**2. FRICTION**

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| **TERMINOLOGIES IN FRICTION:**   1. NORMAL REACTION (): 2. FORCE IN DIRECTION OF POSSIBLE MOTION (): 3. COEFFICIENT OF FRICTION ():  |  |  | | --- | --- | | Static Friction Coefficient () | Kinetic or Dynamic Friction Coefficient () |  1. FRICTIONAL FORCE (): | Friction |

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| **DYNAMICS ANALYSIS** | |
| **KINEMATICS:** Without considering Force | **KINETICS:** With considering force |

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| **LAW OF DRY FRICTION:**   1. The frictional force opposes the relative motion. (Coulomb’s Law Statement-I) 2. The frictional force acts tangential to the contact surfaces. (Coulomb’s Law Statement-II) 3. The total friction developed doesn’t depend upon the contact area. 4. The maximum friction in static case, 5. Force required to sliding is frater than that is required to maintain sliding. | **GRAPHICAL REPRESENTATION OF FRICTIONAL FORCE:**  draw graph connecting frictional force and applied force mark static  friction kinetic friction and limiting - Physics - - 9854509 |  Meritnation.com |

**UNDERSTANDING THE FRICTIONAL FORCE:**

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| If . | If |

**Impending Condition:** Body is about to move but block hasn’t started motion.

**Condition for Static Equilibrium**:

**When to use the limiting frictional force ():**

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| 1. Limiting Friction 2. Impending Condition | 1. Maximum Force for equilibrium 2. Minimum force to start motion (Force just to start motion) |

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| **ANGLE OF FRICTION ():**   |  |  | | --- | --- | |  |  |   **At Limiting Friction,**  **CONE OF FRICTION:** Cone generated with cone angle is known as cone of friction. | 4 (a) A spatial friction cone. The half-angle of the cone is β = tan −1...  | Download Scientific Diagram | what is relation between angle of friction and angle of repose and how we  this in solving questions wg6ejett -Physics - TopperLearning.com |

* Minimum force required to cause the motion in the block,

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| **BELT FRICTION:** | Angle of contact,  Friction between belt and friction,  Tight side and slack side tension. | The side of belt which will try to create the motion or higher force is applied is the tight side. |

* After deciding tight side and slack side we can decide the Force/ Tension is either minimum or maximum.

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| Sliding: Consider Equilibrium of forces.  Tipping: Consider Moment Equilibrium about tipping point.  For Inclined Block at angle with self-weight,   |  |  |  | | --- | --- | --- | |  |  |  | | Static Cond. | Impending Cond. | Motion | |  |  |  |   Angle of friction. | A block of mass 2kg rest on a rough inclined plane making an angle 30° with  horizontal. The coefficient of static friction between block and plane is  0.7. What is the frictional |  |

**ANGLE OF REPOSE:** It’s the angle at which block slides on any surface.E.g.For inclined surface AOR

Min. and Max. force required to **stop sliding** the bock on inclined surface found by changing the direction of friction.

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| Both are smooth (Unstable) | Wall is rough & floor is smooth (Unstable) | Floor is rough & Wall is smooth (stable) | Floor is rough & Wall is rough (stable) |
| Pythagoras Theorem |  |  | |

Stability of inclined ladder increases including angle of inclination Because .