Reminders 08-05-09:

- **9th Webassign due Tonight 11:59PM**
- **Exam 4 Chapters 9-11 Tomorrow**
- **Standard Assessment p.310 #1 D,#2 C, #3 D, #4 C, #5 D, #6 B, #7 B**
- **Read Chapters 20 and 21**
- **Answers to Conceptual in Order:**

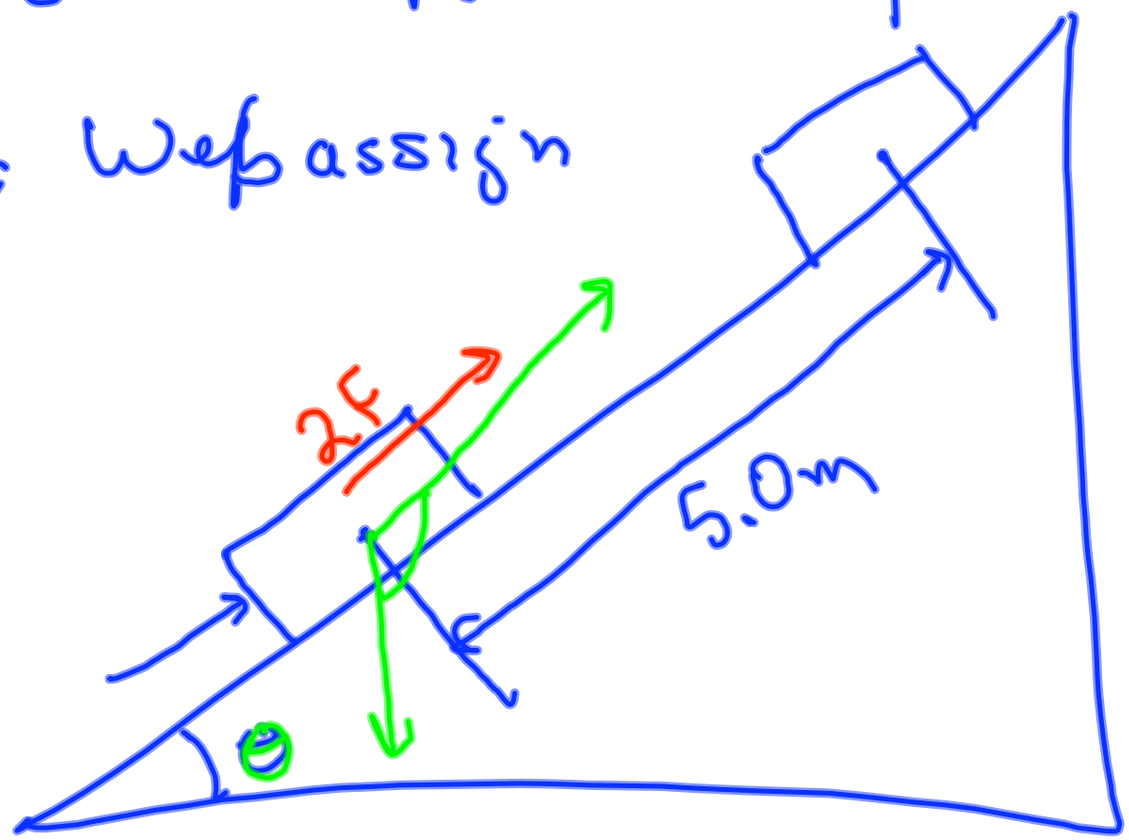
A,B,C,A,B,A,C,B,C,E,A,B,C,D,SKIP 15, C,A,B,A,C,C,C, SKIP 23 (ANSWER SHOULD BE 4 TIMES THAT OF SLOWER OBJECT), A,B,C,B,B,C,H,B,D, SKIP 33, D, C, SKIP 36,B,SKIP 38, B

Objectives:

- **Rotational Energy**
- **Electric Charge**
- **Coulomb's Law**

Call the force in part e, f.

