Physics (New Book) - 9th Class Physics Chapter 3 Long Question Preparation

Q1. Explain braking and skidding

Ans 1: The wheels of moving vehicles have two velocity componentsmotion of wheels along the roadrotation of wheels about their axisto move a vehicle on the road as well as to stop a moving vehicle requires friction between its tyres and the road. For example, if the road is slippery or the tyre are worn out then the typre instead of rolling, slip over the road,The vehicle will not move if the wheels starts slipping at the same point on the slipper ty road. Thus for the wheels to roll, the force of friction9gripping force 0 between the tyres and the road must be enough that prevents them from slipping.if we want to stop a car quickly, a large force of friction between the tyres and the road is needed. But there is a limit to this force of friction that tyres can provide. If the breaks are applied too strongly, The wheels of th car will lock up (stop turning) and the car will skid due to its large momentum. If we want t o reduce the skidding, it is necessary not to apply breaks too hard that lock up their rolling motion. It is unsafe to derive a vehicles wit worn out tyres .

Q2. define and explain friction

Ans 1: Friction: the force that opposes the motion of moving objects is called frictionFactors: in case of solid, forces of friction between two surfaces depends upon many factors such as:nature of two surfaces in contactpressing force between them

Ans 2: Explanation: No surface is perfectly smoot. A surface that appear smooth has pits and bumps that can be seen under a microscope, the contact points between two surfaces form a sort of cold welds there cold welds resist the surfaces from sliding over each other. Adding weight over the surface increase the pressing force that increase the resistance.Limiting friction: maximum value of friction is known as force of limiting friction

Ans 3: Mathematical form: Let a body is at rest if a force is applied to body and body remains at rest then the friction is equal to the applied force that tends tot move a body at rest, it increases with t applied force. Friction can be increased to certain maximum value it does not increase beyond this. This maximum value of friction is force of limiting friction. It depends on normal reaction(pressing force) between two surface in contact

Ans 4: Coefficient of friction: ratio between the force of limiting friction Fs and normal reaction R is constant. This constant is called the coefficient of friction. Coefficient of frication has no unit as it is a ration between two same quantitates.

Ans 5: Uses of friction: friction is needed to walk on the ground. it is risky to run on wet floor with shoes that have smooth soles. Athletes use special shoes that have extraordinary ground grip. Such shoes prevent them from slipping while running fast .To stop a bicycle we apply breaks the rubber pads pressed against the rims provide friction. it is the friction that stops the bicycle.

Q3. State the Newton's first law of motion & Second law of motion.

Ans 1: Newton first law:
A body continues in its state of rest or of uniform motion in a straight line provided no net force acts on it.
Explanation for rest:
Similarly Newton's first law of motion deals with bodies which are either at rest or moving with uniform speed in straight lineAccording to first law of motion, a body at rest remains at rest provided no net force on it .thispart of the law is true as we observe that objects do not move by themselves unless some moves it.
Explanation for motion:
Similarly a moving object does not stop moving by itself. A ball rolled on a rough ground stops earlier than that rolled on smoothground. It is because rough surface offer greater friction. If there would be no force of oppose the motion of the body would never stop
Newton's Second Law of Motion:

When a net force acts upon a body, it produces as acceleration in the body in the direction of force and the magnitude of acceleration is directlyproportional to the net force and is inversely proportional to the mass of the body.
Mathematical From:
If the force f is acting on the body of mass m then we can write this in the mathematical form is as
a x f _____>(1)
a x 1/m _____> (2)
From (1) and (2) we have
a x F/m
a = Constant x F/m
a = k x F/m
In the above equation according to the international system units if m= 1kg
a = 1ms-²,F= 1N then the value of k will be 1. So the equation can be written as
a=1x F/m
F= ma

Q4. Derive relation for tension and acceleration when two bodies moving along vertically

Ans 1: Consider two bodies A and B of masses m1 and m2 respectively. Let m1 is greater than m2. The bodies are attached to the opposite ends of an inextensible string. The string passes over a frictionless pulley. The body A being heavier must be moving downward with some acceleration. Let this acceleration be a. At the same time, the body B attached to the other end of the string moves up with the same acceleration a. As the pulley is frictionless, hence tension will be the same throughout the string. Let the tension in the string be T.

Q5. A force of 20 N moves a body with an acceleration of 2ms-² What is the mass.

