Science 122

Thursday, January 12/17

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1. Check -> Worksheet - Thermal Expansion
   Worksheet - Gas Laws
   Worksheet - Heat Engines and Carnot's Engine

2. SA - Thermodynamics (Only Problems)
   Friday, Jan. 13/17

3. Five Steps for Predicting Redox Reactions

4. Worksheet #64

Physics 112

Thursday, January 12/17

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1. Exam Review: Problem #2 - Freely Falling Body Problems
   Problem #3 - First Law Problem
   Problem #4 - Second Law Problem
   Problem #5 - Second Law Problem

2. Frequency and Period

3. Wave Speed

4. Summary: Measures of a Wave

5. Worksheet - Frequency, Period and Wave Speed

Physics 112 - Exam Review: Problem #2 - Freely Falling Bodies
Thurs., January 12/17

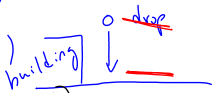
(1) ↓ ↑ ignore air resistance

(2) $\vec{a} = -9.80 m/s^2$ [Earth]
↳ acceleration due to gravity

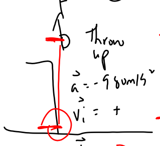
(3) Kinematic equations.
(must use full descriptions of vector quantities).

(4) variables.
$\vec{a} = 9.80 m/s^2$ [down]
$\vec{a} = -9.80 m/s^2$

(5) → Possibilities.

(i)


$\vec{a} = (-)9.80 m/s^2$
$\vec{v_i} = 0 m/s$
$\vec{d} = (-)$
$\vec{v_f} = (-)$

(ii)


throw up
$\vec{a} = -9.80 m/s^2$
$\vec{v_i} = +$
$\vec{d} = (-)$
$\vec{v_f} = (-)$

throw down
$\vec{a} = -9.80 m/s^2$
$\vec{v_i} = (-)$
$\vec{d} = (-)$
$\vec{v_f} = (-)$

(iii)


max height
$\vec{a} = -9.80 m/s^2$
$\vec{v_i} = (+)$
$\vec{d} = (+)$
$\vec{v_f} = 0 m/s$

(iv)


$\vec{v_i} = \vec{v} = +10 m/s$
$\vec{a} = -9.80 m/s^2$
$\vec{d} = (-)$
$\vec{v_f} = (-)$

$t = ?$ $\vec{d} = \vec{v_i} t + \frac{1}{2} \vec{a} t^2$
+
quadratic formula

$t = ?$ $\vec{v_f}^2 = \vec{v_i}^2 + 2\vec{a}\vec{d}$
$\vec{v_f} = \sqrt{\vec{v_i}^2 + 2\vec{a}\vec{d}}$
$\vec{v_f} = +$ or $(-)$
and
$t = \frac{\vec{v_f} - \vec{v_i}}{\vec{a}}$

If the balloon had been travelling downward at a constant velocity, $\vec{v_i}$ would be $(-)$.

Physics 112 - Exam Review: Problem #3 - First Law Problem
Thurs., January 12/17

Forces.

① velocity is constant
or
object is at rest

② FBD

③ $\vec{W}, \vec{F}_A, \vec{N}, \vec{T}, \vec{F}_f$

= (N: surface; T: rope pulls ✗)

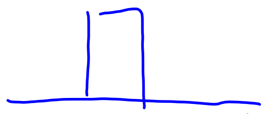
newtons.

μ_s — F_{fs} → static (stationary)

$\mu_s > \mu_k$

μ_k — F_{fK} → kinetic (motion)

④ Possibilities

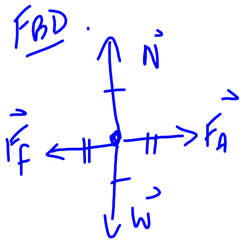


Constant velocity

$\vec{W} = |\vec{N}|$

−10N +10N

FBD.



