Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

PHET: Energy Skate Park Lab

Google: Phet Skate Park. Click the first link and start the simulation.

**INTRO portion:**

Click on the “Bar Graph” and “Speed” check boxes to the top right of the screen.

Put the skater at the top right of the ramp and let him go. Watch for a second as he does his thing.

1. When does the skater have the most kinetic energy?
2. When does the skater have the most potential energy?
3. What do you notice about the speed of the skater compared to the kinetic energy of the skater?
   1. When does the skater gain speed?
   2. When does the skater lose speed?
4. Once the skater is placed on the track (and when it moves up and down) does the total energy bar change heights? Explain why that is.
5. Explain how the bar graph visually keeps track of energy. Draw an example.
6. What happens to the total energy of the skater when we increase the mass all the way?
   1. Thinking of the equations for GPE and KE, why would changing the mass have that effect?

*Hint: GPE = m\*g\*h KE = ½ m\*v2*

1. This is a simplified scenario. Normally, some energy would be transferred into/lost as *thermal energy.*  What important factor did we negate from this scenario that would allow us not to transfer any KE or GPE into thermal energy?

**READ:** Energy is not created or destroyed; it is simply transferred from one storage place to another. This is the law of conservation of energy. It is not the same thing as “conserving energy”, which implies that we need to limit our energy usage and use our resources wisely. The conservation of energy is one of the most important ideas in science.

**FRICTION portion:**

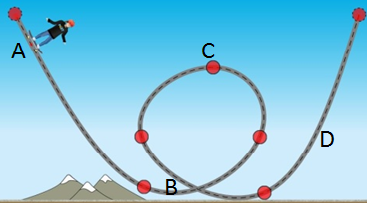
Click on the “Bar Graph” and “Speed” check boxes to the top right of the screen.

Put the skater at the top right of the ramp and let him go. Watch for a second as he does his thing.

1. What force is causing this transfer into *thermal energy*?
2. What happens to the skater’s kinetic and potential energy as energy is converted into *thermal energy*?
3. Does the total energy ever change?

Investigate how friction affects the energy of the skater/ramp system. Experiment with all three track shapes.

1. Where/when within the ramp does most of the energy get transferred to *thermal energy*? Why do you think this is the case?

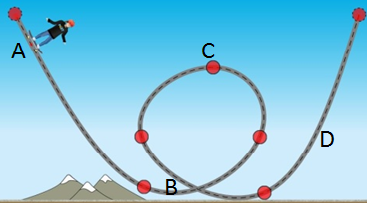
**PLAYGROUND portion:**

Click on the “Bar Graph” and “Speed” check boxes to the top right of the screen. Set the friction to **NO FRICTION**.

1. Assuming no friction, what the kinetic and potential energies will be at point A,B,C and D. Guess which point will have the MOST kinetic energy and potential energy, and which will have the LEAST kinetic energy and potential energy. After you are done, let the skater prove you right or wrong by throwing him on this ramp.

|  |  |
| --- | --- |
| Potential Energy | Kinetic Energy |
| (GUESS)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ | (GUESS)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ |

|  |  |
| --- | --- |
| Potential Energy | Kinetic Energy |
| (ACTUAL)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ | (ACTUAL)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ |

**PLAYGROUND portion:**

Click on the “Bar Graph” and “Speed” check boxes to the top right of the screen. Set the friction to **½ FRICTION**.

1. Assuming half friction, what the kinetic and potential energies will be at point A,B,C and D. Guess which point will have the MOST kinetic energy and potential energy, and which will have the LEAST kinetic energy and potential energy. After you are done, let the skater prove you right or wrong by throwing him on this ramp.

|  |  |
| --- | --- |
| Potential Energy | Kinetic Energy |
| (GUESS)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ | (GUESS)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ |

|  |  |
| --- | --- |
| Potential Energy | Kinetic Energy |
| (ACTUAL)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ | (ACTUAL)  Most \_\_\_\_\_\_\_\_\_\_\_\_  2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Least\_\_\_\_\_\_\_\_\_\_\_\_ |