Science 10

Friday, March 2/18

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1. Submit -> FA - Ionic Compound Maze

2. Rules for Naming Binary Molecular Compounds - Continue

3. Some Common Names

4. Worksheet - Binary Molecular Compounds #1
   Worksheet - Binary Molecular Compounds #2

5. Recap: Types of Compounds

6. Ionic Compounds vs. Molecular Compounds

7. Worksheet - Mixed Ionic/Covalent Compounds #1
   Worksheet - Mixed Ionic/Covalent Compounds #2

8. SA - Chem #1 - Topics -> See Next Page

9. SA - Chem #1 -> After the Break

SA - Chem #1
Topics

1. chemistry
2. matter
3. atoms -> building blocks of matter
   -> names and charges of three subatomic particles: p^+, n, e^-
   -> locations of three subatomic particles
   -> electrically neutral: $\#p^+ = \#e^-$
4. element
5. chemical symbol
6. periodic table of the elements - periods (rows)
   - groups/families (columns)
   - family and period names
   - location of metals, nonmetals and metalloids
   - location of transition elements
7. atomic number = number of protons
8. ions - atoms that have gained or lost electrons
   - cations/positive ions/metallic ions
   - anions/negative ions/nonmetallic ions
   - be able to state number of protons, number of electrons and ion charges
9. be able to identify monatomic ions, polyatomic ions and monatomic ions of multivalent metals
10. ionic bond - created by transfer of valence electrons
11. ionic compounds - electrically neutral
12. be able to write the names of simple binary ionic compounds given their formulas and vice versa
13. be able to write the names of ionic compounds containing polyatomic ions given their formulas and vice versa
14. roman numerals 1-10
15. be able to write the names of ionic compounds containing multivalent metals (metals that can form more than one ion) given their formulas and vice versa
16. be able to write the names of ionic compounds containing multivalent metals and polyatomic ions given their formulas and vice versa
17. covalent bond - created as a result of the sharing of electron pairs
18. molecular compounds = covalent compounds = molecules
19. prefixes 1-10
20. identify 7 homonuclear diatomic molecules: H_2, N_2, O_2, F_2, Cl_2, Br_2, I_2
21. special molecules: P_4, S_8, water, ammonia, hydrogen peroxide
22. be able to write the names of binary molecular compounds given their formulas and vice versa
23. identify ionic compounds and molecular compounds

Physics 112
Friday, March 2/18

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1. Return -> SA - Basic Skills - Attempt #2
   Return -> Justified FAs - Calculating **R** Analytically
2. Check: V/T Graph #2
3. SA - Unit: S1 (Vector Analysis) and S2 (Graphical Analysis)
   - Topics
4. V/T Graphs #3-4
5. FA - V/T Graph

V-T #2.

1. 20 m/s, S
2. 50 s, 65 s, 90 s
3. 0 m/s
4. 2.4 m/s², N
5. 0.57 m/s², S
6. 65 s
7. 20 m/s
8. 100 m
   1.1×10^3 m
9. 0.57 m/s, S
10. 7.9 m/s

#5. acc → m (slope).

(125, -20), (90, 0)

$(x_1, y_1), (x_2, y_2)$

$$\vec{a} = \frac{0 - (-20)}{90 - 125}$$

$$\vec{a} = -0.57 \text{ m/s}^2$$

ave. vel = $\frac{\text{displacement}}{\text{time.}}$ (area s.)

$$\vec{v}_{av} = \frac{360 - 90 + 150 - 500}{140}$$

$V_{av} = \frac{\text{dist}}{\text{time}}$ (area s)

$$V_{av} = \frac{360 + 90 + 150 + 500}{140}$$

Topics

SA - U1: S1 (Vector Analysis) and S2 (Graphical Analysis)

Mechanics ✓
- define kinematics (how) * Wed/Thurs.
- define dynamics (why)