$W = N$ $W = mg$

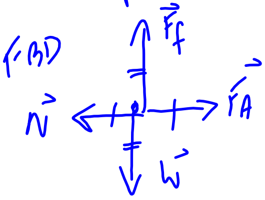
$F_A = F_f$ $F_f = \mu N$

$F_f = \mu N$

$F_A = \mu N$

hold in place

FBD



$F_A = N$ $W = mg$

$W = F_f$ $F_f = \mu N$

Physics 112 - Exam Review: Problem #4 - Second Law Problem
Thurs., January 12/17 Forces.

① acceleration
ie/ $\vec{a}$ given
ie/ $\vec{v_i}, \vec{v_f}$ given

② $\vec{F}_{net} = m\vec{a}$
+
Kinematic equation
(directions).

$\vec{F}_{net} = m\vec{a}$ ⇒ $\vec{v_f}^2 = \vec{v_i}^2 + 2\vec{a}\vec{d}$

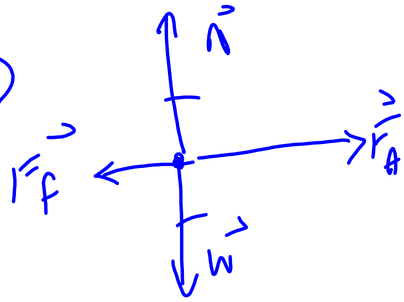
$\vec{F}_{net} = m\vec{a}$ ⟵ $\vec{v_f}^2 = \vec{v_i}^2 + 2\vec{a}\vec{d}$

Physics 112 - Exam Review: Problem #5 - Second Law Problem
Thurs., January 12/17 Forces.

① acceleration

② $\vec{W}, \vec{F}_A, \vec{N}, \vec{T}, \vec{F}_f$

③ FBD



$N = W$

$F_f \neq F_A$

$W = mg$

$F_f = \mu N$

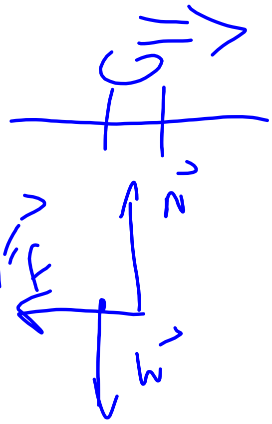
④ $\vec{F}_{net} = m\vec{a}$

$+F_A - F_f = m(+a)$

$F_A - \mu N = ma$

$F_A - \mu W = ma$

$$F_A - \mu mg = ma$$



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

$-F_f = m(-a)$

Physics 122

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1. Exam Review: Force Problems

2. Worksheet: Charge and Coulomb's Law
   Textbook - Page 638, #1-5

3. Worksheet -> Textbook: C14 Page 646, #11-14
   Textbook: C14 Page 655, #20-24

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4. Review - Gravitational Potential Energy

5. Electric Potential Energy

6. Electric Potential Difference

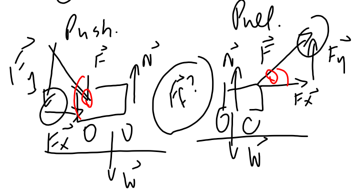
Physics 122 - Exam Review: Force Problems
Thurs., January 12/17

Choice.

Push / Pull — Inclined Plane

Push / Pull

① Push or Pull?



$N \neq W$

3 vertical forces.

Pull.

