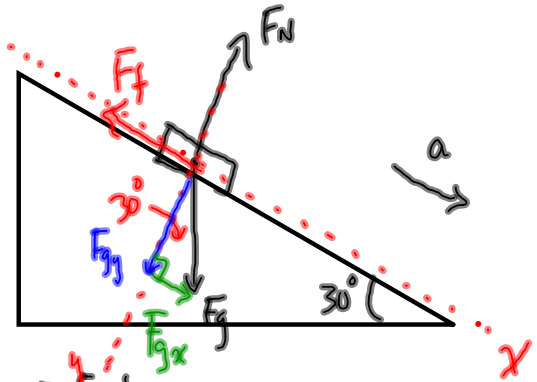
Incline Problems



Note: $F_N \neq F_g$ on an incline.

$F_N = F_{gy}$

$m = 50\,kg$

a) frictionless $\Rightarrow a = ?$

b) $\mu_k = 0.15$, $a = ?$

Along the x-axis:

$\vec{F}_{net} = m\vec{a}$

$F_{gx} = ma$

$F_g \sin\theta = ma$

$mg \sin\theta = ma$

$a = g\sin\theta$

$a = (9.81\,m/s^2)\sin 30°$

no friction → $\boxed{a = 4.9\,m/s^2}$

b) $\vec{F}_{net} = m\vec{a}$

$F_{gx} - F_f = ma$

$F_g \sin\theta - \mu F_N = ma$

$F_g \sin\theta - \mu F_{gy} = ma$

$mg\sin\theta - \mu F_g \cos\theta = ma$

$mg\sin\theta - \mu mg\cos\theta = ma$

$g\sin\theta - \mu g\cos\theta = a$

$\cos\theta = \frac{adj}{hyp}$

$\cos 30° = \frac{F_{gy}}{F_g}$

$F_{gy} = F_g \cos 30°$

from (a) → $4.905\,m/s^2 - (0.15)(9.81\,m/s^2)(\cos 30°) = a$

$4.905\,m/s^2 - 1.27\,m/s^2 = a$

$\boxed{a = 3.6\,m/s^2}$ ← with

Determining g on an Incline

- Not a formal lab!
- Title Section
- Preliminary Questions
- Data/Observations
  - Sample Graphs (Pick one trial - d-t, v-t (slope) graph)
    be sure to identify.
  - Data Table
- Analysis
  - show sample calculations.
  - GA graph (title | axes labelled properly | (0,0))

4. Give equation & use approp variables
   - Show the extrapolated value
   - linear regression
6. % error = $\frac{\text{exp} - \text{true}}{\text{true}} \times 100\%$

7. + 8. N/A

9. Does it make sense to have $\theta = 90°$ for free fall? What are some of the problems with extrapolation?

- Extensions
  1. Consult at least 3 references. (+ cite)
  2. FBD => derive a general expression for acc (include friction)

ADV: Estimate a value for μ_k (using the equation from derivation and the one from GA)

Oct 5-12:26 PM