Physics Name _____

Energy Simulation Date _____ per ____ grp ____

Prelab

1. Energy of position is called _____ _____

2. Energy of movement is called _____ _____

3. Friction in moving parts causes _____ and wastes _____

Simulation

1. Open **phet.colorado.edu** Click on **Play with Sims , Work Energy and Power , Energy skate park**

Basic Setup

2. What kind of energy does the skater have at the highest point _____ lowest point _____

More details

3. Click ***pause*** At the right click on **Potential Energy Reference**

Move the ***Potential Energy Reference line*** up to the lowest point on the ramp

Click ***Energy graphs*** **Bar Graph** ***move graph to far left***

Click **Return Skater** and **Resume** - Watch the bar graph

4. The graph shows that as PE goes down KE goes _____ , and the TOTAL ENERGY is _____

Add Friction

5. Click ***pause*** Bottom Right click on **Track Friction** and scroll down to find the ***Coefficient of Friction*** control.

Change it from ***NONE*** to the ***next mark*** **(0.1)**

Click **Return Skater** and **resume** - Watch the bar graph

6. Is the Total Energy still constant ? _____ What else is happening ? _____

_____

7. Click ***Pause*** On graph click **clear heat** Click **Return Skater** and the ***resume***

- Watch the bar graph while counting each time the skater passes the low point.

8. ***Pause*** when the skater gets to the low point for the 10th time. He has lost approx. _____% of his energy.

Where has it gone ? _____

Investigate Gravity

9. Click **Reset** Find ***Location*** at the middle right. Current location is _____ change to **Moon**

Observe (bring back skater if necessary)
Change locations to complete the table

(just judge the relative speed)

10. What units are used for gravity ? _____

This is the same as _____

Location	Gravity	Skater speed
Earth		
Moon		
Jupiter		

Investigate Mass

11. Click **Reset** (back to earth!) Find ***Choose skater*** at the top right

Observe **Bug** **bulldog** and **Phet skater** . Does the speed seem to change ? _____

Why ? _____

12. The speed of an object at the bottom of a ramp (does) (does not) depend on it's mass

Investigate Joules

13. **RESET** **Potential Energy reference** and **Show grid**

Adjust the bottom of the track and the PE = 0 line to 1 m on the grid

At the lower right Click **edit skater** and change his mass to **100 kg**

14. Calculate the PE of a 100 kg skater at height of 4 m above 0 level _____ Joules

15. Click on ***Energy graphs*** **Energy vs Tim**e

Move this graph to the top and adjust the main window if necessary to see the ramp

Return skater use **REC** (record) to make graphs. **Stop**. (**Clear** and repeat if necessary)

Use ***rewind*** and ***Ste***p to record PE KE at various positions in the table below

	Point 1 about 4m level going DOWN	Point 2 about 2m level going DOWN	Point 3 about 2m level going UP	Point 4 about 4m level going UP
Kinetic Energy				
Potential Energy				
Total Energy				

16. With the Energy graph still showing click **choose skater** and **bug** **Return skater** **Resume**

Enlarge the graph click on + What is the total energy of the bug? _____

Are the KE and PE of the bug acting the same as the skater's ? _____

17. The total energy of the bug is (the same as) (much less than) (much more than) the skater

Investigate Height

18. Click ***Pause*** **RESET** Click on **Show grid**

19. Adjust the ends of the track up to the 11 m level and the bottom down to 1 m

20. Carefully move the skater onto the top of the track . Click **Resume** and observe

21. How does the speed of the skater compare with the original track (Earth) _____

22. If the height of a ramp is increased the speed at the bottom will (increase) (decrease) (stay the same)

PE -> KE Practice Problems (teacher will help!!) - use binder paper if needed

1. Write the equations PE at top = KE at bottom =

2. Total Energy is always _____ so PE at top = _____

3. Rewrite equations and cancel mass

4. New equation for speed at bottom of ramp v =

5. Calculate the following for a 75 kg skater , 5 m ramp speed at bottom on

a) Earth b) Moon c) Jupiter

6. A 75 kg skater on Earth speed at bottom

a) 5 m ramp b) 10 m ramp

7. Potential Energy at the top of a 5 m ramp a) 75 kg skater b) 0.2 kg bug c) 20 kg bulldog