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Introduction to Mechanics

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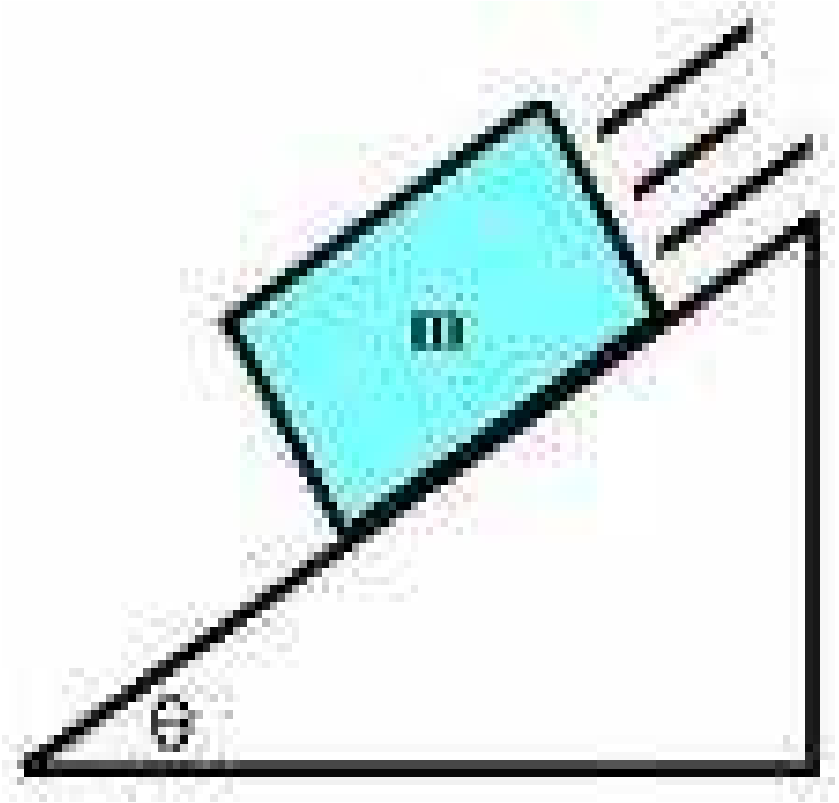
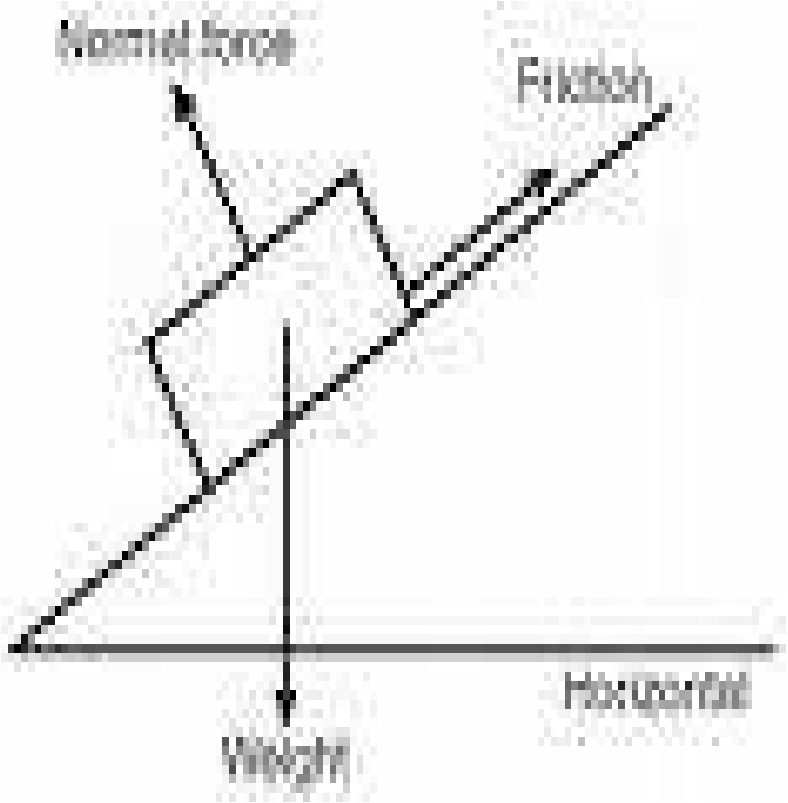
What is Mechanics???

- Mechanics is the branch of physics concerned with the behavior of physical bodies when subjected to forces or displacements, and the subsequent effect of the bodies on their environment.
- Applied mechanics is a branch of the physical sciences and the practical application of mechanics
- Applied mechanics can be subdivided into statics, dynamics, fluid mechanics, deformation mechanics among others
- Dynamics deals with the **effects of forces** on the **motion of objects**