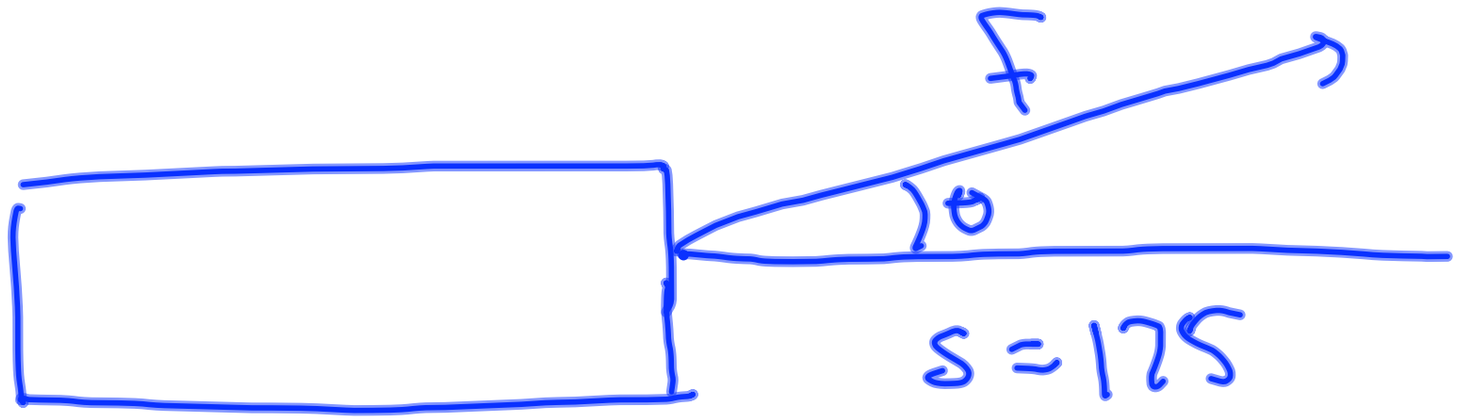
#13f webassign



Double f, which becomes 2f.

$$W_{gravity} + W_{force} = \frac{1}{2} m (v_f^2 - v_i^2)$$

$$|mg||5.0m|\cos(90+20) + |2f||5.0m|\cos 0 = \frac{1}{2} m (v_f^2 - v_i^2)$$



$$W = |\vec{F}||\vec{s}|\cos\theta$$

$$\cos\theta = \frac{W}{|\vec{F}||\vec{s}|} = \frac{12{,}000}{(125N)(175N)}$$

Rotational Dynamics

- If we consider a rolling body, not only does each point of the body have a tangential velocity v_T, but its cm is also moving with a speed v_{cm} . If the object rolls without slipping then $v_{cm} = v_T = r\omega$, and

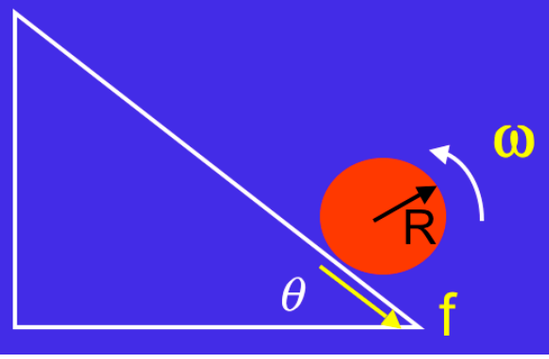
$$KE = KE_t + KE_r = \frac{1}{2} m v^2 + \frac{1}{2} I \omega^2$$

translational part

spinning part

Rotational Dynamics-Ex

- Suppose a disk and a hoop are rolled up the hill with the same initial velocity. Which will roll farthest up the hill?

