Multiple Choice

Read each question and choose the best answer by putting the corresponding letter in the blank to the left.

_____ 1. An ideal string acting on a block
- A. cannot transmit a force around corners.
- B. will stretch so as to reduce friction.
- C. has a small mass.
- D. exerts pulls in line with the string.

_____ 2. Which of the following is *not* a characteristic of an ideal pulley?
- A. The axle is frictionless.
- B. The pulley must be attached to an immovable surface.
- C. The motion of the string around the wheel is frictionless.
- D. The pulley changes the direction of forces without diminishing the magnitude of those forces.

_____ 3. A 35.0 kg child steps on a scale at a doctor's office. What does the scale read?
- A. 35.0 kg
- B. 34.3 kg
- C. 343 N
- D. 343 kg·m

_____ 4. The force that supports an object resting on a surface is called the
- A. tension.
- B. transmitting force.
- C. apparent weight.
- D. normal force.

_____ 5. The apparent weight is
- A. the weight a scale records.
- B. the weight an object has when it is accelerating.
- C. exactly the same as the real weight of an object.
- D. smaller than the object's normal weight.

_____ 6. Which statement about friction is true?
- A. Friction acts perpendicular to the surfaces that are sliding over one another.
- B. Friction is a force that opposes the relative motion of two surfaces in contact.
- C. Friction is dependent on the area of contact.
- D. Friction acts in the same direction as that of the relative motion.

_____ 7. The coefficient of friction
- A. is directly proportional to the normal force.
- B. is different for different substances.
- C. is determined through mathematical calculation.
- D. has units of force.

_____ 8. Which statement about kinetic friction is *not* true?

A. It is independent of sliding friction.
B. It is directly proportional to the normal force.
C. It is perpendicular to the contact surface.
D. It is usually less than static friction for a given object.

_____ 9. Which force does *not* affect a hiker resting on the incline of a mountain?

A. normal force
B. kinetic friction
C. traction
D. gravitational force

____ 10. Which type of friction does *not* play a part in the motion of a bicyclist struggling uphill?

A. traction
B. rolling friction
C. static friction
D. kinetic friction

____ 11. Which statement is true about rolling friction?

A. Rolling friction occurs between the turning force and the wheels.
B. Rolling friction is never greater than sliding friction.
C. Rolling friction results in the wheels exerting a greater force on the ground.
D. Rolling friction causes the ground to exert a greater force on the wheels.

Short Answer

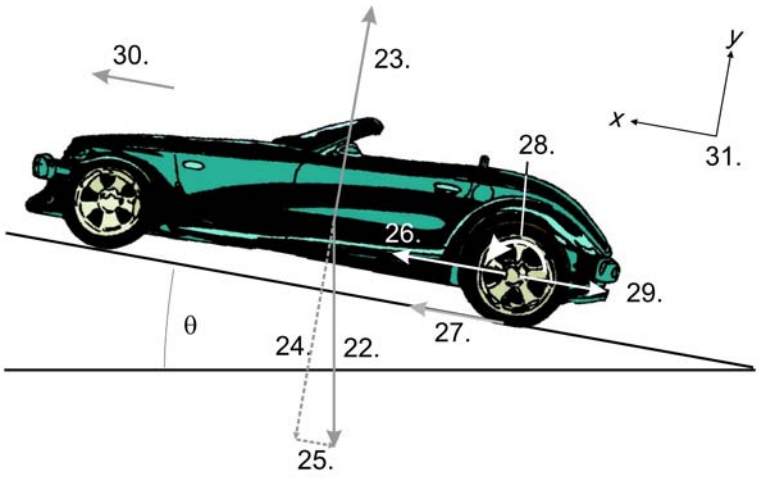
After reading each sentence, write a response in the blank provided.

12. The only force besides gravity affecting a hanging block is _____.
13. An ideal string does not affect a block's acceleration due to gravity because _____.
14. The vertical component of gravity for an object resting on a flat surface is _____ the normal force.
15. The force that keeps you from falling to the floor when you sit in a chair is the _____.
16. When an object accelerates in an upward direction, apparent weight _____.
17. When is apparent weight not equal to actual weight? _____
18. The friction that makes jogging possible is called _____.
19. The quantity that is characteristic of two surfaces in contact is the _____.
20. When a car skids to a stop, the predominant form of friction slowing the car is _____.

21. One of the forces that act on a locomotive that starts from rest to climb a hill is _____.

Short Answer II

Identify each of the parts of this free-body diagram of a car uniformly accelerating up a ramp.



22. _____ 27. _____
23. _____ 28. _____
24. _____ 29. _____
25. _____ 30. _____
26. _____ 31. _____

True/False

Read the following statements. Identify each as true or false by putting *T* or *F* in the blank to the left.

____ 32. In a free-body diagram, forces that a system is exerting are not shown.

____ 33. If a free-body diagram consists of a system of two hanging blocks, one hanging from the other, and the top block is hanging from a fixed surface, then there are only two forces acting on the system.

____ 34. For an object resting on an incline, the normal force is equal in magnitude to the *x*-component of the weight of the object.

____ 35. On a level surface, the normal force and the force of gravity acting on an object are equal vectors.

____ 36. Gravity does not affect an astronaut performing experiments at the International Space Station.

____ 37. Weight does not affect friction.

____ 38. The coefficient of friction is a scalar quantity.

____ 39. In a system of six blocks of equal mass hung one from the other, the bottom block experiences less than the top block when the system experiences an upward acceleration.

____ 40. The equation for kinetic friction is a vector equation.

____ 41. The values of static friction can vary for any given material.

____ 42. It usually requires more force to get a car to start moving than it does to keep it moving.

Application Problems

Complete the problems below. Be sure to show your work, consider significant figures, and put your answer with the correct units in the blank provided.

____ 43. What is the coefficient of friction on a block resting on a board at 15° to the horizontal?

____ 44. A ship is launched into the water down a ramp making an angle of 8° with the horizontal. The coefficient of kinetic friction between the bottom of the ship and the ramp is $\mu_k = 0.06$. What is the acceleration of the ship down the ramp?

____ 45. Tim got a huge birthday gift from his grandmother. A 400 N crate has been delivered to his driveway. In order to get it moving toward his door, he has to push it at a constant speed with a horizontal force of 250 N, but as soon as he gets it moving, he can keep it moving at a constant speed by pushing with a 120 N force. What are the coefficients of static and kinetic friction of Tim's birthday gift?