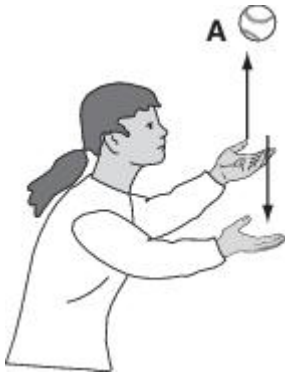


**Directions:** Please choose the best answer choice for each of the following questions.

1. Laura throws a ball up in the air.



The ball travels upward to point A before coming back down. Which energy transformation occurs in the ball once it reaches point A?

- A. heat energy to chemical energy
  - B. potential energy to kinetic energy
  - C. kinetic energy to chemical energy
  - D. muscular energy to mechanical energy
2. The diagram below shows the motion of a skier going up and down a hill.



How does the motion of the skier illustrate the transformation between kinetic and potential energy?

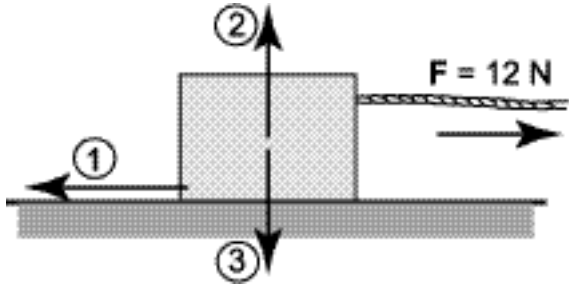
- A. The skier gains both potential and kinetic energy while going up the hill.
  - B. The skier loses potential energy and gains kinetic energy while going up the hill.
  - C. The skier has equal amounts of potential and kinetic energy at the top of the hill.
  - D. The skier loses potential energy and gains kinetic energy while going down the hill.
3. A tennis ball is released from a height of 5 meters. Which statement describes the energy relationship between kinetic and potential energy as the ball falls to the ground?
- A. Potential energy increases as kinetic energy decreases.
  - B. Kinetic energy increases as potential energy decreases.
  - C. Kinetic energy and potential energy balance each other.
  - D. Kinetic energy and potential energy increase due to gravity.
4. Mr. Rogers explains the concept of acceleration to his class. Which example can he use to further clarify his explanation?
- A. the uniform velocity of a car that runs on a highway
  - B. the time it takes Earth to complete a rotation about its own axis
  - C. the rate at which the velocity of a racing car changes on the track
  - D. the distance Earth travels when it completes one revolution around the Sun
5. If a moving object changes the direction of its motion, which of these must also change?
- A. the mass of the object
  - B. the speed of the object
  - C. the weight of the object
  - D. the velocity of the object
6. Angie threw balls at a target. The balls were the same volume, but one ball had a greater mass than the other. Thrown in the same way (with the same force), how did the motion of the balls compare?
- A. Neither ball accelerated.
  - B. Both balls had the same acceleration.
  - C. The lighter ball had greater acceleration.
  - D. The more massive ball had greater acceleration.

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**Directions:** Review the content below and answer the questions that follow

**The Moving Box**

This box is being pulled along a level surface with a force of **12 N** to the right.



7. Which arrow represents the force of gravity acting on the box?
- A. 1
  - B. 2
  - C. 3
  - D. None of the above.
8. Which arrow represents the force of friction acting on the box?
- A. 1
  - B. 2
  - C. 3
  - D. None of the above.

**Go on to the next page »**

**Directions:** Please choose the best answer choice for each of the following questions.

9. Sandra weighs a ball and finds it to be 2 kg. Which factor determines the weight of the ball?
- density of the ball
  - volume of the ball
  - gravitational pull on the ball
  - atmospheric pressure on the ball
10. Different forces are acting on an object with mass  $m$ , moving with velocity  $v$ . If the forces acting on an object are balanced, which effect on the motion of the object will be observed?
- The object will slow down and come to rest.
  - The object will change its direction of motion.
  - The object will undergo uniform acceleration.
  - The object will continue to move at the same velocity.
11. When the net forces of an object are balanced, the motion of the object \_\_\_\_\_
- does not change
  - is not stable
  - will always change
  - can never be changed
12. A race car traveling at a high rate of speed has many forces acting on it, such as wind resistance, gravity, friction, and force from the engine. Which type of motion does the race car have when all these forces are balanced?
- The race car slows down until it stops.
  - The race car speeds up at a constant rate.
  - The race car changes direction if the speed remains constant.
  - The race car travels at a constant speed with no change in direction.
13. In a game of tug of war, members of team A apply a force of magnitude 120 N to the pull rope from their side, while members of team B apply a force of magnitude 140 N to the pull rope from their side. Which option BEST explains the overall effect of these forces?
- The rope will become stationary.
  - The rope will break at the center.
  - The rope will move toward team A.
  - The rope will move toward team B.
14. A wedge is a moving inclined plane used in tools like an axe and a knife. How does a wedge make work easier?
- by altering the mass of an object
  - by altering the shape of an object
  - by changing the size of an applied force
  - by changing the direction of an applied force
15. Leon uses the lever below to lift a heavy box.



