Description
This will not be graded. It is for your practice only.

Instructions
The actual test will be entirely multiple choice, with only one correct answer per question.

1. Question Details
Two forces are acting on an object. Which of the following statements is correct?
   - The object is in equilibrium if the forces are equal in magnitude and opposite in direction.
   - The object cannot be in equilibrium because more than one force acts on it.
   - The object is in equilibrium if the net force and the net torque on the object are both zero.
   - The object is in equilibrium if the forces act at the same point on the object.
   - The object is in equilibrium if the net torque on the object is zero.

   Need Help? Read It

2. Question Details
A constant net nonzero torque is exerted on an object. Which of the following quantities cannot be constant for this object?
   - angular momentum
   - moment of inertia
   - angular velocity
   - angular acceleration
   - center of mass

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3. Question Details
A solid disk and a hoop are simultaneously released from rest at the top of an incline and roll down without slipping. Which object reaches the bottom first?
   - The one that has the largest mass arrives first.
   - The one that has the largest radius arrives first.
   - The hoop and the disk arrive at the same time.
   - The disk arrives first.
   - The hoop arrives first.

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4. **Question Details**

A mouse is initially at rest on a horizontal turntable mounted on a frictionless, vertical axle. As the mouse begins to walk clockwise around the perimeter, which of the following statements must be true of the turntable?

- It turns counterclockwise with the same angular velocity as the mouse.
- It remains stationary.
- It also turns clockwise.
- It turns counterclockwise because mechanical energy is conserved.
- It turns counterclockwise because angular momentum is conserved.

Need Help? [Read It]

5. **Question Details**

Three vessels of different shapes are filled to the same level with water as in the figure below. The area of the base is the same for all three vessels. Which of the following statements is valid?

- The pressure at the bottom of each vessel is the same.
- The force on the bottom of each vessel is not the same.
- The pressure at the top surface of vessel A is greatest because it has the largest surface area.
- At a given depth below the surface of each vessel, the pressure on the side of vessel A is greatest because of its slope.
- The pressure at the bottom of vessel A greatest because it contains the most water.

![Diagram of three vessels](image)

Need Help? [Read It]

6. **Question Details**

A hose is pointed straight up, with water flowing from it at a steady volume flow rate and reaching a maximum height of \( h \). Neglecting air resistance, which of the following adjustments to the nozzle will result in the water reaching a height of \( 4h \)?

- Decrease the area by a factor of 8.
- Decrease the area by a factor of 2.
- Decrease the area by a factor of 4.
- Give up because the water cannot reach a height of \( 4h \).
- Decrease the area of the opening by a factor of 16.

Need Help? [Read It]
7. A rubber ball filled with air has a diameter of 20.7 cm and a mass of 0.582 kg. What force is required to hold the ball in equilibrium immediately below the surface of water in a swimming pool? (Assume that the volume of the ball does not change. Indicate the direction with the sign of your answer.)

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8. A 0.400-kg object attached to the end of a string of length 0.500 m is swung in a circular path and in a vertical plane. If a constant angular speed of 8.00 rad/s is maintained, what is the tension in the string when the object is at the top of the circular path?

  ○ 8.88 N
  ○ 10.5 N
  ○ 12.8 N
  ○ 19.6 N
  ○ none of these

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9. A cyclist rides a bicycle with a wheel radius of 0.500 m across campus. A piece of plastic on the front rim makes a clicking sound every time it passes through the fork. If the cyclist counts 320 clicks between her apartment and the cafeteria, how far has she traveled?

  ○ 0.50 km
  ○ 1.0 km
  ○ 1.5 km
  ○ 1.8 km
  ○ 0.80 km

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10. Consider an object on a rotating disk a distance $r$ from its center, held in place on the disk by static friction. Which of the following statements is not true concerning this object?

  ○ The object has a tangential acceleration only if the disk has an angular acceleration.
  ○ The object always has a centripetal acceleration except when the angular speed is zero.
  ○ If the angular speed is constant, the object must have constant tangential speed.
  ○ If the disk has an angular acceleration, the object has both a centripetal and a tangential acceleration.
  ○ If the angular speed is constant, the object is not accelerated.

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11. Question Details

A merry-go-round rotates with constant angular speed. As a rider moves from the rim of the merry-go-round toward the center, what happens to the magnitude of total centripetal force that must be exerted on him?

- It increases.
- It decreases.
- It is not zero, but remains the same.
- It's always zero.
- It increases or decreases, depending on the direction of rotation.

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12. Question Details

A satellite moves in a circular orbit at a constant speed around Earth. Which of the following statements is true?

- The satellite has an acceleration directed away from Earth.
- No force acts on the satellite.
- Work is done on the satellite by the force of gravity.
- The satellite moves at constant speed and hence doesn't accelerate.
- The satellite has an acceleration directed toward Earth.

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13. Question Details

What is the magnitude of the angular acceleration of a 25.0-kg disk of radius 0.800 m when a torque of magnitude 40.0 N · m is applied to it?

- 5.00 rad/s²
- 7.50 rad/s²
- 12.5 rad/s²
- 2.50 rad/s²
- 10.0 rad/s²

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14. **Question Details**

A wrench 0.500 m long is applied to a nut with a force of 80.0 N. Because of the cramped space, the force must be exerted upward at an angle of 60.0° with respect to a line from the bolt through the end of the wrench. How much torque is applied to the nut?

