Quest Chapter 08

#	Problem	Hint
1	What is a force exerted over a distance to move an object? 1. velocity 2. work 3. power 4. momentum	What is defined as a force acting over a distance?
2	If you exert a force of 20 N to lift a box a distance of 2.45 m, how much work do you do?	Substitute and solve using the work equation.
3	A catcher “gives” with a baseball when catching it. If the baseball exerts a force of 469 N on the glove such that the glove is displaced 9.26 cm, how much work is done by the ball?	Substitute and solve using the work equation.
4	A student weighing 672 N climbs at constant speed to the top of an 14 m vertical rope in 17s. What is the average power expended by the student to overcome gravity?	Substitute and solve to find the work. Then, substitute and solve to find the power.
5	What energy is produced by a 60W lightbulb lit for 2.6 hours?	Substitute and solve using the power equation.
6	Normally the rate at which you expend energy during a brisk walk is 3.5 calories per minute. (A calorie is the common unit of food energy, equal to 0.239 Joules.) How long do you have to walk in order to produce the same amount of energy as in a candy bar (approximately 280 cal)?	Hmmm. 3.5 cal per minute? That is a rate, isn’t it? Set up your equation that uses the rate defined in the problem. Just how would you get 3.5 cal per minute? What would that look like in an equation.
7	Power equals work 1. divided by weight. 2. divided by time. 3. divided by distance. 4. times distance.	Use the definition of power when considering this question.
8	The unit of power is the 1. Joule. 2. Newton. 3. Coulomb. 4. Watt.	Check your notes or remember my overused joke.

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9	Potential energy and kinetic energy are forms of what kind of energy? 1. chemical 2. electromagnetic 3. heat 4. nuclear 5. mechanical	Think of PE as the "gravitational" type. Then, consider the definition of KE.
10	(part 1 of 2) A 500-N crate needs to be lifted 1 meter vertically in order to get it into the back of a pickup truck. What gives the crate a greater potential energy? 1. Either 2. Unable to determine 3. slide it up a frictionless inclined plane 4. lift it straight up into the truck	Be careful: The "either" answer refers to sliding or lifting. Remember to consider the end versus the beginning and not how it got there.
11	(part 2 of 2) What is the advantage of using the inclined plane? 1. less force 2. less distance 3. more power 4. less total energy	If you need one, draw a diagram of an inclined plane. Review your notes or reread the section in the text.
12	Suppose an automobile has a kinetic energy of 2200 J. When it moves with five times the speed, what will be its kinetic energy? Answer in units of J	How does a multiplication of the velocity affect the KE? Check you notes.
13	What is the speed of a 0.149 kg baseball if its kinetic energy is 107 J ?	Substitute and solve using the KE equation.
14	A student wearing frictionless in-line skates on a horizontal surface is pushed by a friend with a constant force of 46 N. How far must the student be pushed, starting from rest, so that her final kinetic energy is 351 J?	Frictionless means no resistance to motion. W=Fd. KE = W if the work was completely converted to KE.

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15	A block sliding on a horizontal surface has an initial speed of 0.5 m/s. The block travels a distance of 1 m as it slows to a stop. What distance would the block have traveled if its initial speed had been 1 m/s? 1. 1 m 2. 3 m 3. 2 m 4. 4 m 5. more information is needed to answer the question 6. 0.5 m	How is the KE of the block at 0.5 m/s compared to 1.0 m/s? How will that difference be played out as the surface does work on the block? Remember that the KE is being completely converted to work.
16	(part 1 of 3) At what point in its motion is the KE of a pendulum bob a maximum? 1. midway between the highest and lowest points 2. The KE does not change. 3. at the lowest point 4. at the highest point	Check you notes. When has its gravitational PE been completely converted to KE?
17	(part 2 of 3) At what point is its PE a maximum? 1. The PE does not change. 2. at the highest point correct 3. at the lowest point 4. midway between the highest and lowest points	Check you notes. When has its KE been completely converted to gravitational PE?
18	(part 3 of 3) When its KE is half of its maximum value, how much PE does it have? 1. half of its maximum value 2. its maximum value 3. its minimum value 4. the same as its PE at any other point.	Remember that PE and KE are being converted back and forth.
19	(part 1 of 2) Consider a ball thrown straight up in the air. At what position is its kinetic energy a maximum? 1. midway between the the lowest point and the highest point 2. the lowest point 3. the highest point 4. KE is constant at all points.	Remember definition of KE. What is the changing when the ball is thrown up in the air?

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20	(part 2 of 2) Where is its gravitational potential energy a maximum? 1. midway between the the lowest point and the highest point 2. the highest point 3. the lowest point 4. Potential energy is constant everywhere.	Remember that PE and KE are being converted back and forth.
21	A 5.18 kg block initially at rest is pulled to the right along a horizontal, frictionless surface by a constant, horizontal force of 13.1 N. Find the speed of the block after it has moved 2.81 m. Answer in units of m/s	You have mass, force, and distance. You also have NO friction. You can find the work: W=Fd. Without friction, all the work goes into KE. So, $W=Fd=\frac{1}{2}mv^2$. Find v.
22	(part 1 of 2) A mechanic pushes a(n) 3060 kg car from rest to a speed of v, doing 5337 J of work in the process. During this time, the car moves 22 m. Neglect friction between car and road. Find the speed v. Answer in units of m/s	You have mass, work, and distance. NO friction. Without friction, all the work goes into KE. So, $W=Fd=\frac{1}{2}mv^2$. Find v.
23	(part 2 of 2) Find the horizontal force exerted on the car. Answer in units of N	Use the work and distance to find the force.
24	A rock of mass m is thrown horizontally off a building from a height h. The speed of the rock as it leaves the thrower's hand at the edge of the building is v_0, as shown. What is the kinetic energy of the rock just before it hits the ground?	Use the Work-Energy theorem: $W = \Delta E$. Remember: Δ = New – Old
25	The fulcrum of which class lever is always between the effort force and the resistance force? 1. Third 2. None of these 3. First 4. Second	Check page 112 in the text.

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26	The mechanical advantage of a machine is the number of times it 1. multiplies the effort force. 2. changes the direction of the effort force. 3. changes the direction of the resistance force. 4. multiplies the resistance force.	Remember definition of mechanical advantage.
27	If you have to apply 30 N of force on a crowbar to lift an object that weighs 330 N, what is the mechanical advantage of the crowbar? 1. 0.09 2. 110 3. 300 4. 11 5. 9900 6. 0.36	Remember definition of mechanical advantage.
28	The mechanical advantage of a pulley system is equal to the 1. number of rope segments pulling up on the load. 2. length of the rope. 3. weight of the object being lifted. 4. distance the load has to be moved.	Check you notes.
29	Which property of a machine compares its work output with its work input? 1. mechanical advantage 2. energy 3. mechanical efficiency 4. ideal mechanical advantage	Look for something in your notes or the book that relates work output to work input.