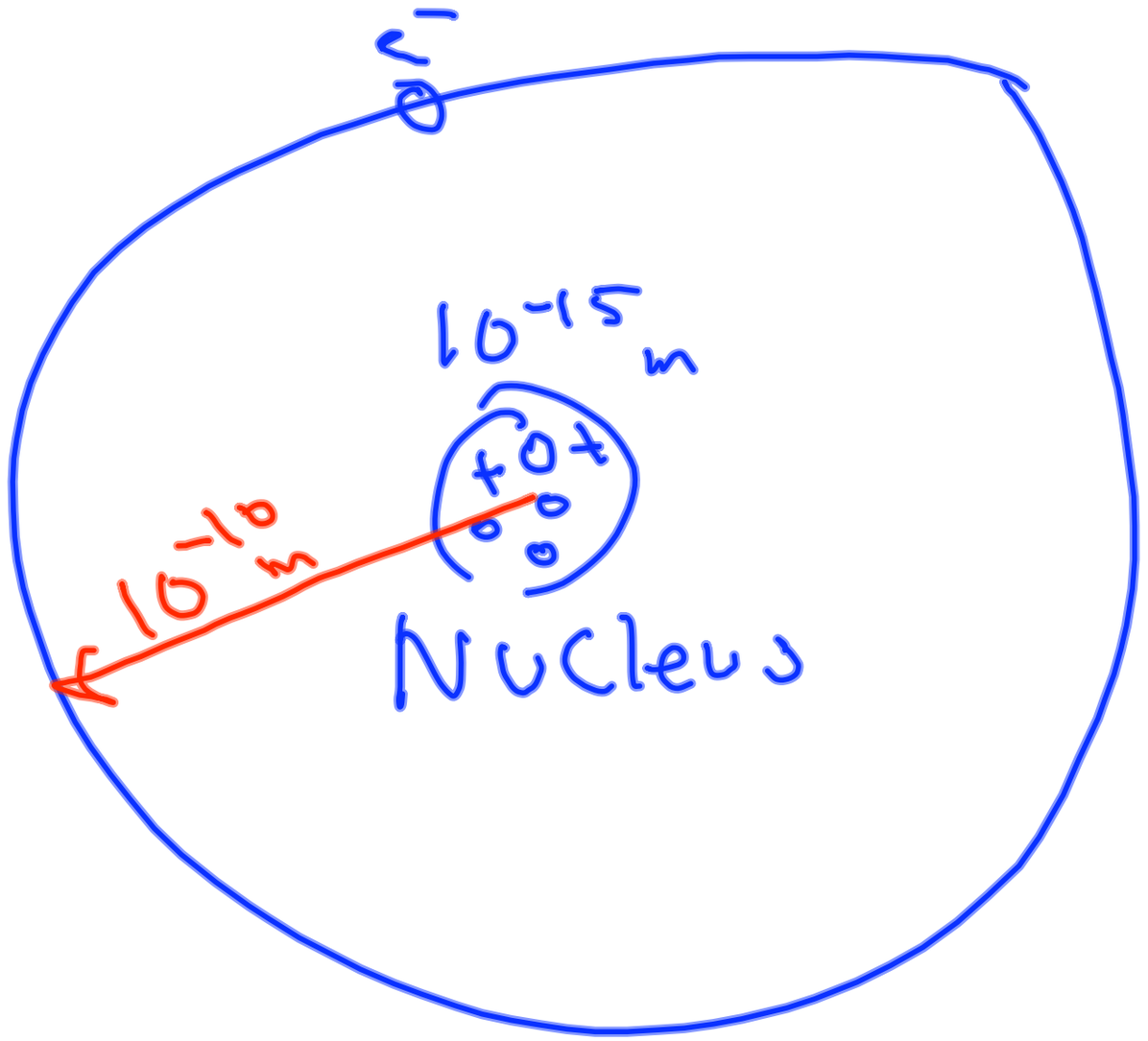


$$TE_i = TE_f$$

$$\frac{1}{2}mv^2 + \frac{1}{2}I\omega^2 = mgh$$

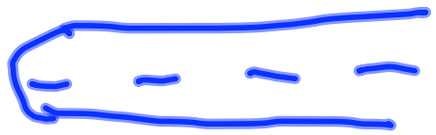
If I bigger then h is bigger

Hoop will go highest because it has higher I


10^{-15} m
10^{-10} m
Nucleus

Insulators

Conductor



Electricity-Coulomb's Law

- The the magnitude of the force on a charge is

$$F = \frac{k q_1 q_2}{r^2}$$

$9.0 \times 10^9 \frac{N m^2}{C^2}$

$k = 8.99 \times 10^9 \frac{N m^2}{C^2}$

use magnitude of charge and let F.B.D. determine direction

- This is Coulomb's law. Note: this force can be attractive or repulsive.