Types of Physical Quantities ✓
- distinguish between scalar quantities (magnitude only) and vector quantities (magnitude and direction)
- use vector notation when appropriate
- define resultant (Sum of vectors)
- given the magnitudes of two vectors determine the range of the magnitudes of all possible resultants
- determine the resultant of vectors graphically using the tip-to-tail method or the parallelogram method
- calculate the resultant of two perpendicular vectors (10)

Types of Motion ✓
- name and describe three types (no motion, uniform motion and uniformly accelerated motion)
  ie/ uniform motion - constant velocity
  - constant speed in one direction

Comparing Directions of Velocity and Acceleration ✓
- use directions of velocity and acceleration to describe the motion of an object (ie/ van example)

Position vs. Time Graphs ✓
- describe position, slope, velocity and type of motion
- determine the time at which direction of motion changes

Velocity vs. Time Graphs ✓
- describe velocity, slope, acceleration and type of motion
- determine the time at which direction of motion changes
- answer questions about an object's speed, velocity, acceleration, distance, displacement, average speed, average velocity, type of motion etc. from a velocity-time graph

Physics 122

Friday, March 2/18

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1. FA - Type I, II and III - Submit

2. SA - Force and Static Torque Problems
   - After the Break: Friday

3. Check -> Worksheet - Static Torque #1

4. Type II - Static Torque - Somes Force at Angles

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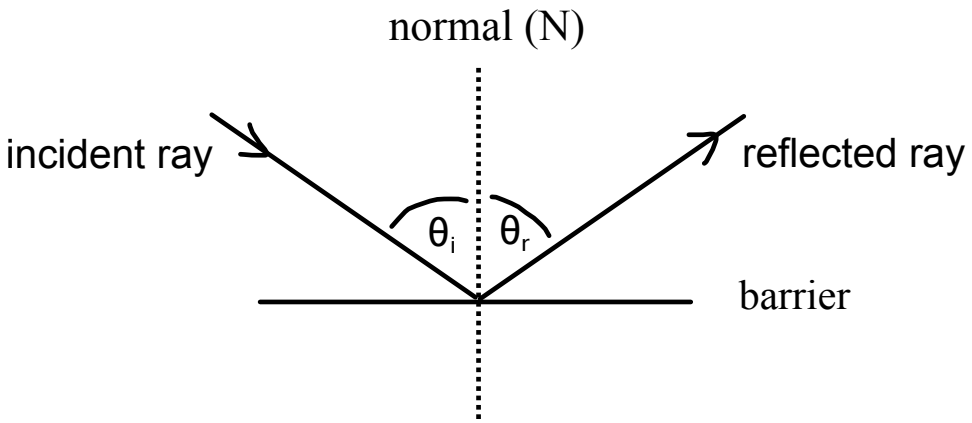
5. Worksheet - Static Torque #2

