

**Grade 9****March 2019/20**

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***The following activities will be done after reading properly your centralized note about simple machines.***

1. Read your centralized note about simple machines then prepare a summary note that covers the unit.
2. Prepare a mind map about simple machines.
3. **C**lassify the tools below as a lever, a wheel and axle, an inclined plane, a wedge, or a pulley.
  - a. screwdriver
  - b. pliers
  - c. chisel
  - d. nail puller
4. A worker is testing a multiple pulley system to estimate the heaviest object that he could lift. The largest downward force he could exert is equal to his weight, 875 N. When the worker moves the rope 1.5 m, the object moves 0.25 m. What is the heaviest object that he could lift?
5. A winch has a crank on a 45-cm arm that turns a drum with a 7.5 cm radius through a set of gears. It takes three revolutions of the crank to rotate the drum through one revolution. What is the *IMA* of this compound machine?
6. Suppose you increase the efficiency of a simple machine. Do the *MA* and *IMA* increase, decrease, or remain the same?
7. What can you do to increase the power you develop as you climb a flight of stairs?
8. A. What is the *IMA* of a multispeed bicycle in the following instances?
  - a. when the chain is set on a front gear with 52 teeth and a rear gear with 14 teeth
  - b. when the chain is set on a front gear with 42 teeth and a rear gear with 34 teethB. Which setting in the previous problem, a or b, would you select to race with a friend on level ground? To climb a steep hill?
9. Is it possible to get more work out of a machine than you put into it?
10. Explain how the pedals of a bicycle are a simple machine.

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***The following activities will be done after reading properly your centralized note about fluid statics.***

1. Read your centralized note about fluid statics then prepare a summary note that covers the unit.
2. Prepare a mind map about fluid statics.
3. Why ice floats in water?
4. Suppose that you have two boxes. One is 20 cm x 20 cm x 20 cm. The other is 20 cm x 20 cm x 40 cm.
  - a. How does the pressure of the air on the outside of the two boxes compare?
  - b. How does the magnitude of the total force of the air on the two boxes compare?
5. Dentists' chairs are examples of hydraulic-lift systems. If a chair weighs 1600 N and rests on a piston with a cross-sectional area of  $1440 \text{ cm}^2$ , what force must be applied to the smaller piston, with a cross-sectional area of  $72 \text{ cm}^2$ ?
6. By multiplying a force, a hydraulic system serves the same purpose as a lever or seesaw.

If a 400-N child standing on one piston is balanced by a 1100-N adult standing on another piston, what is the ratio of the areas of their pistons?
7. A girl is floating in a freshwater lake with her head just above the water. If she weighs 610 N, what is the volume of the submerged part of her body?
8. A fishing bobber made of cork floats with one-tenth of its volume below the water's surface. What is the density of cork?
9. Which of the following displaces more water when it is placed in an aquarium?
  - a. A 1.0-kg block of aluminum or a 1.0-kg block of lead?
  - b. A  $10\text{-cm}^3$  block of aluminum or a  $10\text{-cm}^2$  block of lead?
10. How does the water pressure 1 m below the surface of a small pond compare with the water pressure the same distance below the surface of a lake?