1. Using ground level as the reference height with zero potential energy, which object has the ***greatest*** gravitational potential energy?

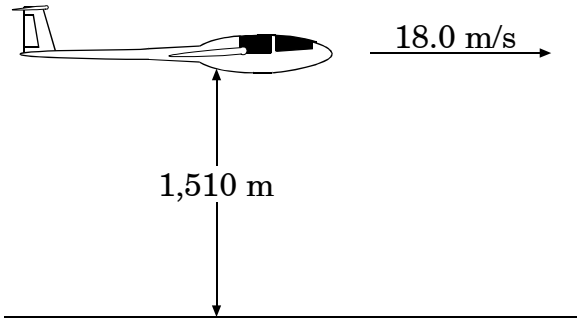
   A a 2-kg mass at 60-m height

   B a 5-kg mass at 5-m height

   C a 20-kg mass at 50-m height

   D a 40-kg mass at 2-m height

2. A 12.5-kg glider is observed flying at an altitude of 1,510 m at a constant velocity of 18.0 m/s. The glider dives to a new altitude of 1,250 m.



Neglecting the effects of air resistance, what is its change in potential energy?

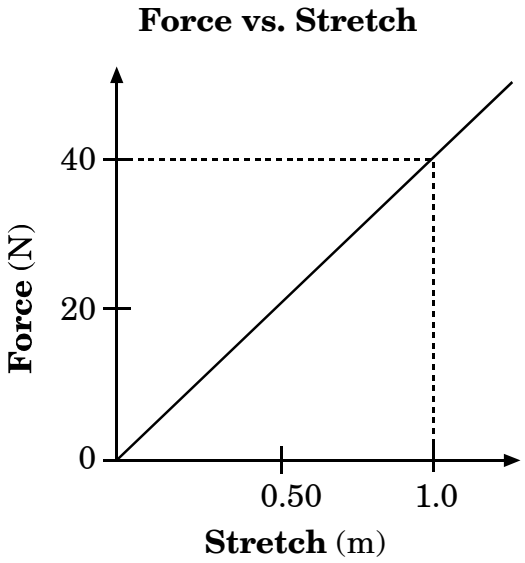
A 31,900 J

B 153,000 J

C 185,000 J

D 338,000 J

3. This graph shows the force vs. stretch relationship for a spring.



How much work would be done in stretching the spring 0.25 m from its equilibrium position?

A 1.3 J

B 3.6 J

C 5.0 J

D 10. J

---

4. A person strikes a ball with a bat. The temperature of the ball increases by 0.06°C. What accounts for the increase?

A The kinetic energy of the moving bat was used to increase the thermal energy of the ball.

B The thermal energy of the bat was transferred to the ball.

C The kinetic energy of the moving bat was converted to the chemical energy of the ball.

D The thermal energy of the bat was converted to potential energy in the ball.

5. A father (100 kg) and his son (50 kg) are jogging at the same speed. Which statement is true about the kinetic energies (KE) of the father and the son?

A $KE_F = 2KE_S$

B $KE_F = \frac{1}{2}KE_S$

C $KE_F = 4KE_S$

D $KE_F = \frac{1}{4}KE_S$

6. A diver with a mass of 80.0 kg dives off the 10.0 m platform. His velocity just before striking the water is 14.0 m/s. What is his kinetic energy at that moment?

A 8.00×10^2 J

B 1.12×10^3 J

C 7.84×10^3 J

D 1.12×10^4 J

7. A person weighing 6.0×10^2 N falls a vertical distance of 20. m into soft snow. What is the average force exerted by the snow if the person stops in 0.15 s?

A 5.3×10^3 N

B 8.0×10^3 N

C 1.8×10^4 N

D 8.0×10^4 N

8. The spring in a dart gun has a spring constant of 20.0 N/m. The spring is compressed 8.00×10^{-2} m from its equilibrium position and used to launch a 1.00×10^{-2}-kg plastic dart. Ignoring friction, what is the dart's speed as it leaves the gun?

A 0.0640 m/s

B 3.58 m/s

C 7.21 m/s

D 12.8 m/s

9. A student eats a candy bar that can provide 1.57×10^6 J of energy. If the student has a mass of 81.8 kg, how high will he have to climb a ladder to offset completely the energy contained in the candy bar?

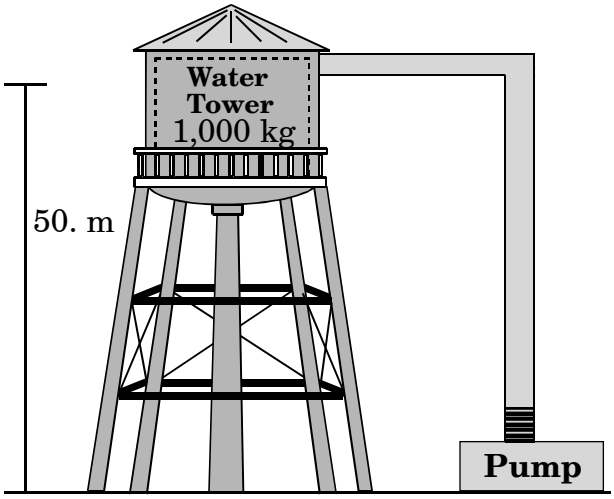
A 1.96 m

B 1.96×10^3 m

C 1.31×10^7 m

D 1.44×10^8 m

10. A city's water tower has a capacity of 1.0×10^3 kg of water. A pump is filling the water tower to an average height of 50. m.



