



Student guide:

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

**Start:**



1. Click on the first link
2. Click on the **Run Now!** button.
3.  Explore the simulation with your partner and complete the following checklist:



Move the blue dots on the track and run the skater.



Try out different locations.



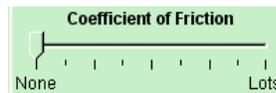
Try different skaters.



Try the different energy graphs.



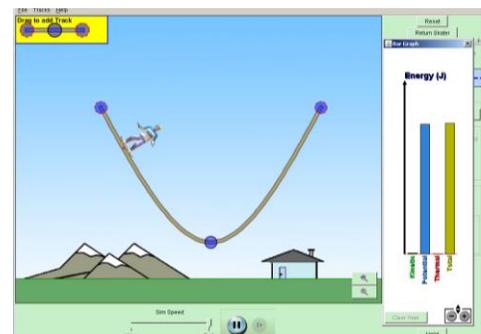
Add friction to a track.



**Time to explore potential energy, kinetic energy and conservation of energy.**

4. Reset the simulation. Then make your screen look like the picture by
  - clicking to open the bar graph
  - dragging the graph closer to the track.
  - ask if you need help

a.  Discuss the changes in the bar graph as the skater moves on the track





b. Use the symbols to fill in the data table:

(↑ increases, ↓ decreases, S for stays the same)

Skater's movement		Potential energy ( ↑ ↓ S )	Kinetic energy ( ↓ ↑ S )	Total energy ( ↑ ↓ S )
Down the hill				
Up the hill				



Discuss any patterns you see for the energy data table.

5. Change the skater and repeat #4.



6.  Add symbols ( ↓ ↑ S ) to complete the observation statements:

As an object moves **down the track**, the kinetic energy \_\_\_\_\_ and the potential energy \_\_\_\_\_ . When the object moves **up the track** the kinetic energy \_\_\_\_\_ and the potential energy \_\_\_\_\_ .

7.  Look at your data table and focus on the **Total energy** column. Write a statement or two about the "total energy" of the object moving up and down the track.

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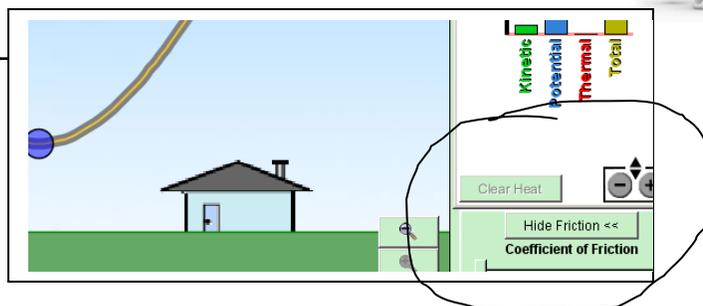


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Name \_\_\_\_\_

## Time to explore friction!



1. Reset the simulation.

a) Open the bar graph again

b) Click **Track Friction**.

c) Move the slider to change the friction



Discuss the changes in the bar graph as the skater moves up and down on the track.

2. Use the symbols to fill in the data table.

(↑ increases, ↓ decreases, **S** stays the same)

Skater's movement	Potential energy ( ↑ ↓ <b>S</b> )	Kinetic energy ( ↓ ↑ <b>S</b> )	Total energy ( ↑ ↓ <b>S</b> )	_____ ( ↑ ↓ <b>S</b> )
Down hill				
Up the hill				



Discuss any patterns you see in the data table.

3. Change the skater and repeat this part of the activity.



**Add arrows** the complete the following observations. ( ↑ ↓ **S** )

- As an object **moves down** the track, the kinetic energy \_\_\_\_\_ and the potential energy \_\_\_\_\_. The total energy \_\_\_\_\_.

- After watching the bar graph while the object is moving, especially with "lots" of friction, write a title for the last column. Use the symbols to fill in the last column.

-complete the observation statement:



As the skater moves with friction, the **kinetic energy** and **potential energy** both \_\_\_\_\_, the **thermal energy** \_\_\_\_\_ and the **total energy** \_\_\_\_\_.

**Write a possible explanation for this.** \_\_\_\_\_



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-  Discuss **what changed** and **what stayed the same** when friction added to the skate park .

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- Which situation, with friction or without friction, is more similar to your everyday experience on a skateboard or bicycle? Write at least 2 sentences to explain your answer.

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