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CONCEPTUAL Physics PRACTICE PAGE

Chapter 7 Energy

Work and Energy

1. How much work (energy) is needed to lift an object that weighs 200 N to a height of 4 meters?

800 J 200×4=

2. How much power is needed to lift the 200-N object to a height of 4 m in 4 seconds? $\frac{800}{4}$ = 200W

3. What is the power output of an engine that does 60,000 J of work in 10 seconds? $\frac{60000}{10}$ = 6000W

4. The block of ice weighs 500 newtons. (Neglect friction.)

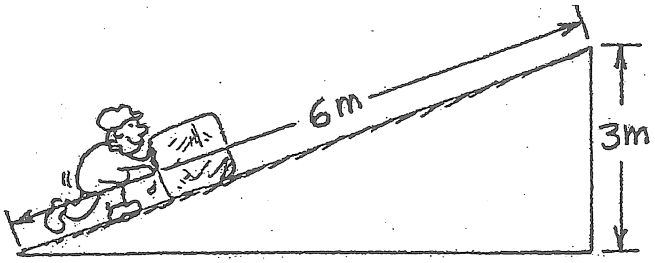
a. How much force parallel to the incline is needed to push it to the top? (250) 500 N

b. How much work is required to push it to the top of the incline? (1500) 1500 J

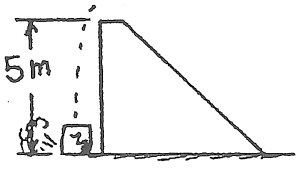
c. What is the potential energy of the block relative to ground level? (1500) 1500 J

d. What would be the potential energy if the block were simply lifted vertically 3 m? 1500J

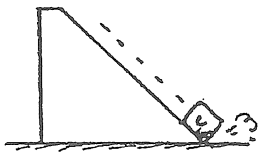
(1500)



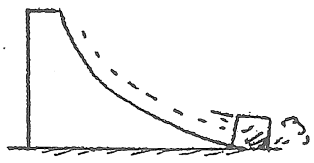
5. All the ramps below are 5 meters high. We know that the KE of the block at the bottom of each ramp will be equal to the loss of PE (conservation of energy).
Find the speed of the block at ground level in each case. (Hint: Do you recall from earlier chapters how much time it takes something to fall a vertical distance of 5 m from a position of rest assuming g = 10 m/s^2 and how much speed a falling object acquires in this time?) This gives you the answer to Case 1.
Discuss with your classmates how energy conservation provides the answers to Cases 2 and 3.



Case 1



Case 2



Case 3

Speed 10 m/s Speed 10 m/s Speed 10 m/s

Hewitt Drew It!

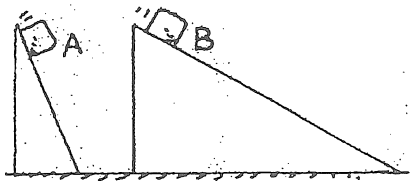
KEY

Chapter 7 Energy

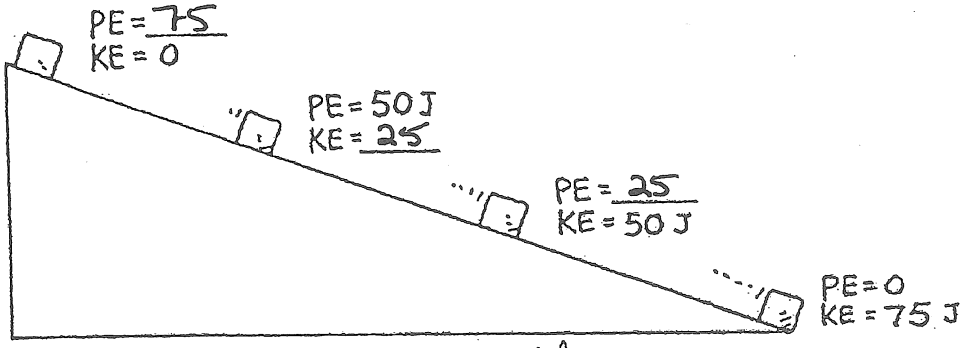
Work and Energy—continued

6. Which block reaches the bottom of the incline first? Assume no friction. (Be careful!) Explain your answer.

Block A - ramp is shorter so it will go in shorter time - but same speed



7. Both the KE and PE of a block freely sliding down a ramp are shown below only at the bottom position in the sketch. Fill in the missing values for the other positions.



8. A big metal bead slides due to gravity along an upright friction-free wire. It starts from rest at the top of the wire as shown in the sketch.

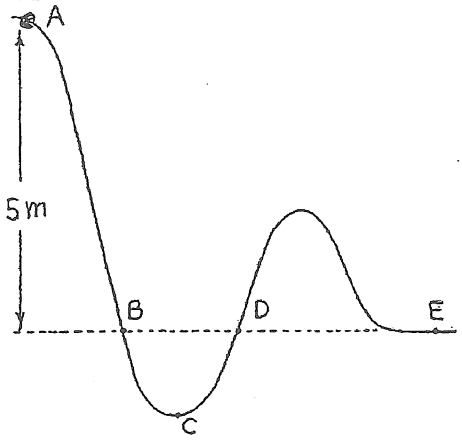
How fast is it traveling as it passes

Point B? 10 m/s

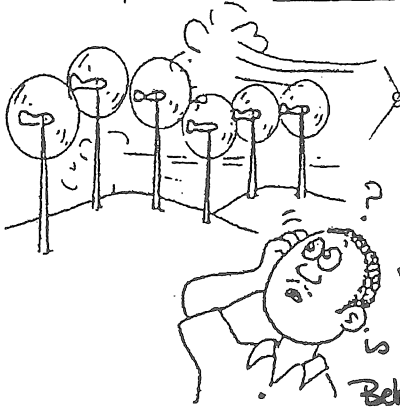
Point D? 10 m/s

Point E? 10 m/s

Maximum speed at Point C



9. Rows of wind-powered generators are used in various windy locations to generate electric power. Does the power generated affect the speed of the wind? Would locations behind the "windmills" be windier if they weren't there. Discuss this in terms of energy conservation with your classmates.



Yes - Conserv. of E ⇒ E gained by windmills is taken from wind KE, so wind must slow down. Behind would be windier without! He will blow it!

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Chapter 7 Energy

Conservation of Energy

1. Fill in the blanks for the six systems. $KE = \frac{1}{2}mv^2$