My ap torque and rotational motion review

AP Physics 1: Rotational Kinematics: Angular Position as a Function of Time GraphAP Physics 1: Rotational Motion v s Rotational Motion 1: Rotational K Rotational Motion: Rolling without Slipping & Rotating about Fixed AxisAP Physics 1 : Rotation 5: Relating Translational & Rotational Quantities: Second Hand of a ClockAP Physics 1: Rotation 6: Rotational dynamics: Constant angular velocity movement, Period & FrequencyAP Physics 1: Rotational Kinematics: Constant Angular Acceleration Motion EquationsAP Physics 1: Rotation 8: Constant Angular Acceleration Motion: Two Wheels Linked by a Belt or Two Meshing Gears Attention: This post was written several years ago and may not reflect the latest changes in AP program®. We are gradually updating these articles and will remove this disclaimer when this post is updated. Thank you for your patience! Speaking of spinning motion, you can think of merry-go-round, a fan or even our spinning earth. Rotation is all about grabbing an object and spinning it. Subjects follow many rules while spinning the same way they do when moving on a straight line. You might think that it's easy to be confused by those rules, but the physical analogy of linear motion actually makes rotation rules very easy to remember. In this article, we'll discuss some basic terms and a set of equations in rotational motion. AP® Physics 1 & 2 Crash Course Review will go through all you need to know about rotation and talk about rotation-related questions in AP® Physics and how those equations apply to solve fact-checking questions. The basic elements in MassTo's RotationCenter address questions related to rotation, we should first expand the object moving from one point to a real object with shape and scale. In linear motion, we often treat objects as if they were single particles, and we assume that all forces are impacted only on a single point representing the object. But how can we be sure? Why is that point summarized and represents the entire audience? If you ever balance a pen on your finger, you should be so familiar that you can always find a specific point to keep the pen from falling. The position of the point varies from pen to pen and is not always in the middle. That certain point is called the center of mass. In other words, the center of the volume is the point where all the volume of the object can be considered concentrated. Pivot PointA pivot point is a medium of rotation. It can be the center of the volume or any point you choose. Force impact at this time will not contribute to the rotation. TorqueTorque is the measure of the effectiveness of a force such as making an object accelerate rotation. Still not What is torque? To understand the torque, let's first recall for a while that you use a wrench to loosen a bolt. Example 1When impacted on the same position, a larger force is usually more effective than a small force. It's easier to turn the chess when we push it by a larger force. Example 2If impacted on another location, the same force can have different effects. You will find it more effective pushing the flag at the end than in the middle. The closer you are to the spindle, the harder it is for you to rotate the flag. Example 3 What about changing the angle of the force of impact on the flag? As shown in the image below, F1 is always perpendicular to the perimeter while F2 has an angle and F3 is parallel to the perimeter. F3 certainly won't contribute to the rotation of the flag and you may find F2 less effective than F1 when doing the job. To summarize what we discussed earlier, we can see that the effect of rotating the chess actually involves 3 factors: Force (in example 1), distance from the pivot point (e.g. 2) and angle (example 3). So then people think of combining these elements together and ... Boom, we have the torque equation:tau =rFsin { theta }Now let's see what we are really calculating. Torque is technically a vector, but for AP® Physics 1&2, you can simply calculate the intensity of torque and rotation (clockwise or counter-clockwise). The term Fsin { theta } equals the strength of force perpendicular to the lever arm. Therefore, we get a variable that is the product of force and distance, so the unit for torque is Newton·meter (Nm). Using this equation, if θ is between 0 and 90 degrees, τ becomes smaller as θ decreases. The change in radius and force also affects torque in the same way. Angular velocity and angular accelerationIf the object has dialed, what are the variables to describe its movement? Just like velocity and acceleration in linear motion, angular velocity and angular acceleration describe the movement of an object or of a specific point on an object. The angular velocity describes the speed at which an object is spinning. It is equal to the angle divided over time, annoted omega =frac { Delta Phi }{ Delta t }. The direction of the angle velocity perpendicular to the rotation plane, is determined by the rule on the right. Angular acceleration is the rate of change of ω, descriptive to α.Moment of Inertia, also known as rotation inertia, the moment