Energy Skate Park: BASIC

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Use the internet, your textbook, or notes to define the following key terms:

Kinetic Energy _____
Potential Energy _____
Mechanical Energy _____
Joule _____

Procedure:
Get the simulation on conantphysics.com

Take some time and play with the skater. Turn on the Bar Graph, Pie Chart, and Speed options.

How does increasing skater's **mass** change the skater's….
1) Kinetic Energy? _____Potential Energy? _____Total Energy? _____

2) How does the skater's **kinetic energy** change as he moves **down** the ramp?

3) How does the skater's **kinetic energy** change as he moves **up** the ramp?

4) How does the skater's **potential energy** change as he moves **down** the ramp?

5) How does the skater's **potential energy** change as he moves **up** the ramp?

6) How does the skater's **total energy** change as he moves **down** the ramp?

7) How does the skater's **total energy** change as he moves **up** the ramp? *get the simulation from twitter*

8) Describe the skater's **kinetic** energy at the bottom of the ramp.

9) Describe the skater's **potential** energy at the bottom of the ramp.

10) What happens when the skater is dropped onto the ramp from above the ramp?

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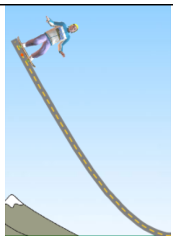
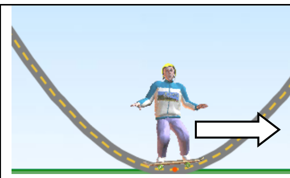
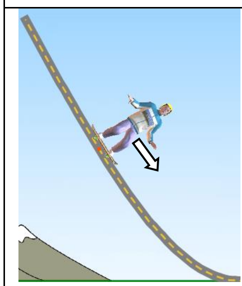
Observe the following situations. Draw the possible bar graphs for the situation shown.



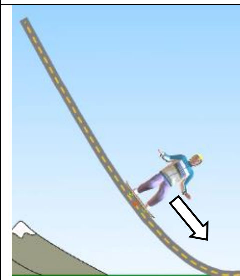
Top of the ramp, stopped for just an instance.



Bottom of the ramp, zooming past the middle.

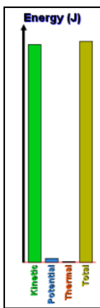


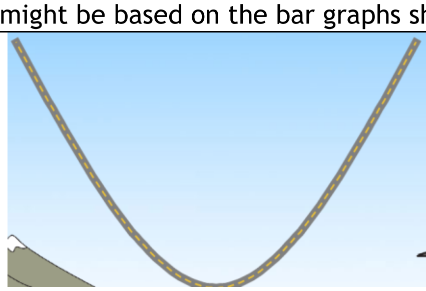
Mid-way down the ramp, moving about mid-speed.

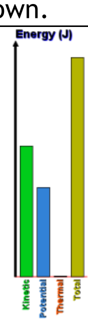


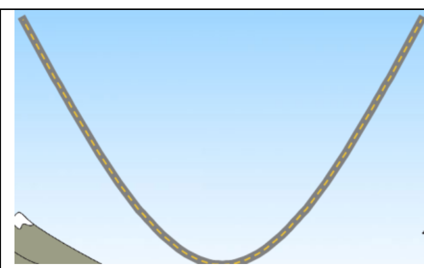
3/4 of the way down the ramp, moving pretty fast.

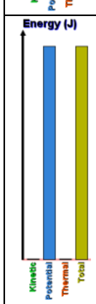
Draw where the skater might be based on the bar graphs shown.

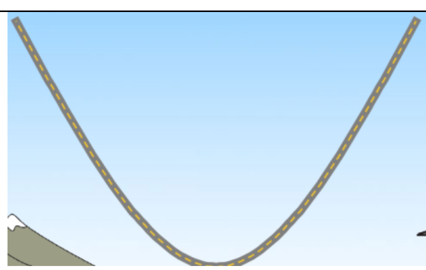


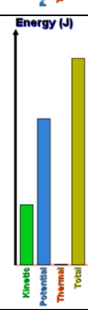


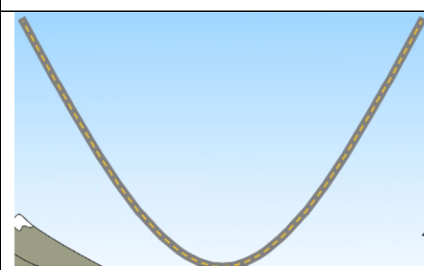


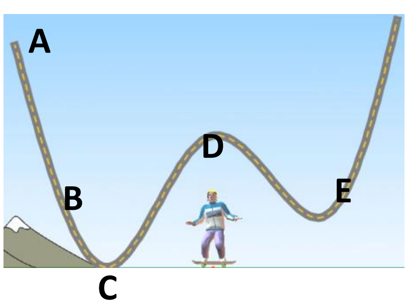








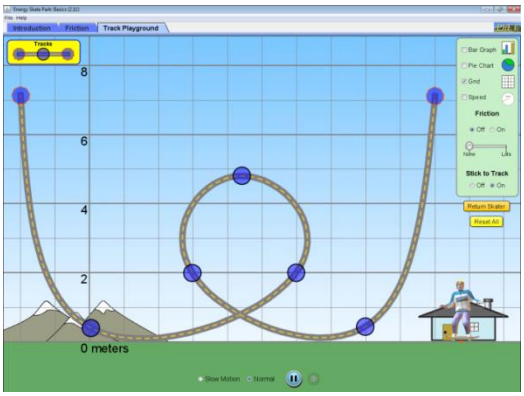




← Consider this zany track. What point or points on this track would the skater have …

The most kinetic energy? ☐ The most potential energy? ☐

The same kinetic energy (two points) ☐ and ☐



Part II: Track Playground
Click the 'Track Playground' tab at the top. Using the track pieces in the upper right of the page, build a track with a ***single loop***, like the track shown in the picture below. Be sure the far left and far right of the track are higher than the loop.