- 14.2 N · m
- 11.8 N · m
- 4.56 N · m
- 34.6 N · m
- 20.0 N · m

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15. **Question Details**

A 66.0-kg man lies on his back on a bed of nails, with 1208 of the nails in contact with his body. The end of each nail has area 1.00 × 10^{-6} m². What average pressure is exerted by one nail on the man's body?

- 3.09 × 10^5 Pa
- 2.21 × 10^5 Pa
- 1.65 × 10^5 Pa
- 4.11 × 10^5 Pa
- 5.35 × 10^5 Pa

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16. **Question Details**

What is the pressure at the bottom of Loch Ness, which is as much as 754 ft deep? (The surface of the lake is only 15.8 m above sea level; hence, the pressure there can be taken to be 1.013 × 10^5 Pa.)

- 2.74 × 10^5 Pa
- 2.35 × 10^5 Pa
- 1.52 × 10^5 Pa
- 3.15 × 10^5 Pa
- 7.01 × 10^5 Pa

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17. Question Details

A wooden block floats in water, and a solid steel object is attached to the bottom of the block by a string as in the figure below. If the block remains floating, which of the following statements is valid? (Choose all correct statements.)

- The buoyant force on the block is equal to the weight of the volume of water it displaces.
- The tension in the string is equal to the weight of the steel object.
- The buoyant force on the steel object is equal to its weight.
- The buoyant force on the block is equal to its weight.
- The tension in the string is less than the weight of the steel object.

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18. Question Details

A horizontal pipe narrows from a radius of 0.250 m to 0.100 m. If the speed of the water in the pipe is 1.00 m/s in the larger-radius pipe, what is the speed in the smaller pipe?

- 5.13 m/s
- 4.50 m/s
- 6.25 m/s
- 3.75 m/s

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19. Question Details

A solid iron sphere and a solid lead sphere of the same size are each suspended by strings and are submerged in a tank of water. (Note that the density of lead is greater than that of iron.) Which of the following statements are valid? (Choose all correct statements.)

- The buoyant force on each is the same.
- The buoyant force on the lead sphere is greater than the buoyant force on the iron sphere because lead has the greater density.
- The tension in the string supporting the lead sphere is greater than the tension in the string supporting the iron sphere.
- The buoyant force on the iron sphere is greater than the buoyant force on the lead sphere because lead displaces more water.
- None of those statements is true.

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20. A soccer player runs up behind a 0.450-kg soccer ball traveling at 3.20 m/s and kicks it in the same direction as it is moving, increasing its speed to 12.8 m/s. What magnitude impulse did the soccer player deliver to the ball?

- 4.32 kg · m/s
- 5.61 kg · m/s
- 9.79 kg · m/s
- 7.08 kg · m/s
- 2.45 kg · m/s

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21. A car of mass \( m \) traveling at speed \( v \) crashes into the rear of a truck of mass 2\( m \) that is at rest and in neutral at an intersection. If the collision is perfectly inelastic, what is the speed of the combined car and truck after the collision?

- \( v \)
- \( \frac{v}{2} \)
- \( \frac{v}{3} \)
- \( 2v \)
- None of these

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22. A 57.0-g tennis ball is traveling straight at a player at 21.0 m/s. The player volleys the ball straight back at 25.0 m/s. If the ball remains in contact with the racket for 0.060 s, what average force acts on the ball?

- 32.5 kg · m/s²
- 43.7 kg · m/s²
- 72.1 kg · m/s²
- 102 kg · m/s²
- 22.6 kg · m/s²

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23. Question Details
A 5-kg cart moving to the right with a velocity of +6 m/s collides with a concrete wall and rebounds with a velocity of −2 m/s. What is the change of momentum of the cart?

- 40 kg · m/s
- −10 kg · m/s
- −40 kg · m/s
- 0
- −30 kg · m/s

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24. Question Details
A 1.7-kg object moving to the right with a speed of 3.1 m/s makes a head-on, elastic collision with a 1.5-kg object that is initially at rest. What is the velocity of the 1.5-kg object after the collision?

- greater than 3.1 m/s
- less than 3.1 m/s
- equal to 3.1 m/s
- zero
- impossible to say based on the information provided

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25. Question Details
A 3-kg object moving to the right on a frictionless, horizontal surface with a speed of 2 m/s collides head on and sticks to a 2-kg object that is initially moving to the left with a speed of 4 m/s. After the collision, which statement is true?

- The momentum of the system is −2 kg · m/s.
- The kinetic energy of the system is greater than 5 J but less than 20 J.
- The kinetic energy of the system is 20 J.
- The momentum of the system is less than the momentum of the system before the collision.
- The momentum of the system is 14 kg · m/s.

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Assignment Details
Name (AID): Practice Exam Chapters 6-9 (Ungraded) (3103258)
Submissions Allowed: 10
Category: Homework
Code: 10
Locked: Yes
Author: Holcomb, Mikel (mikel.holcomb@mail.wvu.edu)
Last Saved: Oct 31, 2014 12:48 PM EDT
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