Loeblein Sample clicker questions for Skate Park activities 1-4
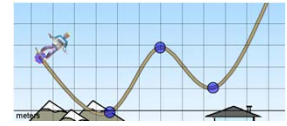
I have written a series of activities and here are the learning goals for all four. Each activity can be downloaded from the Teaching Ideas section of the PhET website.

http://phet.colorado.edu/en/contributions/view/3134

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2. Do you think the Skater will make it over the first hump?

(lots of track friction)

A. No, because his potential energy will be converted to thermal energy
B. No, because he doesn't have enough potential energy
C. Yes, because all of his potential energy will be converted to kinetic energy
D. Yes, because some of his energy will be potential and some kinetic

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These are sample goals:

Activity 1: Introduction to Conservation of Mechanical Energy
   Explain the Conservation of Mechanical Energy concept using kinetic and gravitational potential energy.

Activity 2: Relating Graphs, Position and Speed (no time graphs)
   Predict position/estimate of speed from Energy -Position, -Bar, and -Pie Charts
   Look at the position of an object and use the Energy -Position, -Bar, and -Pie charts to predict direction of travel or change in speed.

Activity 3: Calculating Speed and Height (no time graphs)
   Calculate speed or height from information about a different position.
   Describe how different gravity fields effect the predictions.

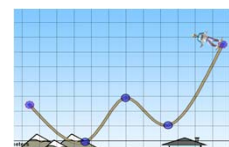**Activity 4: Calculations with Conservation of Mechanical Energy using time graphs**.
   Estimate a location for the Skater on a track.
   Calculate the speed or height of the Skater
   Predict energy distribution for tracks with and without friction.

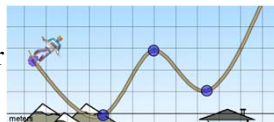3. Do you think the Skater will make it over the first hump?

(No friction on the track)

A. No, because his potential energy will be converted to thermal energy
B. No, because he doesn't have enough potential energy
C. Yes, because all of his potential energy will be converted to kinetic energy
D. Yes, because some of his energy will be potential and some kinetic

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1. Do you think the Skater will make it over the first hump?

(No friction on the track)

A. No, because his potential energy will be converted to thermal energy
B. No, because he doesn't have enough potential energy
C. Yes, because all of his potential energy will be converted to kinetic energy
D. Yes, because some of his energy will be potential and some kinetic

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4. Do you think the Skater will make it over the first hump?

(lots of track friction)
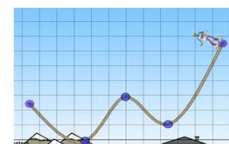
A. No, because his potential energy will be converted to thermal energy
B. Yes, if not too much energy is converted to thermal
C. Yes, because all of his potential energy will be converted to kinetic energy
D. Yes, because some of his energy will be potential and some kinetic

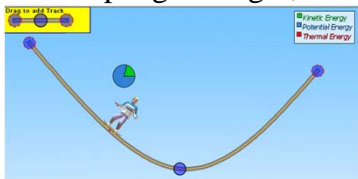5. In the next moment, the KE piece of the pie gets larger, then
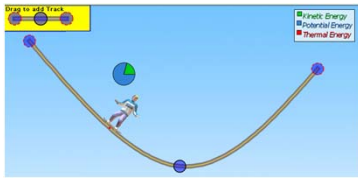
A. The Skater is going up hill (left)
B. The Skater is going down hill (right)
C. There is no way to tell

