

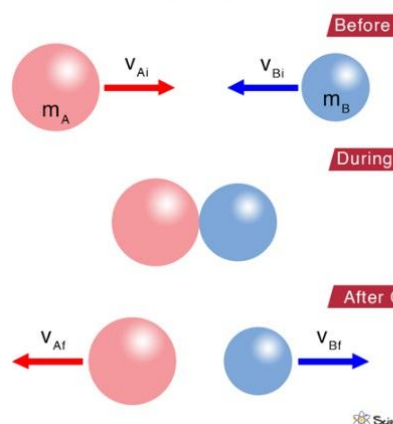
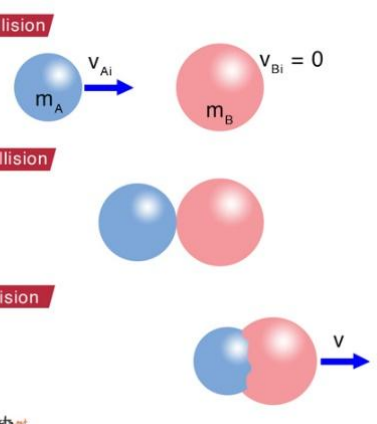
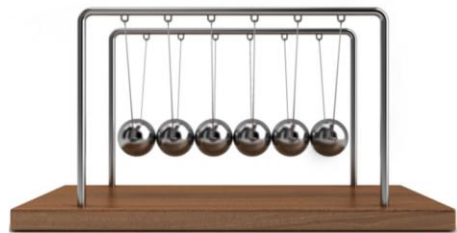
Harold's High School Physics
2nd Semester
Cheat Sheet
 7 April 2026


Chapter 9: Momentum and Its Conservation

Term	Equations & Descriptions
Momentum	The mass of an object times its velocity.
Law of Momentum Conservation	When the net external force on a system is zero, the total momentum cannot change.
Elastic Collision	A collision in which the kinetic energy of the colliding objects is <u>conserved</u> (does not change).
Inelastic Collision	A collision in which the kinetic energy of the colliding objects is <u>not conserved</u> (lower after the collision).
Law of Angular Momentum Conservation	When the net external torque on a system is zero, the total angular momentum cannot change.