How much work is done by the pump to fill the 1.0×10^3-kg tower?

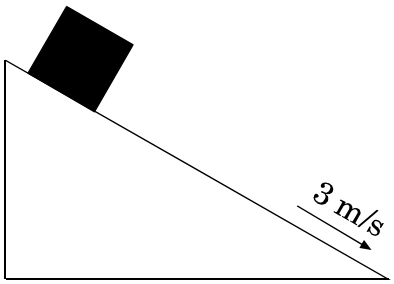
A 2.5×10^4 J

B 5.0×10^4 J

C 4.9×10^5 J

D 2.5×10^6 J

11. In the diagram below, a wooden block slides from rest down a frictionless incline. The block attains a speed of 3 m/s at the bottom of the incline.



How high is the incline?

A 0.21 m

B 0.31 m

C 0.46 m

D 0.59 m

12. A piston, moving through a distance of 15 cm, pushes a box weighing 8.0 kg onto a conveyor belt with a force of 40 N. How much work is done by the piston on the box?

A 6.0 J

B 120 J

C 320 J

D 6.0×10^2 J

13. How high can a worker lift a 40.00-kg bag of sand if he produces 4,000. J of energy? Assume no energy is used to overcome friction.

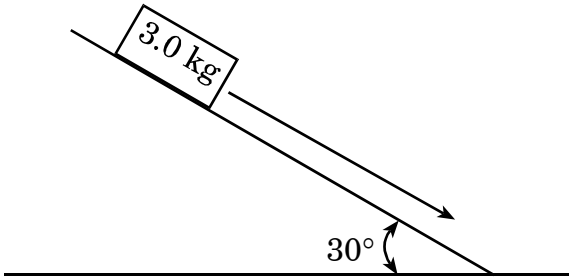
A 1.020 m

B 10.20 m

C 102.0 m

D 1,020. m

14. A 3.0-kg mass slides down a 5.0-m-long frictionless, inclined plane.



How much work is needed to stop the mass at the bottom of the incline?

A 15 J

B 74 J

C 130 J

D 150 J

15. Neglecting friction, if a child exerts a force of 85 N on the handle of a wagon that makes a 35° angle with the horizontal, how far is the wagon pulled when 280 J of work are done?

A ≤ 5.0 m

B > 5.0 m but ≤ 10. m

C > 10. m but ≤ 15 m

D > 15 m but ≤ 20. m

16. If a forklift raises a 76-kg load a distance of 2.5 m, how much work has it done?

A 80.J

B 1.9×10^1 J

C 3.0×10^2 J

D 1.9×10^3 J

17. The amount of power required to move an object can be increased without changing the amount of work required. How can this happen?

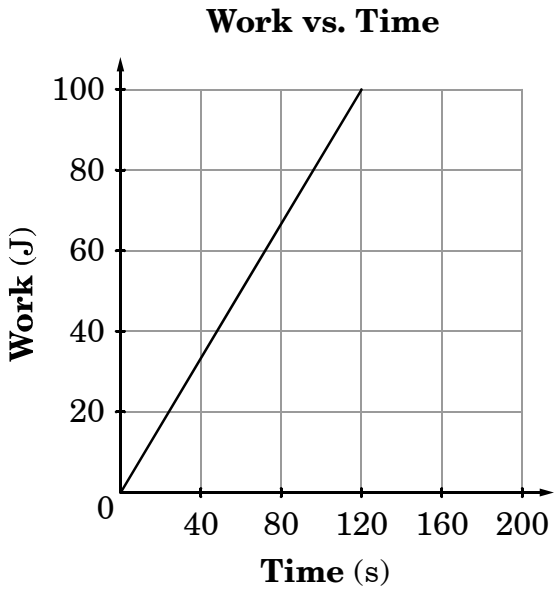
A increase the time required to do the work

B increase the friction on the surface over which the object is moving

C increase the weight of the object being moved

D decrease the time required to do the work

18. This is a graph representing work versus time.



What does the slope of the graph represent?

A acceleration

B impulse

C power

D velocity

19. A block of mass 2.0 kg slides with a velocity of 10. m/s on a frictionless surface. It hits a horizontal massless spring (spring constant of 500 N/m). How much is the spring compressed when the block stops?