Ans 1: F = 20 N
a= 2ms-²
m=?
Solution:
F=ma
So m= 20/2
m = 10 kg

Q6. Write the advantages and disadvantages of friction, also give methods to reduce friction

Ans 1: Advantage; sometimes friction is most desirablewe cannot write if there is no friction between paper and pencilfriction enables us to walk on road. We cannot run on a slippery ground because a slippery ground offers very little frictionbirds cannot fly if there is no air resistance

Ans 2: Disadvantages: friction has advantages as well as disadvantagesfriction is undesirable when moving at high speeds because it opposes the motion and limits the speed of moving objectmost of our useful energy lost as heat and sound due to friction between various moving parts of machinesin machines friction causes wear and tear of their moving parts

Ans 3: Method to reduce friction: friction can be reduced bymaking sliding surfaces smoothmaking fast moving objects a streamline shape (fist shape). Such as cars, aero planes etc, this causes the smooth flow of air a nd thus minimizes the resistance at high speeds.lubricating the sliding surfacesusing ball bearing or rollers bearing. Because rolling friction is lesser than sliding friction

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Q7. Write third law of motoin. explain it with examples

Ans 1: Statement: to every action there is always an equal but opposite reaction

Ans 2: Explanation: Newtons third law f motion deals with the reaction of a body when a forces acts on it. Let a body A exerts a

force on another body B, the body B reacts against this force and exerts a force on body A. The force exerted by body A on V is the action force whereas the force exerted by body B on A is called the reaction force.

Ans 3: Example: Consider a book lying on a table. The weight of the book is acting on the table in the downward direction. This is the action. The reaction o f the table acts on the book in the upward direction. Take an air filled balloon. when the balloon is set free, the air inside it rushes out and the balloon moves forward. In this example, the action is by the balloon that pushes the air out of it when set free. The reaction of the air which escapes out from the balloon acts on the balloon. it is of the air which escapes out from the balloon acts on the balloon. It is due to this reaction of the scaping air that moves the balloon forward.

Q8. Define rolling friction. Also explain why rolling friction is less than sliding friction

Ans 1: Rolling friction: force of friction between body and surface when a body rolls over a surface e.g. when a wheel rolls on ground

Ans 2: Sliding friction: force of friction between body and surface when a body slides over a surface. when a wooden block moves over asurface of table then the force friction between block and surface of table is sliding friction

Ans 3: Comparison of rolling and sliding friction: rolling friction is less than sliding friction because in rolling friction a body rolls without rupturing the cold welds , while in sliding friction a body slides' by rupturing the cold welds so sliding friction is more than rolling friction

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Q9. Explain Newtons first law of motion

Ans 1: Statement: A body continues its state of rest or of uniform motion in a straight line provided no net force acts on it.

Ans 2: Explanation: first law of motion deals with bodies which are either at rest or moving with uniform speed in a straight line. According to Newtons first law of motion, a body at rest remains at rest provided no net force acts on it.

Ans 3: At rest: this part of the law is true as we observe that object do no move by themselves unless someone move them. For example a book lying on a table remains at rest as long as no force acts on it

Ans 4: At uniform speed: similarly a moving object does not stop move by itself. A ball rolled on a rough ground stops earlier than that rolled on a smooth ground. It is because rough surfaces offer greater friction. If there would be no force to oppose the motion of a body then the body would never stop

Ans 5: Law of inertia: Since Newtons first law of motion deals with the inertial property of matter , therefore , Newtons first law of motions is also known as law of inertia
Example: We have observed that the passengers standing in a buss fall forward when its driver applied breaks suddenly. it is because the upper parts of their bodied tend to continue their motion , while lower parts o their bodies in contact with the bus stop with it. Hence they fall forward

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Q10. Define and explain centripetal force

Ans 1: Centripetal force: a force that keeps a body to move in a circular path is called centripetal force

Ans 2: Explanation: Consider a body tied at the end of a string moving with uniform speed in circular path. A body has tendency to move in a straight line due to inertia. The string to which body is tied keeps it to move in a circle by pulling the body towards the center of circle. The string pulls the body pre appendicular o its motion. This pulling force continuously changes the direction of motion and remains towards center of circlewe can conclude the following resultseverybody needs centripetal force to move in a circlecentripetal force is always directed toward the centerit has no component in the direction of motionthis force always acts

perpendicular to direction of motion of a Bodydirection of motion of a body at any point moving in a circle can be found out by drawing tangent at that point

Ans 3: Example: consider a stone tied to one end of a string rotating in a circle . The tension in string provides the necessary centripetal force. if string is not strong enough to provide necessary tension, it breaks and the stone move away along the tangent to the circle.Moon revolves around the earth. the gravitational force of earth provides necessary centripetal force