Electricity-Coulomb's Law

- What happens to the force between two charged particles if the distance between them is tripled? Halved?

$\frac{1}{9}$ 4

- Remember that the electrical force is a vector. We must not only be concerned with its magnitude, but we must also specify its direction.

- The force between two 1.0 coulomb charges is 101 N. Find the distance between them (9.4 *km*).

$$\frac{1.0\ \text{coulomb}}{1.6\times10^{-19}\ \frac{\text{coulombs}}{\text{electron}}} = 6.25\times10^{18}\ \text{electrons}$$

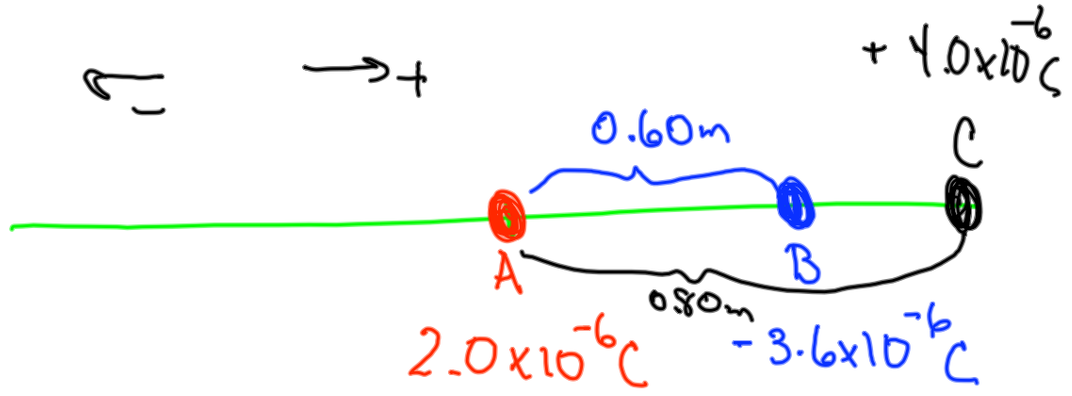
$$F = \frac{k\,q_1 q_2}{r^2} \qquad q_1 = q_2$$

$$F = \frac{k\,q_1^2}{r^2} \qquad r = \sqrt{\frac{k\,q_1^2}{F}}$$

$$r = \sqrt{\frac{\left(8.99\times10^9\ \frac{N\,m^2}{C^2}\right)(1\,C)^2}{101\,N}}$$

$$= 9400\ m = 9.4\,Km$$

#12 p. 552



Find net force on A.

$$\vec{F}_{net_A} = \vec{F}_{BA} + \vec{F}_{CA}$$

$$F_{net_A} = \left(\frac{K q_A q_B}{r_{AB}^2}\right) - \frac{K q_A q_C}{r_{AC}^2}$$