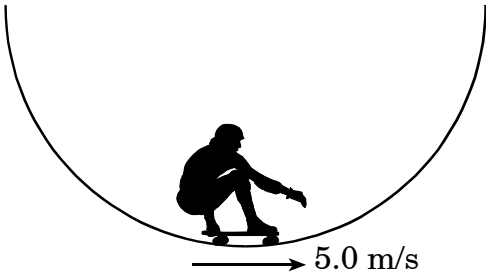
A 0.040 m

B 0.20 m

C 0.40 m

D 0.63 m

20. A skateboarder with a mass of 50. kg is riding on a half-pipe as shown in the diagram below. He has a speed of 5.0 m/s at the bottom.



What vertical distance will the skateboarder climb?

A 0.25 m

B 0.50 m

C 1.3 m

D 2.5 m

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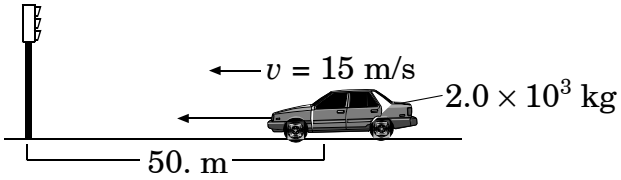
21. A woman driving a 2.0×10^3-kg car at 15 m/s fully applies the brakes 50. m from a stoplight.



If the car stops 5.0 m before the light, what is the magnitude of the average force applied by the brakes?

A 4.1×10^3 N

B 4.5×10^3 N

C 5.0×10^3 N

D 4.5×10^4 N

End of Goal 6 Sample Items

Sample Items Key Report

1 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Organizing **Correct Answer:** C

2 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Applying **Correct Answer:** A

3 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Analyzing **Correct Answer:** A

4 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Analyzing **Correct Answer:** A

Sample Items Key Report

5 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Applying **Correct Answer:** A

6 **Objective: 6.01**
Investigate and analyze energy storage and transfer mechanisms:
a. Gravitational potential energy.
b. Elastic potential energy.
c. Thermal energy.
d. Kinetic energy.
e. Transfer of energy mechanisms.
Thinking Skill: Applying **Correct Answer:** C

7 **Objective: 6.02**
Analyze, evaluate, and apply the principle of conservation of energy.
Thinking Skill: Applying **Correct Answer:** B

8 **Objective: 6.02**
Analyze, evaluate, and apply the principle of conservation of energy.
Thinking Skill: Applying **Correct Answer:** B

9 **Objective: 6.02**
Analyze, evaluate, and apply the principle of conservation of energy.
Thinking Skill: Applying **Correct Answer:** B

10 **Objective: 6.02**
Analyze, evaluate, and apply the principle of conservation of energy.
Thinking Skill: Analyzing **Correct Answer:** C

11 **Objective: 6.02**
Analyze, evaluate, and apply the principle of conservation of energy.
Thinking Skill: Analyzing **Correct Answer:** C

Sample Items Key Report

12 **Objective: 6.03**
Analyze, evaluate, and measure the transfer of energy by a force.
a. Work.
b. Power.
c. Relationship of work and power.
Thinking Skill: Applying **Correct Answer:** A

13 **Objective: 6.04**
Design and conduct investigations of:
a. Mechanical energy.
b. Power.
c. Relationship of mechanical energy and power
Thinking Skill: Applying **Correct Answer:** B

14 **Objective: 6.03**
Analyze, evaluate, and measure the transfer of energy by a force.
a. Work.
b. Power.
c. Relationship of work and power.
Thinking Skill: Applying **Correct Answer:** B

15 **Objective: 6.03**
Analyze, evaluate, and measure the transfer of energy by a force.
a. Work.
b. Power.
c. Relationship of work and power.
Thinking Skill: Applying **Correct Answer:** A

16 **Objective: 6.03**
Analyze, evaluate, and measure the transfer of energy by a force.
a. Work.
b. Power.
c. Relationship of work and power.
Thinking Skill: Applying **Correct Answer:** D

17 **Objective: 6.03**
Analyze, evaluate, and measure the transfer of energy by a force.
a. Work.
b. Power.
c. Relationship of work and power.
Thinking Skill: Analyzing **Correct Answer:** D

Sample Items Key Report

18 **Objective: 6.04**
Design and conduct investigations of:
a. Mechanical energy.
b. Power.
c. Relationship of mechanical energy and power
Thinking Skill: Applying **Correct Answer:** C

19 **Objective: 6.04**
Design and conduct investigations of:
a. Mechanical energy.
b. Power.
c. Relationship of mechanical energy and power
Thinking Skill: Applying **Correct Answer:** D

20 **Objective: 6.04**
Design and conduct investigations of:
a. Mechanical energy.
b. Power.
c. Relationship of mechanical energy and power
Thinking Skill: Applying **Correct Answer:** C

21 **Objective: 6.04**
Design and conduct investigations of:
a. Mechanical energy.
b. Power.
c. Relationship of mechanical energy and power
Thinking Skill: Applying **Correct Answer:** C