Potential Energy

Quick Concepts

A. In words, what is potential energy?

B. The potential energy of something depends on three things - what are they?

C. What is the equation (and therefore the definition) of potential energy?

D. What are the units used for potential energy?

E. If an oject is lifted up, does it gain or lose potential energy?

F. If an object loses potential energy, did it get higher or lower?

G. If you carry a heavy box across the room, did the potential energy of the box change?

Calculations

1. How much potential energy does a 5 kg ball have that is 3 meters in the air?

2. A 20 kg child in a tree has 700 J of potential energy. How high is the child?

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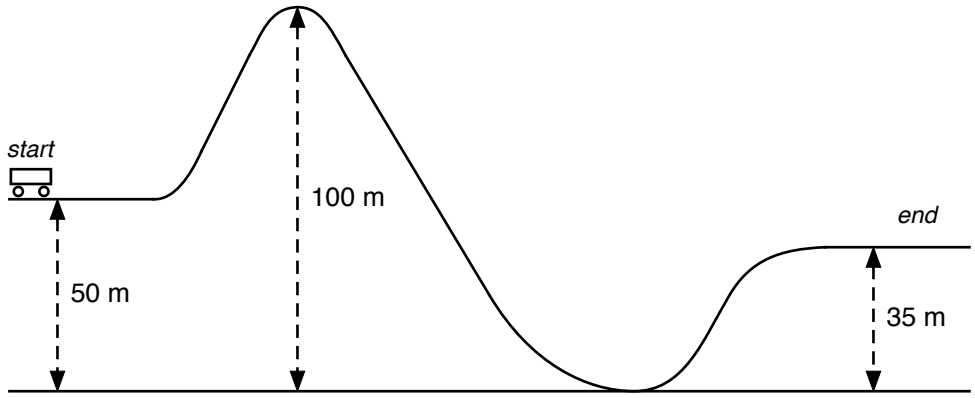
3. A 70 kg upset mother is standing on the ground underneath a tree. How much potential energy does she have?

4. A father is climbing a ladder that is propped up against a tree. When he is 2.5 meters high he has 2000 J of potential energy. What was his mass?

5. Which has more potential energy: a 50 kg object 3 meters in the air or a 25 kg object 5 meters in the air?

6. An object has 500 J of potential energy. What would be its potential energy if it were twice as high? How about triple the height? And how about if it were 1/4 the height?

Questions 7 to 13 refer to the following diagram of a 2000 kg roller coaster.



7. What is the initial potential energy of the coaster?

8. What is the <u>most</u> potential energy the coaster could have? Mark that location on the diagram with an "A."

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9. What is the <u>least</u> potential energy the coaster could have? Mark that location on the diagram with an "B."

10. How high is the coaster if it has 1,600,000 J of potential energy? Mark those locations with a "C."

11. At the end of the ride, how much potential energy did the coaster have?

12. How much potential energy did the coaster gain in going to the top of the first hill?

13. How much potential energy did the coaster lose by the end of the ride?

Answers:

1) 150 J *2) 3.5 m* *3) 0 J* *4) 80 kg* *5) 1500 J vs 1250 J, so 50 kg*

6) 1000 J, 1500 J, 125 J *7) 1,000,000 J* *8) 2,000,000 J (highest point)*

9) 0 J (lowest point) *10) 80 m* *11) 700,000 J*

12) 1,000,000 J *13) 300,000 J*