$$= K q_A \left[\frac{q_B}{r_{AB}^2} - \frac{q_C}{r_{AC}^2}\right]$$

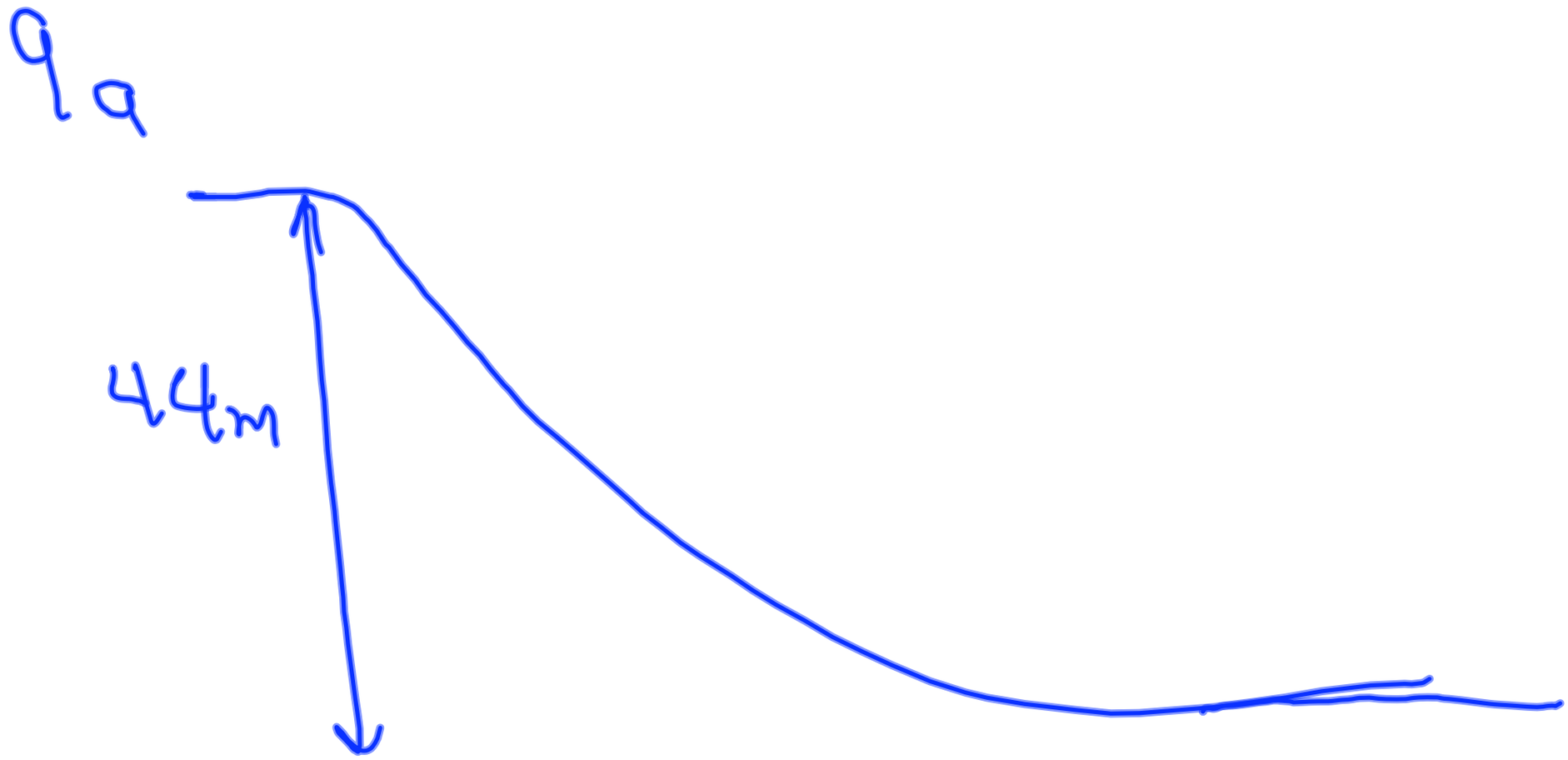
$$= \left(8.99\times10^9 \frac{N\text{-}m^2}{C^2}\right)\left(2.0\times10^{-6}C\right)\left[\frac{3.6\times10^{-6}C}{(0.60m)^2} - \frac{4.0\times10^{-6}}{(0.80m)^2}\right]$$

Webassign #8

b, c $\Delta KE = \frac{1}{2} m(v_f^2 - v_i^2)$

c) ~~same~~ $\frac{\text{answer to part b}}{\text{answer to part c}}$

because f is same in both cases.



$$TE_i = TE_f$$

$$mgh = \frac{1}{2}mv^2$$

$$v = \sqrt{2gh} = \sqrt{2(9.8)(44m)}$$