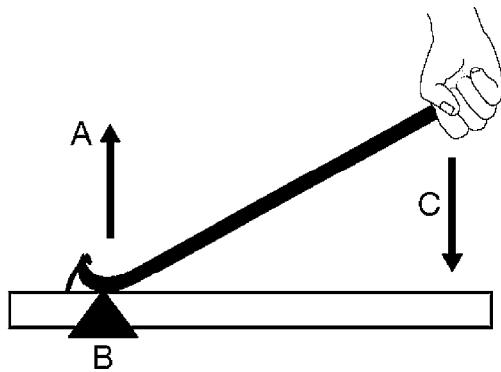


Chapter 09 Multiple Choice Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ____ 1. A simple machine can multiply:
 - a. forces only.
 - b. energy only.
 - c. forces and energy.
 - d. forces and speed.
- ____ 2. All of the following are considered to be simple machines EXCEPT:
 - a. scissors.
 - b. a bicycle.
 - c. a jackknife.
 - d. a wheelbarrow.
- ____ 3. A lever rotates around a fixed point called a:
 - a. ball bearing.
 - b. gear.
 - c. pulley.
 - d. fulcrum.
- ____ 4. Mechanical advantage can be defined as the ratio of:
 - a. work input to work output.
 - b. work output to work input.
 - c. output force to input force.
 - d. input force to output force.
- ____ 5. The simple machine that operates as a ramp that curves around a shaft is a:
 - a. rope and pulley system.
 - b. screw.
 - c. lever.
 - d. gear.
- ____ 6. The force directed along the ropes of a rope and pulley system is called:
 - a. thread.
 - b. lead.
 - c. mechanical advantage.
 - d. tension.

**Figure 9-1A**

- ____ 7. In the picture of the crowbar, which letter shows the fulcrum?
a. A
b. B
c. C
d. None of the above
- ____ 8. In the picture of the crowbar, which letter shows the input force?
a. A
b. B
c. C
d. None of the above
- ____ 9. The gear ratio is equal to:
a. output teeth divided by input teeth.
b. output turns divided by input turns.
c. input speed divided by output speed.
d. input direction divided by output direction.
- ____ 10. Gears may be combined in a system to:
a. transfer motion.
b. change rotating speeds.
c. multiply forces.
d. All of the above

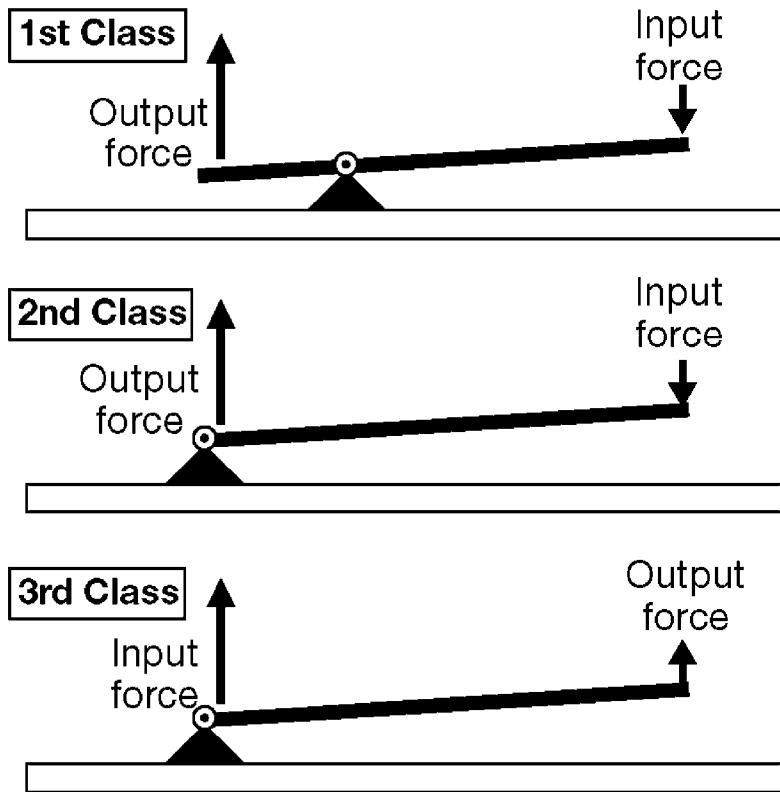
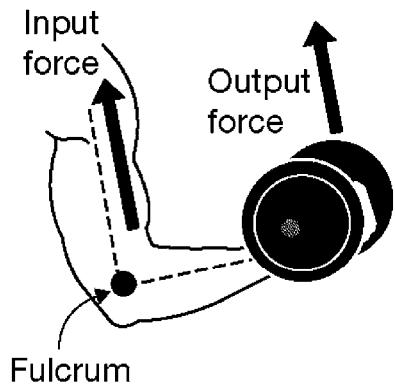