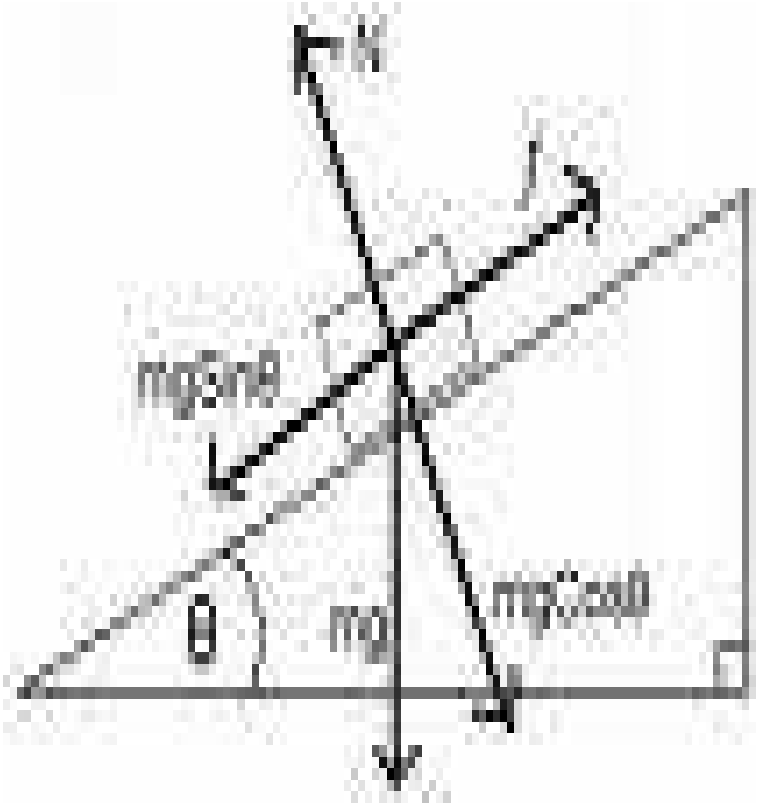
Motion along an inclined plane





Equations of dynamic motion

- Normal Reaction N = mgCosΘ
- Frictional force f = μN = μmgCosΘ
- Resultant force F along the inclined plane is F = mgSinΘ - μmgCosΘ
- Resultant acceleration is given by a = gSinΘ - μgCosΘ



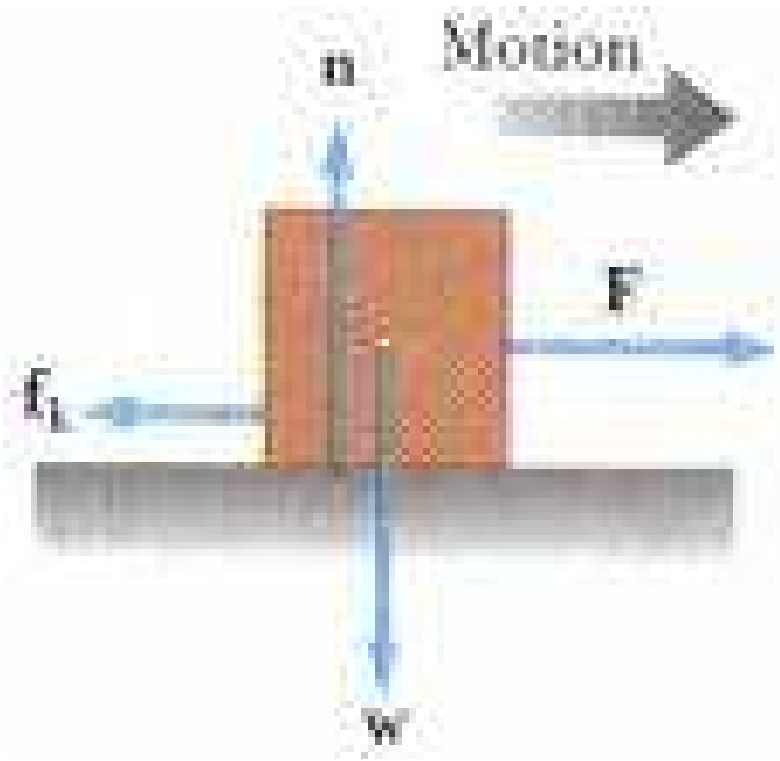
Equations of kinematics

On the Inclined plane

- a = gSinΘ - μgCosΘ
- Final velocity v = u + at (Assuming u = 0)
- Displacement S = ut + (at^2)/2 where u = 0

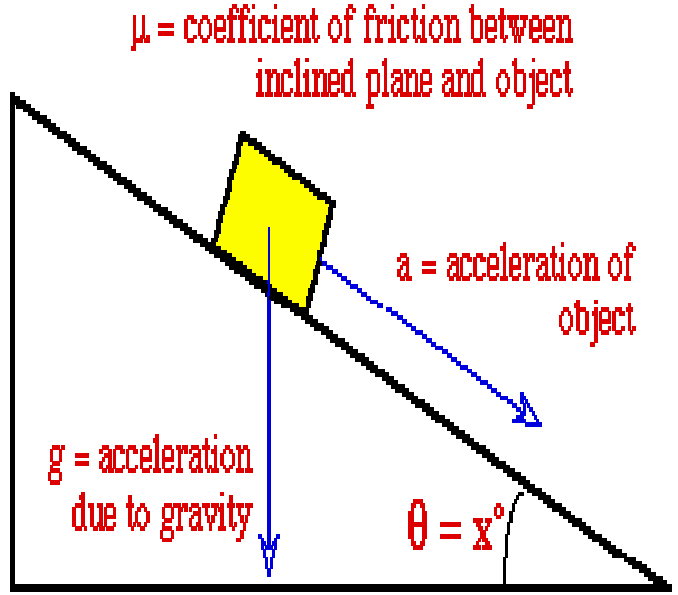
On the ground

- F = 0, f = μN = μmg
- Resultant force = F – f = -μmg
- Resultant acceleration a = -μg
- Final velocity v = u + at
  where v = 0 and a = -μg
- Displacement S = ut + (at^2)/2
  where a = -μg



Measuring the acceleration

- A single-axis accelerometer
- Determination of direction of sensing plane
- Collecting the data
- Determination of other parameters



Acceleration of an object on an inclined plane

References

- Wikipedia, the free online encyclopedia
- http://www.physicsclassroom.com

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Dynamics – May the ‘Force’ be with you!!!