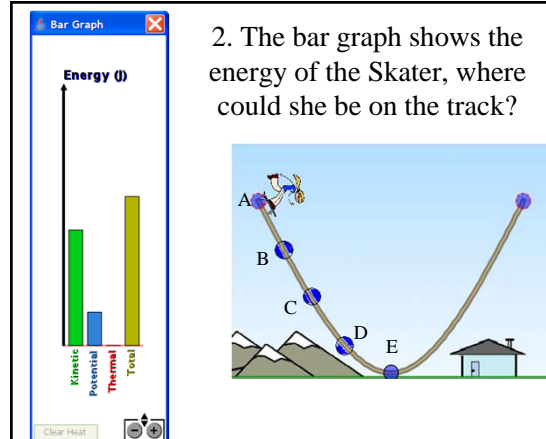1. The dotted line on the chart shows the energy of the Skater, where could she be on the track?
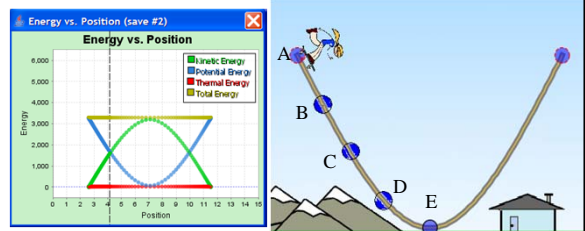
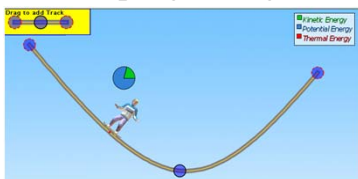6. In the next moment, the KE piece of the pie gets larger, then

A. The PE part stays the same
B. The PE part gets larger too
C. The PE part gets smaller
D. There is no way to tell

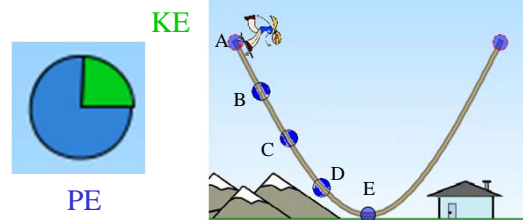2. The bar graph shows the energy of the Skater, where could she be on the track?

7. In the next moment, the KE piece of the pie gets larger, then

A. The Skater will be going faster
B. The Skater will be going slower
C. There is no way to tell

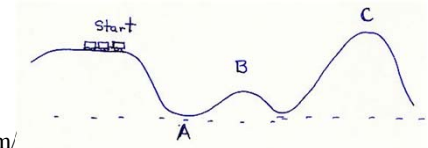3. The pie graph shows the energy of the Skater, where could she be on the track?

KE

PE

7. The Energy chart of a boy skating looks like this →

How would you describe his speed?

A. He is at his maximum speed

B. He is stopped

C. He is going his average speed

D. He is going slow

E. He is going fast

Bar Graph

Energy (J)

Kinetic Potential Thermal Total

Clear Heat

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3. What is its approximate speed at 10 meters high (point B)?

Start

C

B

A

A)   7 m/

B)   10 m/s

C)   14 m/s

D)   20 m/s

E)   none of the above

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8. The Energy chart of a boy skating looks like this →

How would you describe his speed?

A. He is at his maximum speed

B. He is stopped

C. He is going his average speed

D. He is going slow

E. He is going fast

Bar Graph

Energy (J)

Kinetic Potential Thermal Total

Clear Heat

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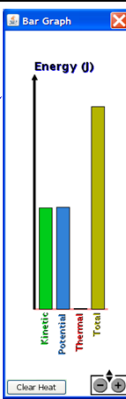
4. How fast would the coaster have to be going at the start to reach 21 meters high (point C)?

Start

C

B

A
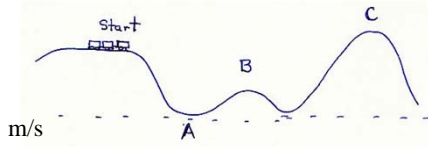
A) 1.1 m/s

B) 3.2 m/s

C) 4.5 m/s

D)   20 m/s

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2. A 5000 kg coaster is released 20 meters above the ground on a frictionless track. What is the approximate speed at ground level? (point A)
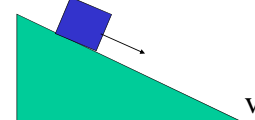
Start