Figure 9-1

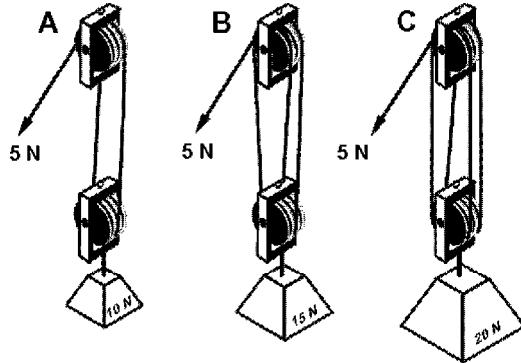
11. According to **Figure 9-1**, if the output force of a lever is located between the fulcrum and input force, the lever is a:
- first class lever.
 - second class lever.
 - third class lever.
 - Not enough information is given.
12. In which class of levers shown in **Figure 9-1** is mechanical advantage always greater than 1?
- First class
 - Second class
 - Third class
 - You cannot have a mechanical advantage greater than 1.

- ____ 13. The human arm is an example of which class of lever?



- a. First class
b. Second class
c. Third class
d. None of the above

- ____ 14. Which of the following rope and pulley systems has the largest mechanical advantage?



- a. System A has the largest mechanical advantage.
b. System B has the largest mechanical advantage.
c. System C has the largest mechanical advantage.
d. All three systems have the same mechanical advantage.

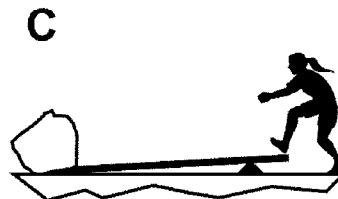
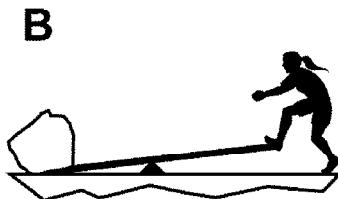
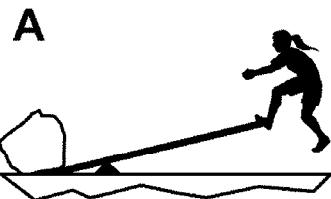
- ____ 15. A simple machine has an input force of 10 newtons and an output force of 100 newtons. What is the mechanical advantage of the simple machine?

- a. 0.1
b. 1
c. 10
d. 90

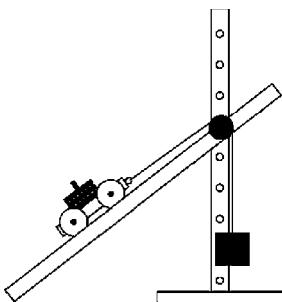
- ____ 16. A rope and pulley system has an input force of 2.5 newtons and an output force of 10 newtons. What is the mechanical advantage of the system?

