Skill 29: Work-Energy Theorem

28. Which is an SI unit for work done on an object?

A) $\frac{kg \cdot m^2}{s^2}$ B) $\frac{kg \cdot m^2}{s}$

C) $\frac{kg \cdot m}{s}$ D) $\frac{kg \cdot m}{s^2}$

momentum Force

29. When a force moves an object over a rough, horizontal surface at a constant velocity, the work done against friction produces an increase in the object's

A) weight B) momentum
C) potential energy D) internal energy

30. How much work is done on a downhill skier by an average braking force of 9.8×10^2 Newtons to stop her in a distance of 10. meters?

A) 1.0×10^1 J B) 9.8×10^1 J
C) 1.0×10^3 J D) 9.8×10^3 J

$W = Fd$

31. As the time required to lift a 60-kg. object 6 meters increases, the work required to lift the body

A) decreases
B) increases
C) remains the same

32. A 15.0-kilogram mass is moving at 7.50 meters per second on a horizontal, frictionless surface. What is the total work that must be done on the mass to increase its speed to 11.5 meters per second?

A) 120. J B) 422 J
C) 570. J D) 992 J

$\Delta KE = W$

$\Delta KE = KE_f - KE_i = \frac{1}{2}m(v_f^2 - v_i^2)$

33. The work done in accelerating an object along a frictionless horizontal surface is equal to the change in the object's

A) momentum B) velocity
C) potential energy D) kinetic energy

34. Sixteen joules of work was required to lift a 2.0-kilogram object from the floor to a table. How much potential energy was gained by the 2.0-kilogram object?

A) 0.80 joule B) 8.0 joules
C) 16 joules D) 32 joules

$W = PE$

35. A person does 100 joules of work in pulling back the string of a bow. What will be the initial speed of a 0.5-kilogram arrow when it is fired from the bow?

A) 20 m/s B) 50 m/s
C) 200 m/s D) 400 m/s

$W = 100\,J = KE$

$KE = \frac{1}{2}mv^2$

$100\,J = \frac{1}{2}(.5kg)v^2$

$v^2 = 400\,m^2/s^2$

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21. How much work is required to lift a 1.0 kilogram mass from 4.0 meters to 40. meters above the surface of Earth?

A) 2.5 J B) 3.6 J
C) 3.6×10^2 J D) 4.0×10^2 J

$W = PE = mg\,\Delta h$
$(1kg)(9.8 m/s^2)(36m)$

22. The total work done in lifting a typical high school physics textbook a vertical distance of 0.10 meter is approximately

Figure out which mass could make sense

A) 0.15 J .15kg B) 1.5 J (1.5kg)
C) 15 J 15kg D) 150 J (150kg

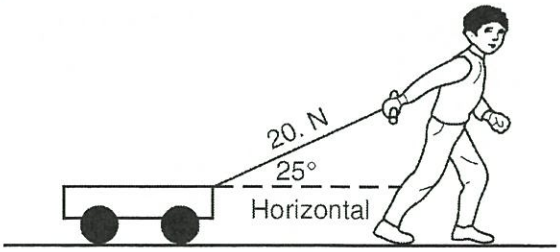
$m = \frac{W}{gh}$ or $\frac{PE}{gh}$

23. The work done in lifting an apple one meter near Earth's surface is approximately

A) 1 J = .1kg (100g) B) 0.01 J = .001kg
C) 100 J = 10kg D) 1000 J = 100kg

$m = \frac{PE}{gh}$

24. As shown in the diagram below, a child applies a constant 20.-newton force along the handle of a wagon which makes a 25° angle with the horizontal.



How much work does the child do in moving the wagon a horizontal distance of 4.0 meters?

A) 5.0 J B) 34 J C) 73 J D) 80. J

$W = F_x d =$

25. Through what vertical distance is a 50.-newton object moved if 250 joules of work is done against the gravitational field of Earth?

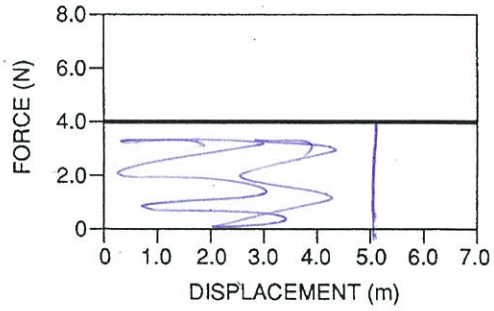
A) 2.5 m B) 5.0 m
C) 9.8 m D) 25 m

$W = Fd$
$250J = 50N\,d$
$d = 5m$

26. Which combination of units can be used to express work?

A) $\frac{\text{newton} \cdot \text{second}}{\text{meter}}$
B) $\frac{\text{newton} \cdot \text{meter}}{\text{second}}$ Fv = watt, $N\,m/s$ = Power
C) newton/meter N/m = spring constant
D) newton • meter $N \cdot m = J$, Fd = work

27. The graph below shows the force exerted on a block as a function of the block's displacement in the direction of the force.



How much work did the force do in displacing the block 5.0 meters?

A) 0 J B) 20. J
C) 0.80 J D) 4.0 J

work = area

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36. An object is lifted at constant speed a distance h above the surface of the Earth in a time t. The total potential energy gained by the object is equal to the

A) average force applied to the object
B) total weight of the object
C) total work done on the object
D) total momentum gained by the object

37. Ten joules of work are done in accelerating a 2.0-kilogram mass from rest across a horizontal frictionless table. The total kinetic energy gained by the mass is

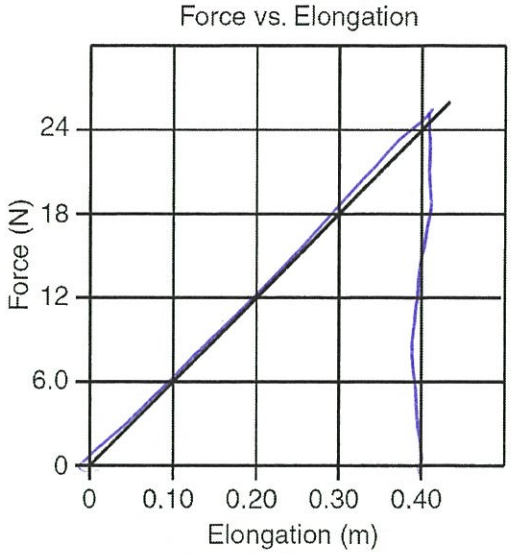
A) 3.2 J B) 5.0 J C) 10. J D) 20. J

38. The work done on a slingshot is 40.0 joules to pull back a 0.10-kilogram stone. If the slingshot projects the stone straight up in the air, what is the maximum height to which the stone will rise? [Neglect friction.]

A) 0.41 m B) 41 m
C) 410 m D) 4.1 m

$W = PE = mgh$
$40J = (.1kg)(9.8m/s^2)(h)$

39. The graph below represents the elongation of a spring as a function of the applied force.



How much work must be done to stretch the spring 0.40 meter?

A) 4.8 J B) 6.0 J C) 9.8 J D) 24 J

$W = \overline{F}_s x$
$\frac{1}{2}(24N)(.4m)$