WebAssign
CH06-HW02-SP12 (Homework)

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PHYS 172-SPRING 2012, Spring 2012
Instructor: Virendra Saxena

Current Score : 25 / 26 **Due :** Thursday, February 16 2012 11:59 PM EST

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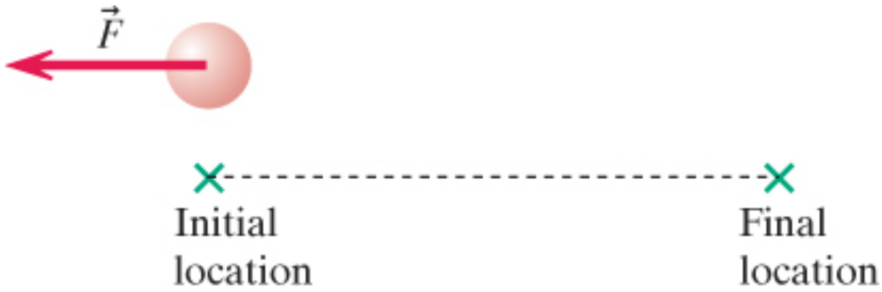
1. 4/4 points | Previous Answers MI3 6.4.X.050



An object which is originally at location < -11, 0, 0 > m moves to location < -3, 0, 0> m as shown in the diagram above. While it is moving it is acted on by a constant force of < -26, 0, 0 > N. How much work is done on the object by this force?

W = -208 J

As a result, the kinetic energy of the object decreases

A different object moves from location < -3, 0, 0 > m to location < -11, 0, 0 > m, as shown above. While it is moving it is acted on by a constant force of < -26, 0, 0 > N. How much work is done on the second object by this force?

W = 208 J

As a result, the kinetic energy of the object increases

- *Read the eBook*
- Section 6.4

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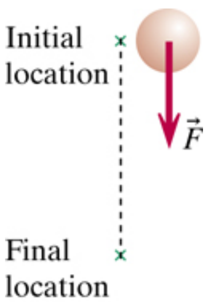
2. 4/4 points | Previous Answers MI3 6.4.X.051

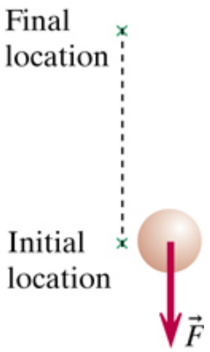


A ball of mass 0.8 kg falls downward, as shown in the diagram above. Initially you observe it to be 4.5 m above the ground. After a short time it is just about to hit the ground.

During this interval how much work was done on the ball by the gravitational force?

W = 35.28 J

As a result, the kinetic energy of the ball increased



The ball hits the ground and bounces back upwards, as shown in the diagram above. After a short time it is 4.5 m above the ground again.

During this second interval (between leaving the ground and reaching a height of 4.5 m) how much work was done on the ball by the gravitational force?

W = -35.28 J

As a result, the kinetic energy of the ball decreased

- *Read the eBook*
- Section 6.4

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3. 2/2 points | Previous Answers MI3 6.7.X.015

An electron traveling through a wire in an electric circuit experiences a constant force of 2 × 10^{-19} N, always in the direction of its motion. How much work is done on the electron by this force as it travels through 0.3 m of the wire?

work = 0.6e-19 J

- *Read the eBook*
- Section 6.7

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4. 1/1 points | Previous Answers MI3 6.3.X.048

You pull your little sister across a flat snowy field on a sled. Your sister plus the sled have a mass of 30 kg. The rope is at an angle of 30 degrees to the ground. As you pull with a force of 30 N, the sled travels a distance of 52 m.

How much work do you do?

W = 1351 J

- *Read the eBook*
- Section 6.3

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5. 4/4 points | Previous Answers MI3 6.3.X.010

A planet of mass 3.00×10^{25} kg is in a circular orbit of radius 5.00×10^{11} m around a star. The star exerts a force on the planet of constant magnitude 4.02×10^{22} N. The speed of the planet is 2.59×10^{4} m/s.

(a) In half a "year" the planet goes half way around the star. What is the distance that the planet travels along the semicircle?

distance = 1.571e12 m

(b) During this half "year", how much work is done on the planet by the gravitational force acting on the planet?

work = 0 J

(c) What is the change in kinetic energy of the planet?

ΔK = 0 J

(d) What is the magnitude of the change of momentum of the planet?

$|\Delta \vec{p}|$ = 1.55e30 kg Â· m/s

- *Read the eBook*
- Section 6.3

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6. 3/4 points | Previous Answers MI3 6.4.P.055

(a) Check all of the following that are correct statements, where E stands for γmc^2. **Read each statement very carefully to make sure that it is exactly correct.**

- [ ] The energy principle can be written $E_{sys,f} = E_{sys,i} + W_{surr}$.
- [ ] The definition of work is $W = F_x\Delta x + F_y\Delta y + F_z\Delta z$.
- [x] The definition $K = E - mc^2$ is valid even for speeds near the speed of light.
- [ ] The definition of work is $W = < F_x\Delta x, F_y\Delta y, F_z\Delta z >$.
- [ ] The definition of work is $W = |< F_x\Delta x, F_y\Delta y, F_z\Delta z >|$.
- [x] The energy principle can be written $\Delta E_{sys} = W_{surr}$.
- [ ] At speeds close to the speed of light, kinetic energy is approximately equal to $(1/2)mv^2$.

(b) An object with mass 100 kg moved in outer space. When it was at location < 8, -35, -2 > its speed was 16 m/s. A single constant force < 180, 410, -130 > N acted on the object while the object moved to location < 14, -39, -6 > m. What is the speed of the object at this final location?

final speed = 15.97 m/s

- *Read the eBook*
- [Section 6.4]

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7. 5/5 points | Previous Answers MI3 6.4.P.057

Jack and Jill are maneuvering a 3100 kg boat near a dock. Initially the boat's position is < 2, 0, 3 > m and its speed is 1.9 m/s. As the boat moves to position < 8, 0, 0 > m, Jack exerts a force of < -400, 0, 200 > N, and Jill exerts a force of < 160, 0, 320 > N.

How much work does Jack do?

W_{Jack} = -3000 J

How much work does Jill do?

W_{Jill} = 0 J

Which person exerted a force perpendicular to the displacement of the boat?

- ( ) both Jack and Jill
- ( ) Jack
- ( ) neither Jack nor Jill
- (•) Jill

What is the final speed of the boat?

v_f = 1.29 m/s

- *Read the eBook*
- Section 6.4

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8. 2/2 points | Previous Answers MI3 6.7.P.066

Outside the space shuttle, you and a friend pull on two ropes to dock a satellite whose mass is 1000 kg. The satellite is initially at position < 3.9, -1.3, 2.3 > m and has a speed of 3 m/s. You exert a force < -480, 350, 210 > N. When the satellite reaches the position < 0.0, 2.3, 5.0 > m, its speed is 4.77 m/s. How much work did your friend do?

Work done by friend = 3177.45 J

- *Read the eBook*
- Section 6.7