- a. 0.25
b. 4
c. 7.5
d. 25

- ____ 17. A rope and pulley system is used to lift a box that weighs 90 newtons. How much force do you need to pull on the rope if the machine has a mechanical advantage of 5?
- 5 newtons
 - 9 newtons
 - 18 newtons
 - 45 newtons
- ____ 18. Which of the following levers has the largest mechanical advantage?



- Lever A
 - Lever B
 - Lever C
 - All three levers have the same mechanical advantage.
- ____ 19. A lever has an input arm 50 centimeters long and an output arm 40 centimeters long. What is the mechanical advantage of the lever?
- 0.8
 - 1
 - 1.25
 - 2.0
- ____ 20. All of the following simple machines are represented in the diagram below EXCEPT:



- lever.
 - ramp.
 - wheel and axle.
 - rope and pulley.
- ____ 21. If the mechanical advantage of a simple machine is 5, then:
- the input force is 5 times greater than the output force.
 - the output force is 5 times greater than the input force.
 - The output work is 5 times greater than the input work.
 - The efficiency is 500%.

- ____ 22. Janice experiments with two meshed gears. She observes that when she rotates the input gear 5 times, the output gear rotates 15 times. What is the gear ratio of this system?
- 3:1
 - 2:1
 - 15:1
 - 4:1
- ____ 23. If the output force is bigger than the input force, the mechanical advantage is always:
- between 0 and 1.
 - less than 1.
 - larger than 1.
 - 0.

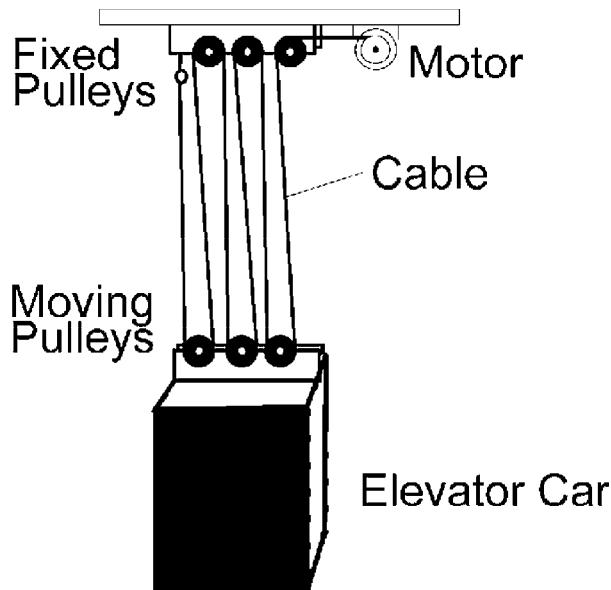


Figure 9-3A

The elevator car in the picture is lifted with an electric motor using a cable and pulleys system. Answer the following questions using this picture.

- ____ 24. If the elevator car in **Figure 9-3A** weighs 3,000 newtons, what is the tension in each supporting cable?
- 0.002 N
 - 500 N
 - 3,000 N
 - 18,000 N
- ____ 25. What is the mechanical advantage of the cable and pulley system used to raise the elevator car in **Figure 9-3A**?
- 1
 - 3
 - 6
 - 12

- ____ 26. If the elevator car in **Figure 9-3A** is raised 2 meters, how far must the motor pull the input end of the cable?
- 2 m
 - 6 m
 - 12 m
 - 18 m
- ____ 27. Making a ramp steeper:
- increases its mechanical advantage.
 - decreases its mechanical advantage.
 - increases its efficiency.
 - decreases its efficiency.
- ____ 28. What are the units of mechanical advantage?
- Newton's
 - Joules
 - Watts
 - Mechanical advantage has no units.
- ____ 29. In the human body, what does the elbow joint act as?
- Fulcrum
 - Gear
 - Ramp
 - Screw
- ____ 30. When you stand on your toes, what does your foot act as?
- Gear
 - Lever
 - Screw
 - Ramp