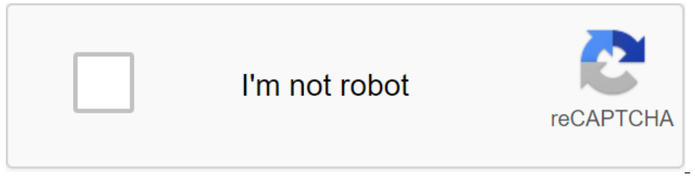

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Dynamics a level physics notes pdf

· The first law is: if the body is at rest, it is left alone or if it is in motion, it moves at an even speed until it is affected by force or torque of the Second Law: the rate of change in the body's impulse is proportional to the result of force and occurs in the direction of force; Facial Third Law: If Body A exerts force on body B, then body B exerts equal but opposite force on body A, forming the reaction of the mass weight pair Is measured in kilograms of Scalar quantity Standing throughout the universe Measured in Newtons Vector amount Not constant Va-mg Mass: is a measure of the amount of matter in the body, and is the property of the body, which resists the change in movement. · Weight: this is the force of gravitational pull (rendered by the Earth) on the body. · Linear Pulse: Product mass and p Strength: The rate of change in impulse F (mv - mu) / t Principle of maintaining a linear pulse: when the body in the system interacts, the overall impulse remains constant provided that the external force does not act on the system. mAuA - mBuB - mAvA - mBvB Common impulse is retained Total kinetic energy saved Example: two identical spheres collide elasticly. Initially, X moves at v and Y motionless. What happens after a collision? X stops and Y moves at speed v Relative speed before collision - Relative speed after collision uA - uB - vB - vA relative speed of approach - relative speed of separation o Common impulse is maintained a completely invulnerable collision: only momentum is saved, and particles stick together after a collision (i.e.. Move at the same speed) In invulnerable collisions, total energy is retained, but Ek can be converted into other forms of energy, such as Heat Chapter 3 - Dynamics (Forces) Newton 1st Law: the object will still be at rest or in continuous linear motion if the change is caused by force acting on it. The object is either in constant motion or at rest of the 2nd Newton's Law: as a result, the force (F) is equal to the mass (m) of an object multiplied by its acceleration (a) in the same direction as the result of force. F and ma Applcation: Unbalanced forces - resulting in force at Obj object either accelerates or slows down Newton's 3rd Law: For every action (force) there is an equal and oppositional reaction (strength). Applying Newton's Laws: Drawing a Free Body Chart - Identify the forces involved Identify the forces involved in determining friction: The force that confronts the movement of the object (Note: if the object does not move - there is no friction force) Static friction: Friction between 2 solid objects that do not move towards each other Kinetic friction: Friction between 2 objects that are moving in relation to Other General Static Friction and Kinetic Friction Application: Draw a FBD moving object with frictional force This is a short note about dynamics that includes the movement and preservation of linear momentum for the level of CIE A Physics.4.1 Momentum and Newton's motiona laws) understand that mass is a body property that resists change in motionMass: it is a measure of the number of matter in the body, and is the property of the body that resists the change in movementIn kinematics, the movement of the body does not depend on its mass, it is a change in its state of motion, which depends on / depends on its mass) to remember the relationship of F and ma and solve problems using it, assessing that acceleration and cutting force is always in the same direction) to identify and use linear impulse as a product of mass and speedLiner pulse: the body is determined as a product of its mass impulse , ie m vMomentum - Mass x velocityp (kgms-1) m (kg) x (ms-1)d) to identify and use force as the rate of change momentumForce: defined as the rate of momentum change, i.e. F th m (v - u) / t - ma or F - v dm / dt The one Newton: defined as the force needed to accelerate the mass of 1 kg by 1 m s-2. F'Dp/Dte) state and apply each of the laws of Newton's movement of the First Newton Act Each body continues in a state of rest or uniform movement in a straight line, if pure (external) force acts on it, when there is no external unbalanced (result) force acting on the body, its speed remains constant. An external force is required to change the speed of the body. Internal forces do not affect the object of motion The object remain at rest or in a straight line of motion at a constant speed if acting on external unbalanced forces. External force must be unbalanced, i.e. two equal opposing forces will not change the speed of the body. The vector amount of force should be greater than in the second law of Newton The rate of change in the body's impulse is directly proportional to the pure force acting on the body, and the change of momentum occurs in the direction of pure force1. When an external, unbalanced force acts on an object, the object accelerates in the same direction as the F pure force on the object. Acceleration A, changes directly as pure F power, and back as mass of the object, ma q F, for m constant.a 1/m, for F constantThus, Newton's Law 2nd Special Case of Law1, when F q 0.a 0, and v Constant. Please note that F, a and v are in the same direction. In nature, the only situation in which there is only one force acting on the body is when it falls through a vacuum. In other cases, there is more than one force, although the directions may differ. The concept of inertia is a fundamental property of an organ that measures its reluctance to change its state of movement... the body's ability to withstand changes in (the cause of law 1). Body weight is a measure of this body's inertia. The more massive the body, the greater its inertia. Newton's Third Law When object X exerts force on object Y, object Y exerts the same type of force, which is equal in size and opposite in direction on object X.The two forces ALWAYS act on different objects, and they form a pair of reaction actions. If they were acting on the same body, we would never accelerate, because as a result, the force on any body would be zero. The acceleration of the two objects is different if