

Concept Review

Section: Work, Power, and Machines

1. **Define** each of the following terms, and write the equation for each.

a. work

b. power

c. mechanical advantage

2. **Explain** the relationship between work and power.

3. **Explain** how machines make work easier if they still require that the same amount of work be done.

4. **Calculate** the amount of work done when a grocery store stocker uses 120 N of force to lift a sack of flour 1.5 m onto a shelf.

5. **Calculate** the average power in kilowatts required to pull a car up a ramp if the amount of work is 250 kJ over a period of 45 s.

6. **Calculate** the mechanical advantage of a group of pulleys used to raise an engine from a car. The engine is raised 1.2 m with the pulleys when 4.8 m of rope is pulled through the pulleys.

Concept Review

Section: Simple Machines

1. **Name** an example of each of the following types of simple machines:

- _____ a. lever
- _____ b. wedge
- _____ c. pulley
- _____ d. wheel and axle
- _____ e. inclined plane
- _____ f. screw

2. **Draw** the three types of levers, and label the input force, output force, and fulcrum on each.

First class lever	Second class lever	Third class lever

3. **Compare** a wedge and a screw with an inclined plane.

4. **Describe** how an inclined plane increases the force without changing the amount of work done.

5. **Explain** how a wheelbarrow is a compound machine.

Concept Review

Section: What Is Energy?

1. **Define** the following terms:

a. kinetic energy

b. potential energy

c. mechanical energy

2. **Calculate** the gravitational potential energy of a 95 kg rock at the top of a 45 m cliff. The acceleration due to gravity is 9.8 m/s^2 .

3. **Calculate** the kinetic energy of a bicyclist traveling at 11 m/s. The total mass of the cyclist and the bike is 74 kg.

4. **Identify** the type of energy stored in a stretched bungee cord.

5. **Explain** how sunlight is converted into potential energy by plants.

6. **Explain** how the kinetic energy of an object changes when the speed of the object doubles.

7. **Contrast** chemical energy with mechanical energy.

Concept Review

Section: Conservation of Energy

1. **Define** the term *efficiency*.

2. **List** two ways mechanical energy can be transformed into nonmechanical energy.

3. **Calculate** the efficiency of the following machines:

a. A lever is used to lift a 45 N rock. The applied force is 75 N.

b. A pulley system raises a 39 N log with an applied force of 45 N.

c. You do 425 J of work to push a 75 N box up a ramp until the box is 2.5 m above the ground.

4. **Describe** why a high-efficiency machine is more desirable than a low-efficiency machine.

5. **Explain** why the height of a bouncing ball decreases after each bounce.

6. **Explain** how a skier, gliding down a hill, illustrates the conservation of energy.
