Rotational Motion Test Review

⚠ This is a preview of the published version of the quiz

Started: Mar 11 at 10:32am

Quiz Instructions

g = 10 m/s/s

Type the magnitudes of the vectors; do not include negative signs.

Carry the decimals a minimum of two places.

Question 1	1 pts

A meter stick has mass .6 kg and is leaning stationary against a wall. There is a 2 kg mass hanging .3 meters from the top end. The wall is frictionless but the ground is not. The bottom end of the meter stick is .6 meters from the base of the wall. What is the friction force exerted on the stick by the floor in Newtons?

Question 2	1 pts

 A screwdriver is 15 cm long and is used to pry open the lid of a paint can. The person doing the pushing must apply a minimum downward force of 150 Newtons at the handle end of the screwdriver to pop the lid open.   The screwdriver is supported on the end of the can 1.5 cm from the tip. The very tip of the screwdriver is under the lid. What would be the force required in Newtons to lift open the paint lid without the screwdriver?

Question 3   1 pts

A condition for static equilibrium is that the angular velocity of an object remain constant.

○ True

○ False

Question 4   1 pts

In 9 seconds a car accelerates from rest to a velocity at which its wheels are turning at 16 revolutions per second. What is the angular acceleration of the car's wheels in radians per second per second?

[   ]

Question 5   1 pts

In 9 seconds a car accelerates from rest to a velocity at which its wheels are turning at 16 revolutions per second.   If the tires have radius 45 cm, and they rolled on the ground without slipping, how far in meters did the car go in the 9 seconds?

[   ]

Question 6   1 pts

Angular momentum is the product of an object's moment of inertia and the object's angular velocity.

○ True

○ False

Question 7   **1 pts**

Angular acceleration is the slope of the angular position v. time graph.

○ True

○ False

Question 8   **1 pts**

The higher the moment of inertia, the greater the resistance to changes in angular velocity.

○ True

○ False

Question 9   **1 pts**

The higher the moment of inertia, the faster something will roll down an incline.

○ True

○ False

Question 10   1 pts

Henry, who has mass 35 kg, and Jordan, who has mass 40 kg, are trying to balance a seesaw. Henry is sitting 1.4 meters to the left of the fulcrum. How far to the right in meters should Jordan sit from the fulcrum to balance Henry?

Question 11   1 pts

If a car has a linear acceleration of 2.3 m/s/s and a the radius of the wheel is .41 meters, what is the angular acceleration in rad/s/s of the wheel?

Question 12   1 pts

Hector tightens the bolt on his motorcycle with a wrench that is .3 meters long. If he pulls perpendicularly on the end of the wrench with a force of 210 Newtons, how much torque in Nm does he apply to the bolt?

Question 13   1 pts

A disc has a radius of 8 cm. If the disc rotates about its central axis at an angular speed of 6 revolutions per second, what is the linear speed of a point on the rim of the disc in m/s?

Question 14   1 pts

The diameter of a car's steering wheel is .25 meters and the diameter of a truck's steering wheel is .36 meters. Assuming that your applied force is the same for both steering wheels on the outer rims, by what percentage does the torque increase if you are driving the truck rather than the car?

Question 15   1 pts

An acrobat performs by walking on a loose board laid on top of a flat roof such that 2/5 of the board's length extends beyond the roof edge. If the length of the board is 15 ft, the mass of the board is 30 kg, and the mass of the acrobat is 50 kg, how far beyond the edge of the roof can she stand safely on the board in ft?

Question 16   1 pts

The horizontal distance of a bicycle pedal from its axle is about 21 cm. If a bicycle rider with a mass of 60 kg exerts all of her weight on the pedal, what is the torque in

Nm applied?

Question 17   1 pts

The distance from the elbow to a clenched fist of a person is .25 meters. If the person slowly lifts a 7 kg object on planet earth by bending at the elbow, what is the torque exerted at the elbow in Nm?

Question 18   1 pts

For an object to be in equilibrium _____.

○ the net torque on the object or system must be equal to zero

○ the object or system must be stationary

○ both net force and net torque on the object or system must be equal to zero

○ the net force on the object or system must be equal to zero

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Question 19   1 pts

A uniform meter stick of mass .3 kg is pivoted at the .35 meter mark. Where should one hang a mass of .4 kg to balance the stick?

Question 20   1 pts

A traveling disk and a stationary rod are a system and collide on a frictionless table. The rod is struck by the disc at a point far from the rod's center of mass and the rod begins to rotate as well as travel linearly. Which of the following quantities must be the same for the system before and after the collision?

- [ ] mechanical energy

- [ ] heat

- [ ] linear momentum

- [ ] angular momentum

- [ ] kinetic energy

Question 21   1 pts

A stone is tied to a string and whirled in a vertical circle on planet earth. Which of the following could be true? Choose all that apply.

- [ ] The string is most likely to break at the bottom of the circle

- [ ] The tension force is the same everywhere in the circle

- [ ] The tension force and the weight of the stone always affect centripetal force

- [ ] The tension is the least when the stone is at the top of the circle.

Question 22   1 pts

A heavy 3 kg point-like object rests .3 meters from the center of a rough turntable as the turntable rotates. The period of the turntable's rotation is 6 seconds. The coefficient of static friction is .7. What is the magnitude of force friction acting on the object in Newtons?

Question 23   1 pts

Riders in a carnival ride stand with their backs against a wall of a circular room of diameter 9 meters. The room is spinning about an axis through its center at a rate of 40 revolutions per minute when the floor drops so that it no longer provides any support for the riders. What is the minimum coefficient of static friction between the wall and the rider so that the rider does not slide down the wall?

Question 24   1 pts

A 6 kg mass is attached to one end of a 3 meter long rope on planet earth. If the mass is swung in a vertical circle from the free end of the rope, what is the tension (Newtons) in the rope when the mass is at its highest point if it is moving with a speed of 7 m/s?

g = 10 m/s/s

Question 25   1 pts

Inside a washing machine, the radius of the cylinder where the clothes sit is .4 meters. In one of its settings the machine spins the cylinder at 3 revolutions per second. What is the centripetal acceleration magnitude on an item of clothing on the outside rim of the cylinder in m/s/s?

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