Name:_____School:_____

Teacher:_____Class:_____

Group:_____Date: _____

Physics Fiesta 2012

Instructions: Read each question carefully and choose the best option. Choose only *one* option to indicate your answer to the question.

Important: All of the situations are in an environment with ***no friction***, unless otherwise stated in the question.

1. Net force is:
    a. The sum of the forces acting on an object.
    b. The force of a surface supporting an object.
    c. An outside force applied to an object.
    d. The force pulling an object toward the center of the earth.

2. Force vectors represent the _____of forces acting on an object.
    a. Time and direction
    b. Size and time
    c. Size and direction
    d. Direction only

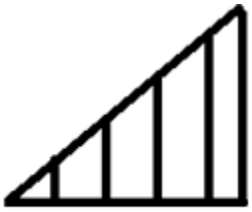
3. Accelerations are produced by:
    a. Masses.
    b. Forces.
    c. Velocities.
    d. None of the above

4. The Law of Conservation of Energy states that:
    a. Energy cannot be created or destroyed.
    b. Total energy within a system will remain constant.
    c. Energy decreases when forces are added.
    d. Both A and B

5. The images below show three ramps of different heights. Using these images and what you know about physics, fill in the statement below.

Ramp A: Short Height

Ramp B: Medium Height

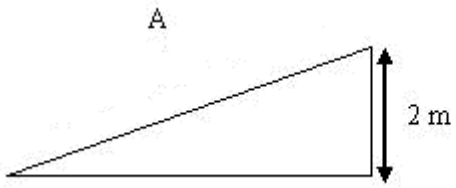


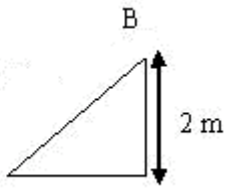
Ramp C: Tall Height

Lifting the car up Ramp _____ would require the most work.

a. A
b. B
c. C
d. Not enough information to decide

6. Use the images below to answer the following question: Louis pushed a box to the top of Ramp A. Toby pushed a box to the top of Ramp B. Who did more work to push their box to the top of the ramp?





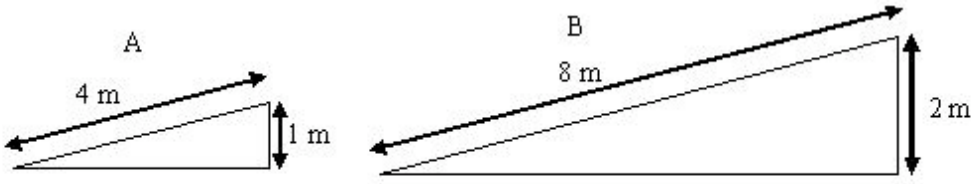
a. Louis did more work.
b. Toby did more work.
c. Both Toby and Louis did the same amount of work.
d. Not enough information to decide

7. Use the following information and your knowledge of physics to help you to answer questions 7a and 7b below: Antonio moved a 2kg block up a ramp. Then, Gloria moved a 4kg block up the same ramp at the same rate.

   7a. Who did more work to move their block up the ramp?
   - a. Gloria did more work.
   - b. Antonio did more work.
   - c. Both Gloria and Antonio did the same amount of work.
   - d. Not enough information to decide

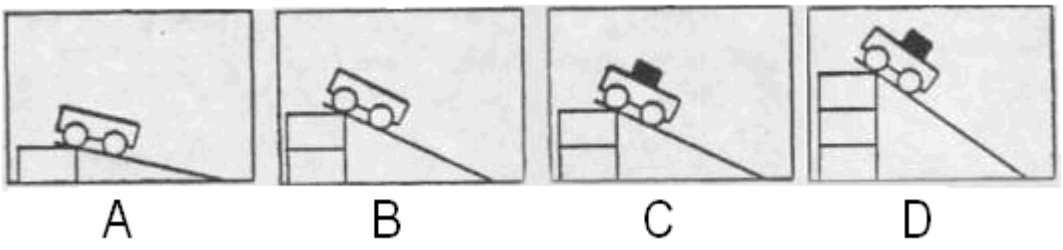
   7b. Who had to apply more force to move their block up the ramp?
   - e. Gloria applied more force.
   - f. Antonio applied more force.
   - g. Both Gloria and Antonio applied the same amount of force.
   - h. Not enough information to decide

8. Use the images below to answer the following question: You are moving a box to the top of Ramp A and Ramp B. At the top of which ramp will the box have more potential energy?



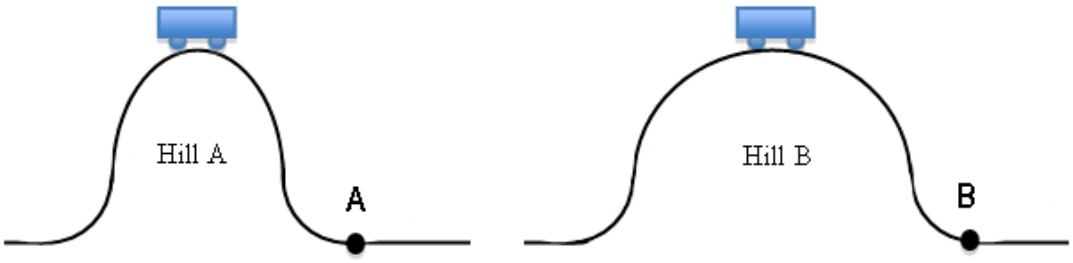
   - a. Ramp A
   - b. Ramp B
   - c. The box will have the same potential energy at the top of both ramps.
   - d. Not enough information to decide

9. The diagrams below show cars of different masses at the top of different ramps. Which car has the highest potential energy at the top of the ramp?