C

B

A
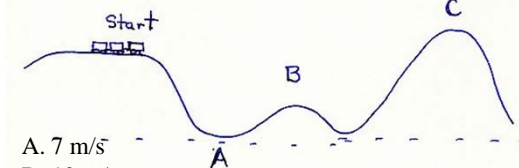
A. 7 m/s

B. 10 m/s

C. 14 m/s

D. 20 m/s

E. none of the above

Velocity from PE

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6. A block initially at rest is allowed to slide down a frictionless ramp and attains a speed v at the bottom. To achieve a speed 2v at the bottom, how many times higher must the new ramp be?

A) $\sqrt{2}$ B) 2   C) 3   D) 4   E) none of these.

v

CQ1 PE to KE from Dubson/Tanner

Energy Skate Park 4

Learning Goals:

Students will be able to use **Energy-Time** graphs to… at a given time.

●● Estimate a location for the Skater on a track.
• Calculate the speed or height of the Skater *Friction and frictionless*.
• Predict energy distribution for tracks with and without friction.

By Trish Loeblein updated July 2008

The Friction concepts are not addressed in these clicker questions. Some screen images are included, but it would be better to have the sim running. I have used tracks that are the default or under Track menu for easy reproduction.

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3. The energy graph at 10 s:

A

B

C

10
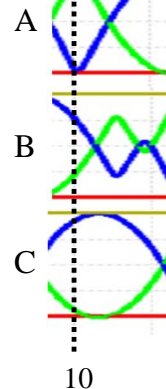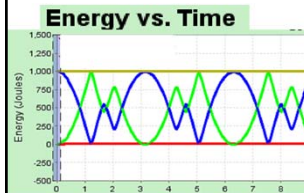
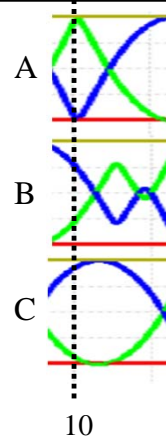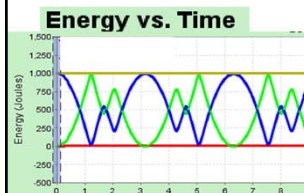## 1. What will the speed of the 75kg Skater be at 2 seconds?
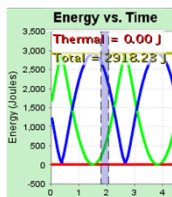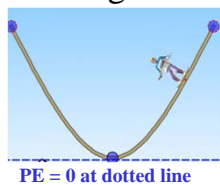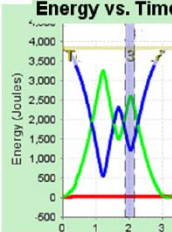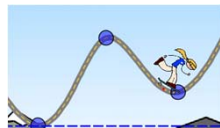
Total =2918 J

KE=509 J

PE=2408 J

PE = 0 at dotted line

A. 14m/s   B. 8.8m/s   C. 8.0m/s   D. 3.7m/s

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3. The energy graph at 10 s:

A

B

C

10

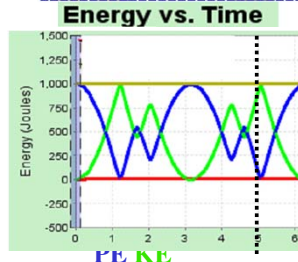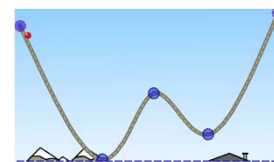## 2. At what height is the 60kg Skater at 2 seconds?

Total =3829 J

KE=2429 J

PE=1365 J

A. 6.5m   B. 4.2m   C. 2.3m   D. 1.9m

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4. What might the ball be doing at 5 seconds?

A. Going left to right at the lower dip
B. Going right to left at the lower dip
C. Going left to right at the higher dip
D. Going right to left at the higher dip

PE KE