance the yellow block was lifted (it may be 0). If it was successful, the yellow block will lift and the text will be green. If it is not successful, the yellow block will not lift and the text will be red. Indicate whether or not it was successful by putting a "Yes" or "No" in the table. Repeat using 5 different fulcrum placements.

Distance (m)	**Force (N)**	**Success**

1. What are the advantages of using a lever to lift this stone?

2. What did you notice about the placement of the fulcrum in each successful trial?

Link 4- The Inclined Plane (Ramp) http://aspire.cosmic-ray.org/Labs/Machines/act2a/lab1.html

Select a length for the inclined plane. Click on "push". Record the length of the ramp, force and indicate whether or not it was successful. Repeat using 5 different ramp lengths.

Length of Ramp (m)	Force (N)	Success

Use your data from the table to the left to create a new table showing work done. **Use the data from successful attempts.**

Effort Distance (m) x Effort Force (N) = Work (J)

Length of Ramp (m) x	Effort Force (N) =	Work (J)

1. What is the maximum length of ramp that will be successful?

2. What is an inclined plane that you have used in your life?

Link 5- The Pulley http://aspire.cosmic-ray.org/Labs/Machines/act2a/lab5.html

Click on the numbered button to select the number of supporting ropes you want to test. Click "pull." Record the number of supporting ropes, the effort force applied to the rope and the distance the rope is pulled. Record the data for all 4 available arrangements.

Draw a picture of each pulley in the box below. ↓

# of supporting ropes	Effort Force (N)	Rope Pulled (m)
1		
2		
3		
4		

1	2
3	4

1. As the number of supporting ropes increases, what happens to the length of the rope that must be pulled to lift the stone into place?

2. As the number of supporting ropes increases, what happens to the amount of force applied?

Link 6- The Screw http://aspire.cosmic-ray.org/Labs/Machines/act3a/lab1.html

Use the sliding bar to change the number of threads on the screw. Click "Lift." Record the effort force, the distance lifted and the thread density for 5 tests. Leave the wheel diameter fixed for now.

Effort Force (N)	Distance (m)	Radius (cm)	Threads/m
		100 cm	
		100 cm	
		100 cm	
		100 cm	
		100 cm	

Draw each of the 5 screws you used below.

1. As the number of threads increases, what happens to the distance the wheel is turned to lift the gate?

2. As the number of threads per centimeter increases, what happens to the amount of force needed to turn the wheel?

Link 7- The Wheel and Axle http://aspire.cosmic-ray.org/Labs/Machines/act3a/lab2.html

Keeping the threads/m at 3, change the wheel radius. Click "lift". Record the force applied, distance lifted, and wheel radius. Repeat this test using 4 different radii. Record.

Effort Force (N)	**Distance (m)**	**Radius (cm)**	**Threads/m**
			3
			3
			3
			3

1. What happens to the effort force as the radius increases?

Link 8- Simple Machines Game https://www.msichicago.org/play/simplemachines/ Click on "New game". Watch the intro. You will need to complete 4 tasks to help Twitch collect the parts he needs to fix his robot.

Task	1. Inclined Plane	2. Lever	3. Wheel & Axle	4. Pulley
What part are you retrieving?				
Draw a diagram of the item that you used to complete the task.				
How much force did you have left?				
Definition of the simple machine				
Explain how the simple machine makes the task easier (or possible)				
Another example of this type of simple machine				

Link 9- Tinker Ball http://invention.si.edu/tinker-ball

Play Tinker Ball at least 3 times. Draw the path you use to solve the puzzle (complete with pictures).

Tinker Ball #1	Tinker Ball #2	Tinker Ball #3