their masses are different, so, F1 - F2becomes, m1a1 - m2a2 Acceleration now depends on the inertial mass of objects. Therefore, although there are equal and opposing forces, forces cannot be balanced, causing the result of movement/acceleration of two bodies. The interaction between one body and the other is due to the forces between them4.2 Not uniform motion:a) describe and use the concept of weight as the influence of the gravitational field on the mass and resemble, that the weight of the body is equal to the product of its mass and the acceleration of free fall Weight - gravity exerted on the object (or force on the supporting scale)Weight (N) - mass (kg) x (N/kg) g'gravitational field strengthb) qualitatively describe the movement of bodies falling into an even gravitational field with air resistance, when any object moves through the air, air offers friction resistance (drag) This causes the object to slow down. The slowdown is not permanent, but depends on the speed of the object. The faster the object, the greater the resistance and slowdown. You can experience this when you run - the faster you run, the harder the air seems to blow against. Therefore, if the body falls under the influence of gravity, the air resistance resists the fall, and therefore the downward acceleration decreases. This means that bodies falling into the air take longer to fall the same distance than in a vacuum, the principle of maintaining momentumWhen the objects of the system interact, their overall momentum before and after the interaction is equal, if there is no pure (external) force acts on the systemThe overall momentum of the isolated system is constant m1 u2 - m1 v1 - m2 v2, if pure F No 0 (for all collisions) NB: The overall momentum of the interaction DURING/collision is also maintained (completely) elastic collision: Unmentioned collision: Only momentum is saved, total kinetic energy is not retained and particles stick together after a collision (i.e. move at the same speed) When collisions are unclear, general energy is retained, but kinetic energy can be stored Converted into other forms of energy, such as sound and thermal energyOnly: Resolved issues on the dynamics of the 1A ball X and Ball Y travel in the same straight line in the same direction as shown in the fig below. The Y ball has a mass of 600 g and a horizontal speed of 0.45 m c-1. Ball X prepares and collides with the ball Y. After the collision X has a horizontal speed of 0.41 m c-1 and Y has a horizontal speed v, as shown belowCalculate (i) the total initial pulse of the two balls, (ii) speed v, (iii) the total initial kinetic energy of the two balls. (iv) Explain how you would check whether the collision is elastic (v) Use Newton's Third Law, to explain why during the collision the change of pulse X is equal and the opposite of changing the pulse Y.Before the collision, the balls are moving in the same direction, therfore, the overall momentum before the collision - m1u1 m2u2 0.4 0.65 0.60.45 y 0.53 kgms-1Thee initial pulse of two - 0.53 kg-1Le. столкновение, шары также двигались в том же направленном импульсе после столкновения - m1v1'm2v2' 0.4'0.41 - 0.6'vtotal импульс перед столкновением - общий импульс после столкновения (закон сохранения линейного импульса)0,53 x 0,16 0,6v0,6v й 0,37v 0,37/0,6v и 0,617iii) общая начальная кинетическая энергия двух шаров1/2 m1 u1'2 2u2'21/2 0,4'0,65'2 1/2 0,6'o.45'20.145 Jiv), как бы вы проверили, является ли столкновение эластичной проверкой того, равна ли относительная скорость подхода относительной скорости разделения конечной кинетической энергии, равной общей первоначальной кинетической энергии) Использование Третий закон Ньютона, чтобы объяснить, почему, во время столкновения, изменение импульса X равно и противоположно изменению импульса третьего закона YNewton Когда объект X оказывает силу на объект Y, объект Y оказывает силу того же типа, что равны по величине и напротив в направлении на объекте X.Change в импульсе x -1 (v-u) - 0,4 (0,41-0,65) y m2 (v-u) 0.6 (0.617-0.45) - 0.1kgms-12 шариков будут иметь такое же время удара во время collisiontherefore -Fx и Fy ..... this meet newton's third law of motionIt can be delivered this way: the forces on the two bodies (or on X and Y) are equal and the opposite time for both forces and strength is the change of momentum / timeTwo balls X and Y are supported by long strings, as shown below balls are each pulled back and pushed towards each other. When the balls collide in a position shown in the pic. 3.1, the strings are vertical. Balls rebound in opposite directions The figure below shows data for X and Y during this collision. The positive direction is horizontal and right. Use the preservation of linear pulse to determine the mass of M Y. From the key points givenm1u1 m2u2 m1v1 m2v2B coollision objects move in the opposite direction to each other, and this is the reason for the negative speed included in the questiontherefore, the entire mometum before the collision ism1u1 - m2u2 - 0.05 th 4.5 - M 2.8 note that the mass is in grams (50g), but it has been converted into a kilogram (0.05), so that the whole device will be in the S.I base unit. After the collision, the total momentum ism2v2 -m2v2 - MH 1.4 - 0.05 th 1.8th Of the Law of Maintaining Linear Impulse0.05 1.5 - M 2.8 m 1.4 - 0.05 1.8 Gathering, As terms0.225 0.09 th 4.2 M0,315 th 4.2 MMM 0.315/4.2 M 1 0.075 kg 0r 75gA baby on sleigh glides down the slope with acceleration A. Holm makes a corner θ with horizontalAl mass of the child and sledge m. Accelerating free fall g. What is the friction force of F? A m (g cosθ - a) b (g cosθ a) c m (g sinθ - a) d m (g sinθ a) According to newton's first law, theObject movement is left alone or in a straight line at a constant speed if we do not act on external unbalanced forces, so we have two unbalanced forces acting on the boy, which are a force down the slope and a friction. The body accelerates evenly down the hill due to eat as a result of force or pure forcethe pure force - matherefore, F-Fr and maF is a force down the slopeFr is a frictional force opposing the movement boyF - mgsinθmgsinθ - Fr and maFr - mgsinθ -mafactorise, we then have gsinθFr dynamics a level physics notes pdf