Optics - Concepts

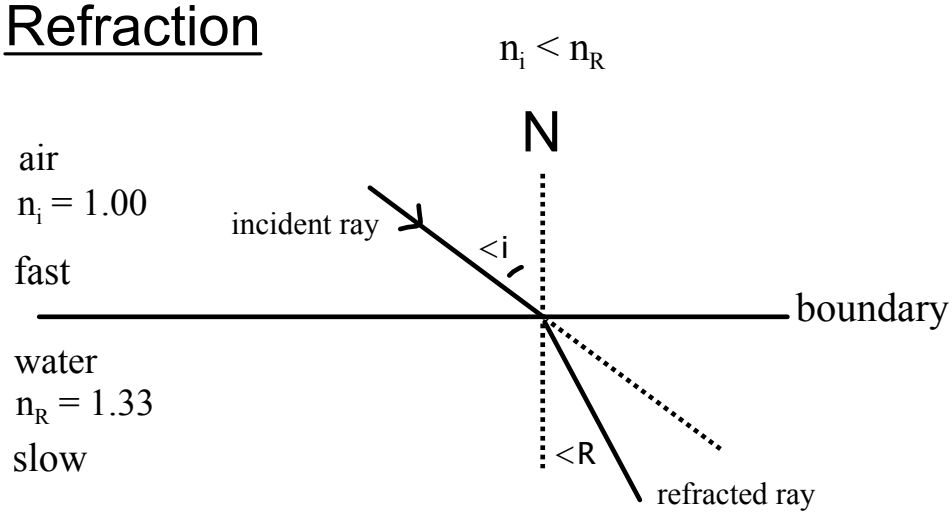
1. Reflection



Law of Reflection

$\theta_i = \theta_r$

2. Refraction



$n = \frac{c}{v}$ $c = 3.00 \times 10^8$ m/s

Snell's Law

$n_i \sin i = n_R \sin R$

3. Plane (Flat) Mirrors

- labelled ray diagrams and POST

4. Spherical (Curved) Mirrors

Concave (Converging)

- 5 labelled ray diagrams and POST

Convex (Diverging)

- 1 labelled ray diagram and POST

5. Lenses

(1) index of ref.
(2) shape of lens

- 2 factors affecting focal length

Convex (Converging)

- 5 labelled ray diagrams and POST

Concave (Diverging)

- 1 labelled ray diagram and POST

6. Equations (Mirror/Lens and Magnification)

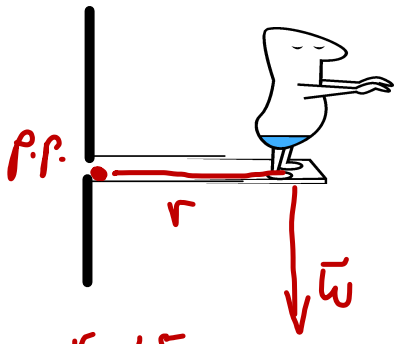
$$\frac{1}{f}=\frac{1}{d_i}+\frac{1}{d_o} \qquad m=\frac{h_i}{h_o}=\frac{-d_i}{d_o}$$

$R = 2f$ or $f = \frac{R}{2}$.

* Sign Conventions.

Label the Pivot Point

Example: A 490 N man stands at the end of a diving board at a distance of 1.50 m from the point at which it is attached to the tower. What is the torque the man exerts on the board? (735 Nm, CW or -735 Nm)



$r = 1.5m$

$W = 490N$

$\theta = 90.0^\circ$

$\tau = rF\sin\theta$

$\tau = rW\sin 90.0^\circ$

$\tau = rW$ ←

$\tau = (1.50m)(490N)$

$\tau = 735\ Nm$

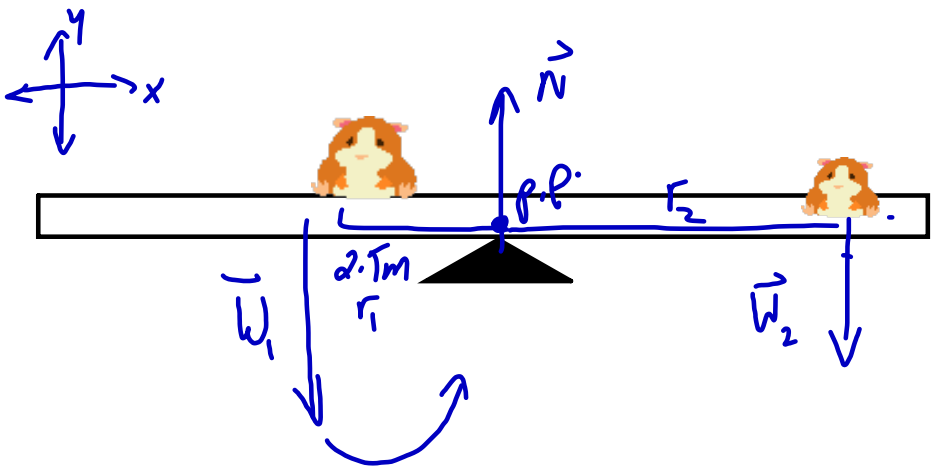
$\vec{\tau} = -735\ Nm$

$\vec{\tau} = 735\ Nm, CW$

The torque exerted by the man on the board was 735 Nm, CW.