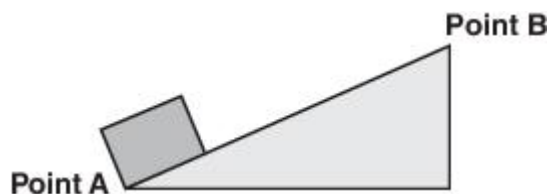
In which direction should Leon apply the force on point A to use mechanical advantage to lift the box?

- upward
  - downward
  - toward the left
  - toward the right
16. Pulleys use a wheel and a rope to lift heavy loads. How do pulleys make lifting easier?
- by altering the mass of the object
  - by altering the frictional force in the rope
  - by changing the direction of the applied force
  - by changing the amount of gravity on the load

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17. Anthony's family is moving. The movers want to move a large box from the driveway up into their truck. Which machine would be easiest for them to use to do the job?
- A. lever
  - B. screw
  - C. inclined plane
  - D. wheel and axle

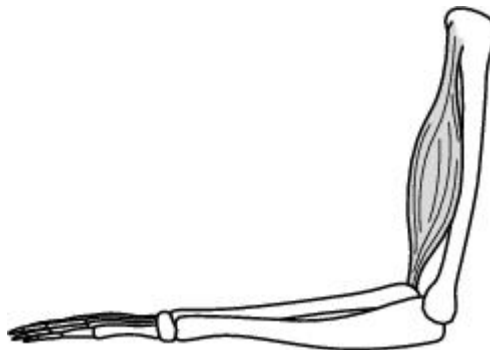
18. Lee wants to move an object from Point A to Point B using the inclined plane shown below.



How does the inclined plane help move this object?

- A. reduces the weight of the object
  - B. reduces the amount of gravitational force
  - C. reduces the force needed to lift the object
  - D. reduces the distance between Point A and Point B
19. Which type of simple machine BEST describes the cutting surface of the scissors?
- A. Lever
  - B. Wedge
  - C. Inclined plane
  - D. Wheel and axle

20. The human elbow is similar to the principle of a simple machine.



Which type of simple machine is MOST similar to an elbow?

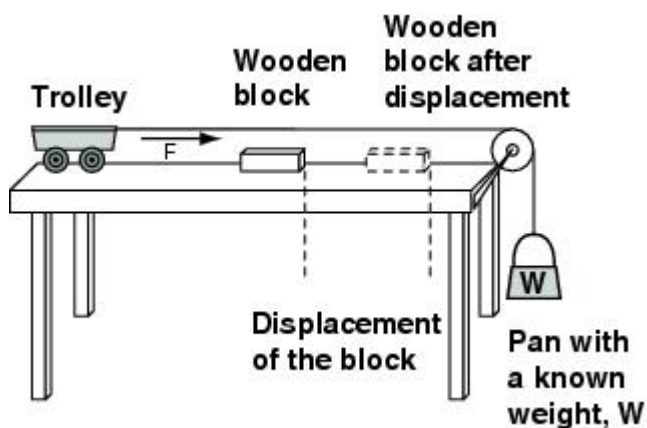
- A. Lever
- B. Pulley
- C. Inclined plane
- D. Wheel and axle

**Directions:** Review the content below and answer the questions that follow

**Effect of Forces on Objects**

The arrangement for a science activity to study the effect of forces on objects is described below.

- Place a wooden block in front of a trolley at a convenient fixed distance.
- Use a pulley to attach the trolley to a pan that can carry different weights.
- Place a known weight,  $W$ , on the pan.
- The weight sets the trolley moving.
- When the trolley moves forward, it hits the wooden block and displaces it.



