Part A. Vocabulary Review

Directions: Identify each statement as true or false. Replace the italicized term in false statements with the term that makes them correct.

1. A device that does work with only one movement is a compound machine.

2. The number of times a machine multiplies the input force is the output force of the machine.

3. A grooved wheel with a rope or chain running through the groove is a pulley.

4. A wheel with teeth along its circumference is a pulley.

5. A sloping surface used to raise objects is a wedge.

6. A screw is an inclined plane wrapped in a spiral around a cylindrical post.

7. A wheel and axle is a simple machine consisting of two wheels of different sizes that rotate together.

8. An inclined plane with two or more sloping sides is a screw.

9. The mechanical advantage of a fixed pulley is always two.

10. A machine made up of two or more simple machines is a(n) ideal machine.

11. The mechanical advantage of a block and tackle is equal to the number of ropes used to raise the object.

12. Power is the rate at which work is done.

13. A measure of how well a machine operates is its efficiency.
Chapter Review (continued)

Part B. Concept Review

Directions: In the blank at the left, write the name of the simple machine represented by each example.

1. staircase
2. spiral staircase
3. crowbar
4. bicycle pedals
5. knife
6. screwdriver
7. block and tackle
8. ramp

Directions: In the spaces provided, label the following diagram by writing the letter of the term that correctly identifies each part.

a. fulcrum  b. output arm  c. input arm  d. output force  e. input force

Directions: Calculate the ideal mechanical advantage for each of the machines shown. Write your answers in the spaces provided.

14. 15. 16.

Directions: Answer the following question using complete sentences.

17. What is the difference between ideal mechanical advantage and actual mechanical advantage?
I. Testing Concepts

Directions: For each of the following, write the letter of the term or phrase that best completes the sentence or answers the question.

____ 1. A slanted surface used to raise an object is a(n)______.
   a. inclined plane   b. screw   c. pulley   d. efficiency board

____ 2. A device that does work with only one movement and changes the size or direction of a force is the definition for a(n)______.
   a. compound machine   b. simple machine   c. input machine   d. ideal machine

____ 3. A bar that is free to pivot about a fixed point is a ______.
   a. lever   b. wedge   c. fulcrum   d. ramp

____ 4. The rate at which work is done is the ______.
   a. efficiency   b. input time   c. power   d. force

____ 5. ______ is transferred to an object when work is done.
   a. Energy   b. Force   c. Motion   d. Friction

____ 6. The output work of a machine compared to its input work is the ______ of the machine.
   a. efficiency   b. power   c. input   d. output

____ 7. The amount by which a machine multiplies an input force is called the ______.
   a. output force   b. efficiency   c. fulcrum   d. mechanical advantage

____ 8. Two inclined planes that meet form a simple machine called a(n)______.
   a. screw   b. input arm   c. lever   d. wedge

____ 9. An inclined plane wrapped around a cylindrical post is a ______.
   a. wedge   b. screw   c. pulley   d. lever

____ 10. A machine that changes only the direction of a force has a mechanical advantage of ______.
    a. 10   b. 5   c. 2   d. 1

____ 11. A winding mountain road is an example of what kind of simple machine?
    a. a lever   b. an inclined plane   c. a wheel and axle   d. a pulley

____ 12. What are two or more simple machines that work together called?
    a. compound machine   b. pulley   c. lever   d. wheel and axle

____ 13. The unit of power is the ______.
    a. joule   b. MA   c. watt   d. second
14. A lever with a mechanical advantage greater than one is used to ______.
   a. increase distance  
   b. change direction  
   c. increase force  
   d. increase speed

15. Three of the following simple machines are basically the same. Choose the one that DOES NOT belong with the group.
   a. pulley  
   b. wedge  
   c. lever  
   d. wheel and axle

16. A system of pulleys designed to multiply the input force is called a _____.
   a. simple pulley  
   b. fixed pulley  
   c. movable pulley  
   d. block and tackle

17. Two simple machines that are part of a bicycle are a(n) ______.
   a. inclined plane and a wedge  
   b. inclined plane and a lever  
   c. gear and a wheel and axle  
   d. wheel and axle and an inclined plane

18. Which of the following groups of simple machines represent variations of a lever?
   a. pulley, inclined plane, and wedge  
   b. pulley, wheel and axle  
   c. pulley, wedge, and screw  
   d. wedge, screw, and wheel and axle

19. The mechanical advantage of a single fixed pulley is always one because _____.
   a. the pulley changes only the direction of the input force  
   b. the pulley changes only the size of the input force  
   c. the pulley changes the size and direction of the input force  
   d. the pulley changes only the speed at which the input force is exerted

20. Which of the following CANNOT be done by a simple machine?
   a. change the direction of a force  
   b. increase the amount of work done  
   c. decrease the time it takes to do work  
   d. transfer energy from one location to another

II. Understanding Concepts

Skill: Using Equations
1. Calculate the ideal mechanical advantage of the lever in the diagram. Record your answer in the space provided.

Fulcrum

Output

Input

1.0 meter 4.0 meters

Ideal mechanical advantage

Skill: Recognizing Cause and Effect
2. How would the ideal mechanical advantage of the lever shown in question 1 be changed if the fulcrum were moved 2 m to the right, so that the input arm was 2 m and the output arm was 1 m?
Skill: Making and Using Tables
Directions: Complete the table below by writing the terms **pulleys**, **screws**, **wedges**, and **wheels and axles** next to the numbers under the correct headings.

<table>
<thead>
<tr>
<th>Inclined planes</th>
<th>Levers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>5.</td>
</tr>
<tr>
<td>4.</td>
<td>6.</td>
</tr>
</tbody>
</table>

Skill: Concept Mapping
Directions: Include the information in the table above in the concept map below. Add to the concept map by identifying the three types of pulleys and writing them in the correct location.

III. Applying Concepts
Directions: Study Figures 1 and 2. The figures show the same block being lifted in two ways—with an inclined plane and with a fixed pulley. Use the diagrams to answer questions 1–5.

1. The IMA of the inclined plane in Figure 1 is ______.
   a. a  
   b. 2  
   c. 3  
   d. 1

2. The weight of the block in Figures 1 and 2 is ______.
   a. 210 N  
   b. 23 N  
   c. 70 N  
   d. 140 N
Chapter Test (continued)

3. The amount of work required to move the block along the inclined plane is ______.
   a. 70 J       b. 280 J       c. 700 J       d. 840 J

4. If the weight of the block were doubled, the work required to move it up along the length of the inclined plane would be ______.
   a. 1/2 as much   b. 1/4 as much   c. doubled   d. quadrupled

5. If the efficiency of the fixed pulley were 100%, the force required to lift the block off the ground would be ______.
   a. 70 N       b. 210 N       c. 840 N       d. 280 N

6. The fixed pulley ______.
   a. doubles the force required to lift the block
   b. decreases the force required to lift the block
   c. makes the block easier to lift by changing the direction of the force needed to lift it
   d. increases and changes the direction of the force

IV. Writing Skills

Directions: Answer the following questions using complete sentences.

1. What is required for work to be done?

2. Which would provide a greater mechanical advantage—a screwdriver with a 5-cm handle and a 1-cm shaft or a screwdriver with a 3-cm handle and a 1-cm shaft?

3. How are work, power, and time related?

4. Why would adding oil to the moving parts of a machine increase its efficiency?