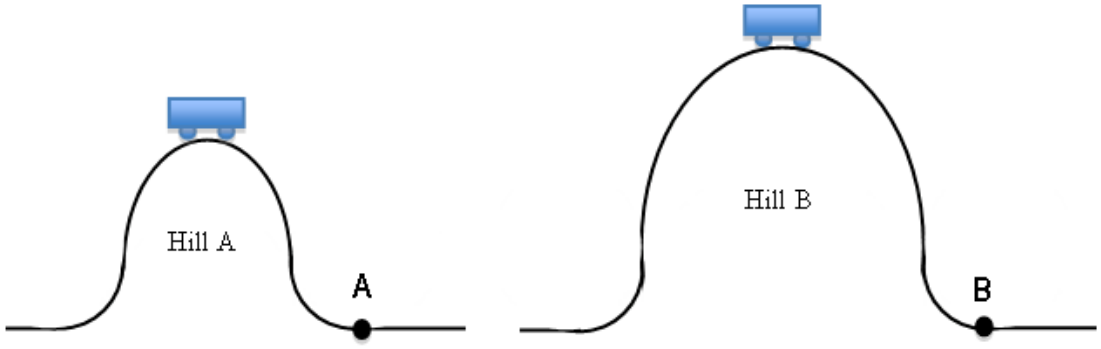
a. A
b. B
c. C
d. D

10. Two identical roller coaster cars sit at the top of different hills, shown below. One car rolls down Hill A, and another car rolls down Hill B. How does the *kinetic* energy of the car at Point A compare to the *kinetic* energy of the car at Point B?



a. The car at Point A has a greater kinetic energy than the car at Point B.
b. The car at Point B has a greater kinetic energy than the car at Point A.
c. Both of the cars have the same kinetic energy at the bottom.
d. Neither of the cars have any kinetic energy at the bottom.

11. Two identical roller coaster cars sit at the top of different hills, shown below. One car rolls down Hill A, and another car rolls down Hill B. How does the *velocity* of the car at Point A compare to the *velocity* of the car at Point B?



a. The car at Point A has a greater velocity than the car at Point B.
b. The car at Point B has a greater velocity than the car at Point A.
c. Both the cars have the same velocity at the bottom.
d. Neither of the cars have any velocity at the bottom.

12. Use the following information and your knowledge of physics to fill in statements 12a. and 12b. below: Two cars of different masses, Car A (1,000kg) and Car B (500kg), are released at the top of a hill that is 10 meters high.

12a. At the bottom of the hill, Car A would have _____ velocity compared to Car B.

a. More
b. Less
c. The same
d. Not enough information to decide

12b. At the bottom of the hill, Car A would have _____ kinetic energy compared to Car B.

a. More
b. Less
c. The same
d. Not enough information to decide

13. If you are rolling a ball down a ramp and want to increase its velocity at the bottom, you can increase the height of the ramp.

a. True
b. False
c. Not enough information to decide

14. To keep the ride safe, if you want to decrease the velocity of a roller coaster car at the bottom of a hill, you could decrease the mass of the roller coaster car.
    a. True
    b. False
    c. Not enough information to decide

15. If you increase the friction between the surface of a ramp and the object you are lifting, you will not change the:
    a. Efficiency of the ramp.
    b. Applied force needed to lift the object.
    c. Work done in lifting the object.
    d. Potential energy of the object at the top of the ramp.

16. The amount of potential energy that a roller coaster car has at the top of the initial drop must be _____ the potential energy at the top of the hill.
    a. More than
    b. Less than
    c. The same amount as

17. If there is a great deal of friction between a roller coaster car and track, the amount of potential energy at the top of the hill will be greater than the amount of kinetic energy at the bottom of the hill.
    a. True
    b. False
    c. Not enough information to decide

18. If there is no friction, the amount of potential energy that a roller coaster car has at the top of a hill is _____ the kinetic energy at the bottom of the hill.
    a. More than
    b. Less than
    c. The same amount as

19. A book is sitting on a dashboard of a car that is stopped at a traffic light. As the car starts to move forward, the book slides off the dashboard. The most correct explanation is:
    a. Newton's First Law.
    b. Newton's Second Law.
    c. Both A and B.
    d. Not enough information to decide.

20. The *best* example of Newton's Second Law is a bowling ball:
    a. At rest on a rack.
    b. Accelerating due to the force exerted by a person.
    c. Both A and B.
    d. Moving at a constant speed.

21. According to Newton's Second Law, if two balls have the same mass, a larger force will produce _____ acceleration.
    a. A larger
    b. A smaller
    c. The same

22. If the net force acting on a cart doubles, the cart's acceleration:
    a. Increases.
    b. Decreases.
    c. Stays the same.
    d. Not enough information to decide

23. You are designing a roller coaster ride. Your roller coaster car has a mass of 500 kg and you need it to accelerate at 10 m/s^2 so that your ride will be fun. Use the equation from Newton's Second Law to calculate how much force you would need to move the car at this rate.
    a. 1500 N
    b. 5000 N
    c. 15000 N
    d. Not enough information to decide

24. A hockey puck sliding across a frictionless ice rink is moving at a constant velocity. According to Newton's First Law, which of the following is true:
    a. The net force acting on it must be greater than 0.
    b. The net force acting on it must be 0.
    c. The puck is accelerating.
    d. Not enough information to decide

25. If an object's acceleration is zero, its motion could be described as:
    a. Increasing or decreasing in velocity.
    b. Not moving.
    c. Moving at a constant velocity.
    d. Both B and C

26. While entering a highway a car speeds up quickly. This is an example of:
    a. Velocity.
    b. Acceleration.
    c. Normal Force.
    d. All of the above

27. Which force is most often responsible for the slowing of moving objects?
    a. Normal Force
    b. Gravitational Force
    c. Friction Force