21. Susan repeated the above activity by placing objects with different weights in the pan and recording the data. Which force determines the weight of an object?
- A. force applied by the pulley
  - B. force applied by the trolley
  - C. force due to Earth's gravity
  - D. force due to Earth's magnetic pull

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**Directions:** Please choose the best answer choice for each of the following questions.

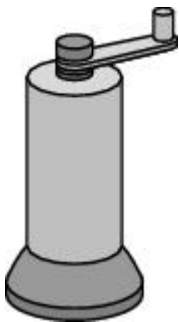
22. Sheila observes that a free-falling object increases its speed as it gets nearer to the surface of Earth. Which option describes the force acting on the object that causes its speed to increase?
- A. The normal force acting on an object increases its speed.
  - B. The adhesive force acting on an object increases its speed.
  - C. The magnetic pull from a distance on an object increases its speed.
  - D. The gravitational pull acting from a distance on an object increases its speed.
23. The gravitational force exerted by one object onto another object depends on which two factors?
- A. the masses of the two objects and how much force is exerted
  - B. the masses of the two objects and the distance between them
  - C. how fast one object goes around the other and how much force is exerted
  - D. the distance between the two objects and how fast one object goes around the other
24. Mike is making a presentation on the characteristics of gravitational force. Which characteristic can he include in his presentation?
- A. Every mass exerts gravitational force on every other mass.
  - B. Every mass repels another mass because of gravitational force.
  - C. Gravitational force on masses decreases with increase in weight.
  - D. Gravitational force on masses increases with increase in distances between masses.
25. Gravitational attraction exists between any two objects with mass.
- Draw three pairs of planets. Make sure each pair has a different amount of gravitational attraction.
  - Clearly identify which pair of planets has the least, the middle, and the most gravitational attraction.
26. Scientists launch a rocket into space. What is the effect of the gravitational force on the rocket as the rocket travels farther away from Earth?
- A. The gravitational force increases due to the gravity of other planets.
  - B. The gravitational force increases as the weight of the rocket increases.
  - C. The gravitational force decreases due to the acceleration of the rocket.
  - D. The gravitational force decreases as the distance between Earth and the rocket increases.

Use words, numbers, and/or pictures to show your work. Write your answer(s) on the paper provided.

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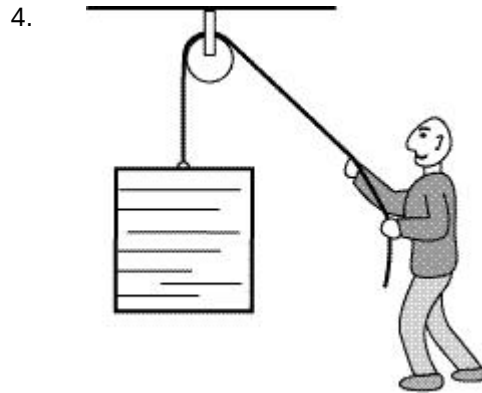
**Directions:** Please choose the best answer choice for each of the following questions.

1. How does the energy of a rock change as it falls off a cliff?
  - A. Potential energy changes into kinetic energy.
  - B. Kinetic energy changes into potential energy.
  - C. Kinetic energy changes into mechanical energy.
  - D. Mechanical energy changes into potential energy.
  
2. Johnny climbed a tree and dropped his shoe from the top limb. How did the potential and kinetic energies of his shoe change as it fell from the tree?
  - A. Both kinetic energy and potential energy increased.
  - B. Both kinetic energy and potential energy decreased.
  - C. Kinetic energy increased, while potential energy decreased.
  - D. Kinetic energy decreased, while potential energy increased.
  
3. Consider this pepper mill. A pepper mill is used to provide fresh ground pepper. The handle is turned to crush the pepper.



This handle is MOST similar to which type of simple machine?

- A. Lever
- B. Screw
- C. Wedge
- D. Wheel and axle



What is true about lifting a box with a pulley?

- A. Lifting the box with the pulley requires more force than lifting the box by itself.
- B. The only force the rope exerts on the pulley is the force of friction.
- C. Every inch the rope is pulled down, the box will rise two inches.
- D. The pulley changes the direction of the force that the man is exerting on the box.

**Stop! You have finished this exam.**