*Turn on the '**Bar Graph**,' '**Grid**,' and options. For now, set the '**Friction**' option to '**Off**,' and the '**Stick to Track**' option '**On**.'*

Using the grid, what is the height of the ***top*** of the loop: _____

Try placing your skater at different starting points on one side of the track.

11) What is the ***minimum height*** you can place the skater so that he makes it all the way around the loop?

12) Explain, in terms of energy, why the skater must be at the height in question 17 to make it through the loop.

13) With the friction off, does the ***kinetic*** energy ***ever*** get as high as the ***total*** energy? If so, when? If not, why?

*Set the '**Friction**' option to '**On**.'*

14) With the friction off, does the ***kinetic*** energy ***ever*** get as high as the ***total*** energy? If so, when? If not, why?

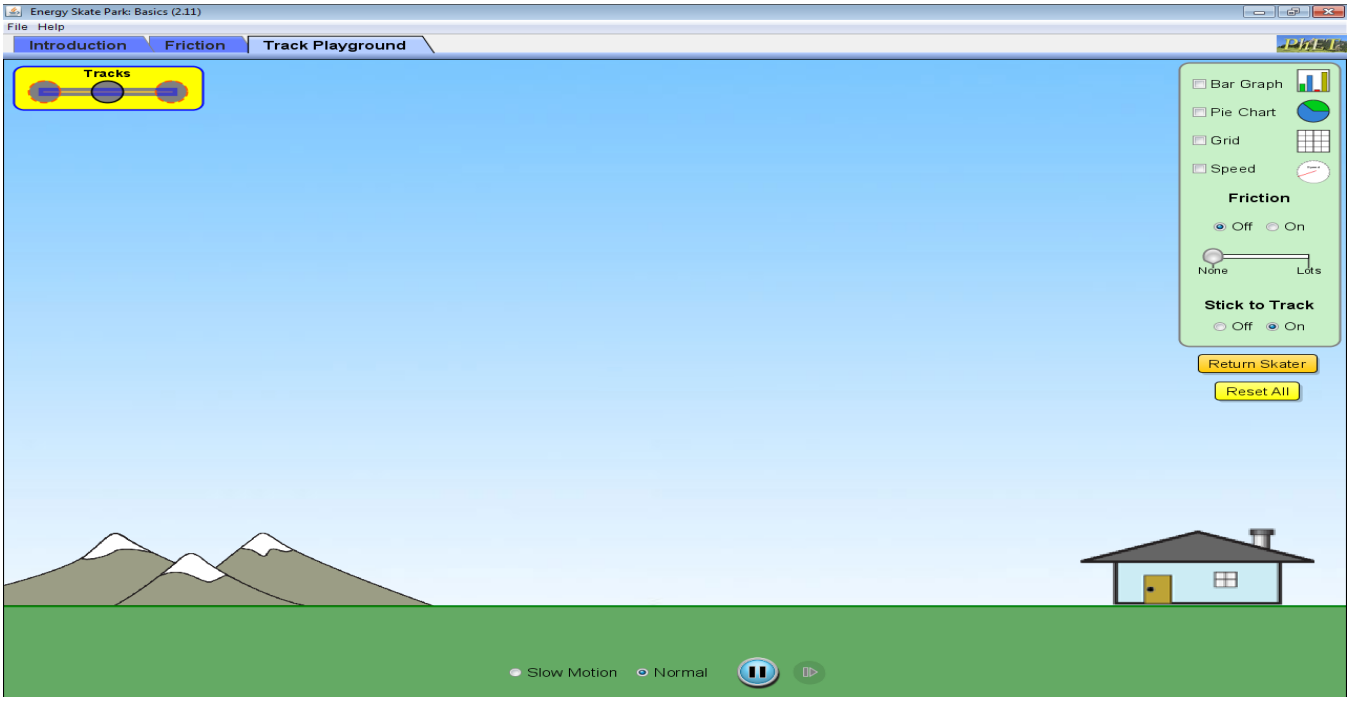
15) Now with the friction on, what is the ***minimum height*** you can place the skater so that he makes it all the way around the loop? Is this different than if friction were turned off?

16) In one of the previous questions, we say you may have "lost," or "dissipated" some energy. Where is this energy going according to your bar graph? What does this mean in real life?

17) Energy can be dissipated (or "lost") in another way on this simulation. What is one more way that you can find that you will "lose" energy?

Create a track of your own. Draw in in the diagram below.

18) Label where on the diagram you have the greatest kinetic energy, the greatest potential energy, and two places that have the same potential energy.



These Questions will be graded.

<u>Conclusion Questions:</u> **(*circle the correct answers*)**

19) At the highest point kinetic energy is *zero* / *maximum* while the potential energy is *zero* / *maximum*.

20) At the lowest point kinetic energy is *zero* / *maximum* while potential energy is *zero* / *maximum*.

21) Mass *affects* / *does not affect* the amount of energy.

22) As an object falls in gravity, kinetic energy *increases* / *decreases* / *remains the same*.

23) As an object falls in gravity, potential energy *increases* / *decreases* / *remains the same*.

24) As an object falls in gravity, total energy *increases* / *decreases* / *remains the same*.

25) An object travelling faster and faster has a kinetic energy that *increases* / *decreases* / *remains the same*.

26) An object travelling faster and faster has a potential energy that *increases* / *decreases* / *remains the same*.

27) As an object speeds up, the total energy *increases* / *decreases* / *remains the same*.

28) As an object slows down, the total energy *increases* / *decreases* / *remains the same*.