$F_x - F_f = ma \qquad N + F_y - W = 0$

$F\cos\theta - \mu N = ma \qquad N = W - F_y$

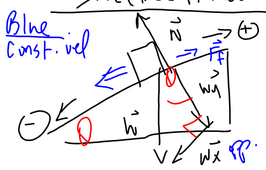
$N = mg - F\sin\theta$

$F\cos\theta - \mu(N) = ma$

$F\cos\theta - \mu(mg - F\sin\theta) = ma$

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

Inclined Planes



$F_{net} = ma$

$-W_x + F_f = 0$

$-W\sin\theta + \mu N = 0$

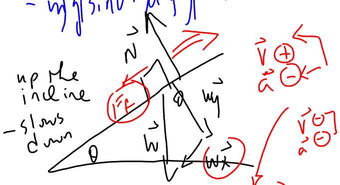
$-mg\sin\theta + \mu(W_y) = 0$

$-mg\sin\theta + \mu mg\cos\theta = 0$

$F_{net} = ma$

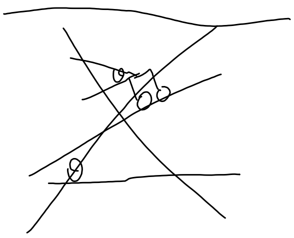
$+N - W_y = 0$

$N = W_y$

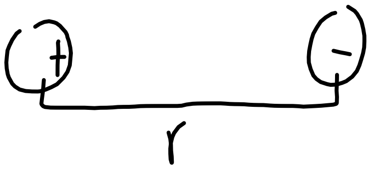


$-F_f - W_x = m(-a)$

$F_f + W_x = ma$



Worksheet - Charge + Coulomb's Law



q_1, q_2] Coulombs (C)

r (m)

F (N)

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

#6.

$F = ?$

$K = 9.0 \times 10^{9} \ \frac{Nm^2}{C^2}$

$q_1 = 1.8 \times 10^{-6}\,C$

$q_2 = 1.0 \times 10^{-6}\,C$

$1\,\mu C = 10^{-6}\,C$

$r = 0.040\,m$

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

$F = \_\_\_\_\_\_\_\_\_\_ N.$

9.

$q_1 = 1.60 \times 10^{-19}\,C$ (e^-)

$q_2 = 1.60 \times 10^{-19}\,C$ (p^+)

$r = 5.3 \times 10^{-11}\,m$

$F = ?$

$q_1 = q_2 = q$

$$F = \frac{Kq^2}{r^2}$$

11. A positive charge of 3.2×10^{-5} C experiences a force of 4.8 N to the right when placed in an electric field. What is the magnitude and direction of the electric field at the location of the charge?

$E = ?$

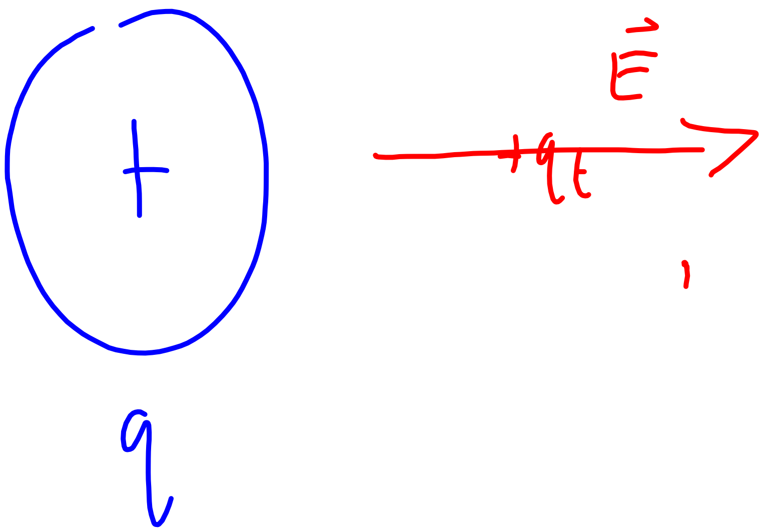
$q_t = 3.2 \times 10^{-5}$ C

$F = 4.8$ N

$E = \frac{F}{q_t}$

$E = \frac{4.8\text{ N}}{3.2 \times 10^{-5}\text{ C}}$

$E = 1.5 \times 10^{5}$ N/C



Science 10

Thursday, January 12/17

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1. Roller Coasters - 2 Days Late

2. Assignment - Oh, What a Tangled Web
   - Due - Monday, Jan. 16/17

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3. Indicator Species

4. Optional: Article Review - Indicator Species - Amphibians
   - Friday, Jan. 20/17

5. Factors Affecting Ecosystems

6. Worksheet - Abiotic and Biotic Factors