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web rotational inertia is given the symbol i i for a single body such as the tennis ball of mass m m shown in figure 1 rotating at radius r r from the axis of rotation the rotational inertia is i mr 2 i mr2 and consequently rotational inertia has web rotational motion we are going to consider the motion of a rigid body about a fixed axis of rotation the angle of rotation is measured in radians s rads dimensionless r notice that for a given angle the ratio s r is independent of the size of the circle example how many radians in 180o circumference c 2 r s r web the imaginary or actual axis around which an object may rotate average angular acceleration α alpha α alpha measure of how angular velocity changes over time the rotational analogue of linear acceleration a vector quantity with counterclockwise defined as the positive direction web feb 20 2022 to determine this equation we recall a familiar kinematic equation for translational or straight line motion v v0 at constanta note that in rotational motion a at and we shall use the symbol a for tangential or linear acceleration from now on web a is required to change the rotational state of motion of an object 4 circle the letter of each statement that is true of rotational inertia a rotational inertia depends on the force of gravity b rotational inertia depends on the mass of an object c rotational inertia depends on the distribution of mass in the object d web kinematics of rotational motion revision questions 1 the rotor of an engine having a radius of 21 cm rotates unformly at 300 rot min calculate the distance travelled by rotor s peripheral points during 10 s take π 22 7 6600 m 66 m 1 32 m 0 66 m reveal answer correct answer b web the kinematics of rotational motion describes the relationships between the angle of rotation angular velocity angular acceleration and time it only describes motion it does not include any forces or masses that may affect rotation these are part of dynamics web rotational motion is defined as a type of motion associated with objects that travel in a circular path types of rotational motion include motion about a fixed axis motion about an axis in rotation and a combination of rotational motion and translational motion web mar 13 2023 rotational motion when a block is moving about a fixed axis on a circular path then this type of motion is called rotational motion torque τ it is the twisting force that tends to cause rotation the point where the object rotates is known as the axis of rotation mathematically it is written as τ rfsin θ explanation web rotational motion problems solutions 12 1 model a spinning skater whose arms are outstretched is a rigid rotating

body visualize solve the speed v r ω where r 140 cm 2 0 70 m also 180 rpm 180 2 60 rad s 6 rad s ππ thus v 0 70 m 6 rad s 13 2 m s π assess a speed of web for rotational equilibrium about the centre of gravity t 1 cos35 x d t 2 cos 55 2 d t 1 t 2 x0 82d 2 x 0 57 0 57d substituting t 1 1 42t 2 1 42 x 0 82 d 0 57 d 1 14 1 73d 1 14 therefore d 0 65m q9 a car weighs 1800 kg the distance between its front and back axles is 1 8 m web the answers to the questions are realistic after unwinding for two seconds the reel is found to spin at 220 rad s which is 2100 rpm no wonder reels sometimes make high pitched sounds the amount of fishing line played out is 9 90 m about right for when the big fish bites figure 10 7 fishing line coming off a rotating reel moves linearly web calculated by displacement over time moment of inertia the is the resistance to rotation radian the is 1 2 pi of a revolution of a spinning object centrifugal force the apparent force that seems to pull an object on a spinning platform toward the outside of the platform is called angular acceleration web an object having mass m does rotational motion its angular velocity is ω and radius of motion path is r find kinetic energy of the object in terms of r ω and m ek 1 2m v^2 v ω r ek 1 2m ω r ² ek m$ω^2$ r^2 2 5 stone having mass web rotational inertia rotational analog of mass for point masses i mr2 i rotational inertia kg m2 m mass kg r radius of rotation m for solid objects i r2 dm parallel axis theorem i i cm m h2 conservation of angular i rotational inertia about center of mass angular momentum of a system will not change web unit 6 rotational motion 5 translating linear equations to rotational equations linear motion rotational motion distance x q displacement x q ave velocity vave wave instant velocity vinst winst how are v and w related web the property of an object that measures its resistance to any change in its state of rotation if at rest the body tends to remain at rest if rotating it tends to remain rotating and will continue to do so unless acted upon by a external net torque web possible answers correct answer explanation for a rotating object or an object moving in a circular path the relationship between angular acceleration and linear acceleration is linear acceleration is given by angular acceleration is and the radius of the circular path is web an object with more rotational inertia is harder to accelerate a number that represents how an object s mass is distributed it s really just mass 2 a spinning top has a moment of inertia of 2 web correct answer 11 the rotational inertia of a wheel about its axle does not depend upon its a diameter b mass c distribution of mass d speed of rotation correct answer 12 when a thin uniform stick of mass m and length l is pivoted about its midpoint its rotational inertia is ml2 12

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