Type I - Static Torque - All ForcesVertical

Example: A massless board serves as a seesaw for two giant hamsters as shown below. One hamster has a mass of 30 kg and sits 2.5 m from the pivot point. At what distance from the pivot point must a 25 kg hamster place himself to balance the seesaw? (3.0 m)



$$\tau_{net} = 0$$

$$+\tau_1 - \tau_2 = 0$$

$$r_1 W_1 \sin 90^\circ - r_2 W_2 \sin 90^\circ = 0$$

$$r_1 m_1 g - r_2 m_2 g = 0$$

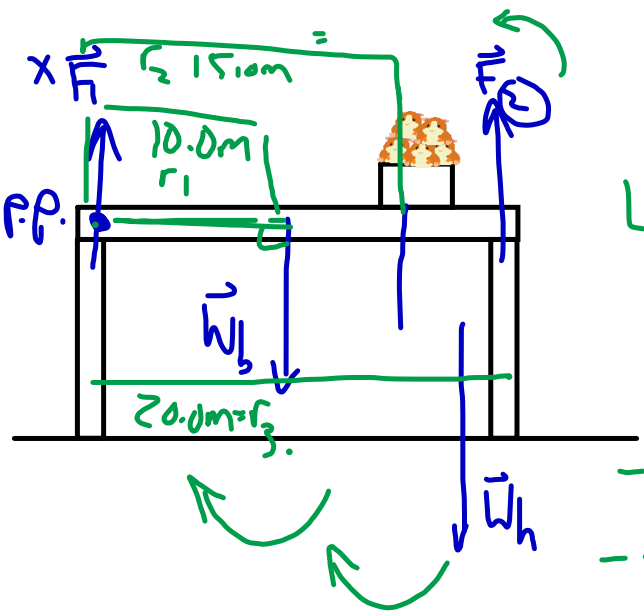
$$r_2 = \frac{r_1 m_1 g}{m_2 g}$$

$$r_2 = \frac{(2.5\,m)(30\,kg)}{25\,kg}$$

$$r_2 = 3.0\,m$$

* If a solid object has mass, treat the object as if all its mass were concentrated at a point - the center of mass.

Example: A uniform 1500 kg beam, 20.0 m long, supports a 15000 kg box of hamsters 5.0 m from the right support column. Calculate the magnitude of the forces on the beam exerted by each of the vertical support columns. (1.2×10^5 N, 4.4×10^4 N)



$\tau = rF\sin\theta$

WS

$F_{net_y} = 0$

$+F_1 - W_b - W_h + F_2 = 0$

$\tau_{net} = 0$

$-\tau_b - \tau_h + \tau_2 = 0$

$-r_1 W_b \sin 90^\circ - r_2 W_h \sin 90^\circ + r_3 F_2 \sin 90^\circ = 0$

$-r_1 m_b g - r_2 m_h g + r_3 F_2 = 0$

$r_3 F_2 = r_1 m_b g + r_2 m_h g$

$F_2 = \dfrac{r_1 m_b g + r_2 m_h g}{r_3}$

$F_2 = 1.2 \times 10^5$ N

$F_1 - W_b - W_h + F_2 = 0$

$F_1 = W_b + W_h - F_2$

$F_1 = m_b g + m_h g - F_2$

$F_1 = 4.4 \times 10^4$ N

Science 122

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1. Experiment 37 - Image Formation by a Converging Lens - P167
2. SA: Optics - After the Break: Wednesday.
3. Pressure - Balloon Demo
4. Pressure and Depth in a Static Fluid
5. Worksheet - Cutnell Problems