of inertia used to describe the tendency of an object to continue spinning before torque is impacted on it. To better understand ineries, compare ineries with volume. Mass is the tendency of an object to resist changes in its movement. To make an object move, we add a force to it. To make a rotating object, we promote a torque. While F = ghost, torque equals the moment of angular inerness Rotation inerness is expressed as I.tau =IalphaSo so what determines the time of inerness? Let's first look at an example in figure skating. If athletes want to speed up while spinning, they draw in their arms and legs. Why would this do? Because ineries are related to mass distribution. The farther an object from the pivot point or axis, the harder it is to make it spin. So when athletes fold their arms, they are reducing their rotational ineries, thereby reducing the torque needed to make them rotate and raise the angular velocity. About rotational balanceAfter getting used to rotating terms, we can see how those terms apply in solving problems. First, we want to determine when an object can reach the state of balance. Translation balance is achieved when the total force of impact on the subject is 0. Similarly, rotation balance is achieved when the total torque acts on the object to a non-. Be careful, in a rotating balancing state does not necessarily mean that the object does not rotate, it can also rotate around the center of its mass at a constant speed. If the subject is completely rested, it is believed to be in a static balance state .sum { tau } =0Tackling Rotation-related QuestionsThe first type of questions you might meet on test date is finding center of mass. The location of the center is related to the distribution of mass in the object. In general, we use the equation below to calculate the position of the volume center. { x }_{ CM }=frac { x }_{ 1 }{ m }_{ 1 }+{ x }_{ 2 }{ m }_{ 2 }+{ x }_{ 3 }{ m }_{ 3 }+... ...+{ x }__{ { n}{ m }_{ n } }{ { m }_{ 1 }+{ m }_{ 2 }+{ m }_{ 3 }+......{{ m }_{ } }For objects with uniform density, uniform objects, the center of mass is located in the center of the picture. For example, for a uniform stick, the center of volume is the middle point of the bar. Always remember that the center of mass can be placed outside the body of the object, such as the center of a mass ring located in its center. For other systems, just use the equation above. For example 4Now we have a unified 2 kg bar with the length of L. M1 = 40kg, M2 = 60kg, M3 = 70kg, M2 is attached to a quarter of the point of the bar. If we attach it to the ceiling, where should the string be attached to achieve an even state of balance? This really requires you to find the center of volume. First select a point as a reference point. You can choose wherever you want as long as it's easy to calculate. Then figure out the distance between the object and the reference point. Finally, use the formula. For example, let's choose the middle point to calculate. { x }_{ CM }=frac { x }_{ 1 }{ m }_{ 1 }+{ x }_{ 2 }{ m }_{ 2 }+{ x }_{ 3 }{ m }_{ 3 } }{ { m }_{ 1 }+{ m}_{ 2 }+{ m }_{ 3 } } } = frac { { L/2}{40kg}+{ L/4 }{ 60kg}-{ L/2}{70kg} }{ 40kg + 60kg+ } = 0The results show that the volume center is located exactly above middle point. The second type of question may be how to achieve a state of balance. For example 5A 2 kg unified bar is attached to the wall in the middle point. The thread has a 30 degree angle to the wall. M = 40kg. The system is in an balanced state. Find the tension in the thread. First specify the pivot point as the attachment point at the left end of the bar. According to the total { tau } =0, the torque M that acts on the bar is MgL. Do not forget to add torque due to the weight of the bar, mg(L/2). To eliminate the effect of the totality of these 2 torques, the thread should exert another torque equivalent to the size of the MgL but in the opposite direction. Then we haveT(L/2)cos30 = MgL + mg(L/2)T = 2Mg+mg/cos30 = 1620frac { sqrt { 3 } }{ 3 } NYou may wonder why the normal force caused by the wall does not contribute to rotation. That's because normal force goes straight through the shaft, so the torque that it causes is not. In short, rotation is very similar to linear motion in any way. The chart below will help you better remember the relationship between linear motion and rotation. Linear MotionRotational MotionForce (N)Torque τ (N·m)Velocity (m/s)Angular velocity ω (rad/s)Acceleration (m/s2)Angular acceleration α (rad/s2)massrotational inertiaF = maτ = IωLooking for AP® Physics 1 & 2 practice? Check out our other articles on AP® Physics 1 & 2.You can also find thousands of practice questions on Albert.io. Albert.io allows you to customize your learning experience to target practice where you need the most help. We'll provide you with challenging practice questions to help you gain proficiency in AP® Physics 1 & 2.Start practice here. Are you a teacher or administrator interested in promoting AP® student outcomes® Physics 1 & 2? Learn more about our school licenses here. It's here.

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