

IB Physics HL Notes

Forces and Dynamics

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DYNAMICS

* The explanation of the causes of motion due to forces.

4 "fundamental forces" of nature

- | | | |
|-------------------|-------------|------------------------|
| - Strong force | ↓
Weaker | (keeps p^+ together) |
| - Electromagnetic | | (+ -) |
| - Weak force | | (nucleus) |
| - Gravity | | ("graviton") |

* Force is a vector \vec{F} : with both direction and magnitude.

* F_{AB} is "the force of A on B."

* Forces can:

- cause an acceleration
- change direction
- do nothing
- cause work $W = Fd$
- change shape

* Types of forces:

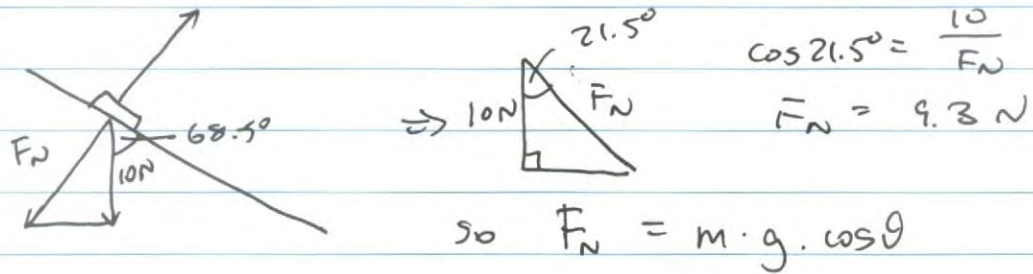
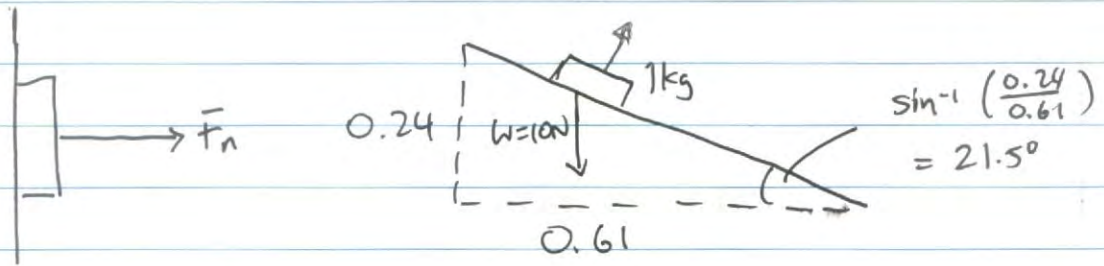
- centripetal force F_c
- gravity F_g
- friction F_f

• static friction $F_{fs} = F_s$

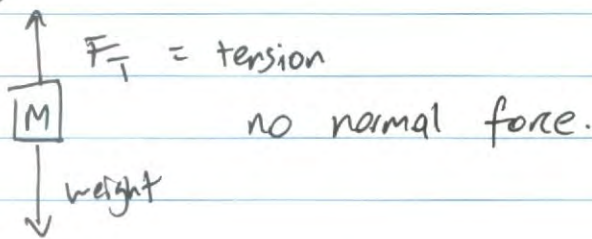
• dynamic / kinetic friction $F_{fk} = F_k$

- electromagnetic force F_e (Coulomb's force)
- normal force $F_N = N =$ "normal interaction"
⇒ i.e. perpendicular to the surface. (\perp)
force that a surface exerts to an object.

Free body diagrams



Springs



Drawing FBD.

- + isolate an object
- & draw xN ← mass
- + draw forces acting on it.
- NB/ vector length is magnitude.
- * resolve the forces into x + y components.
- + / - forces to get 1 resultant force per axis.
- or with θ .
- * express FBD with resultant force. ΣF