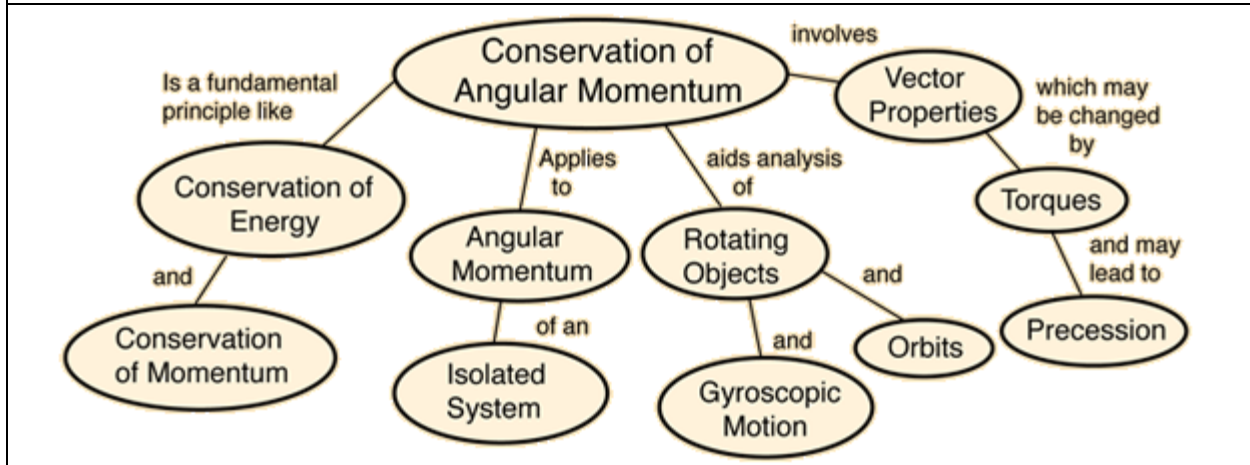
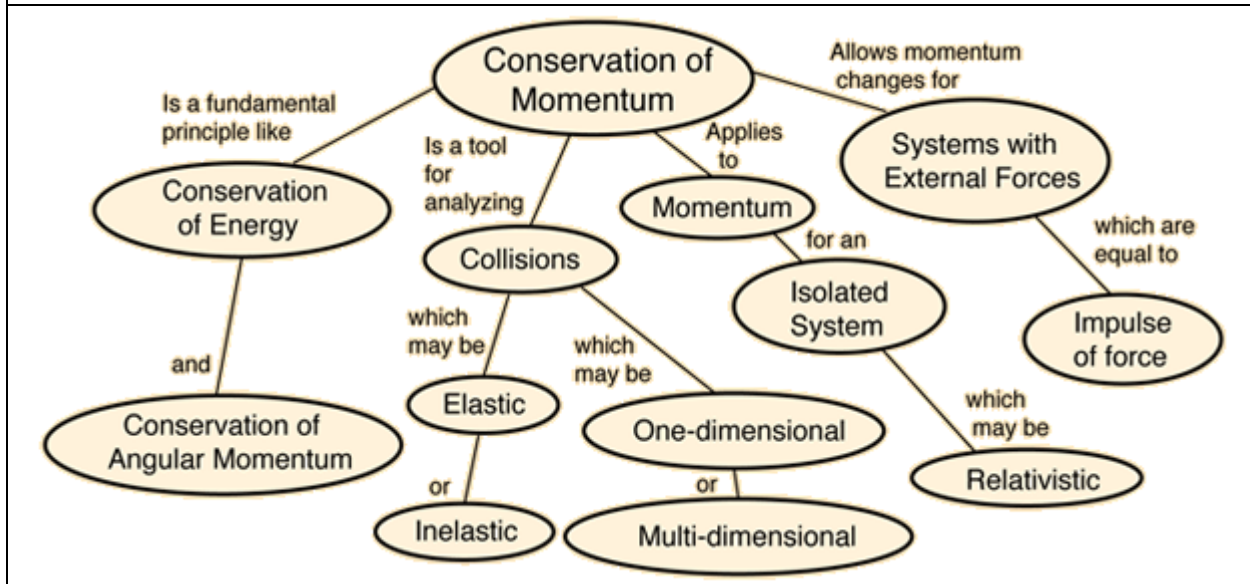
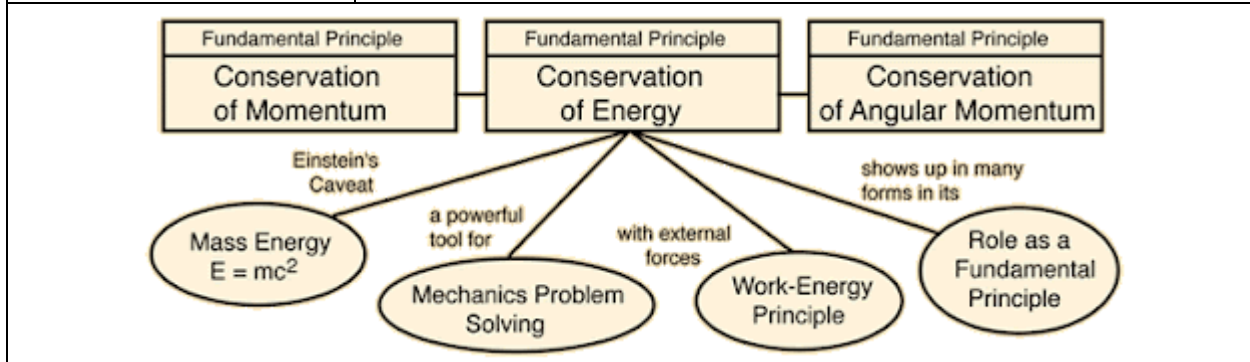
Physics Constants

Constant	Value
Gravitational Constant	$G \approx 6.674\ 30(15) \times 10^{-11} \frac{m^3}{kg\ s^2}$
Gravity Acceleration (Earth)	$g \approx -9.806\ 65 \frac{m}{s^2} \approx -32.174\ 0 \frac{ft}{s^2}$
Speed of Light in Vacuum	$c = 2.997\ 924\ 58 \times 10^8 \frac{m}{s}$
Electron-Volt	$1eV = 1.602\ 176\ 634 \times 10^{-19} J$
Charge of an Electron	$e = -1.602\ 176\ 634 \times 10^{-19} C$
Mass of an Electron	$m_e \approx 9.109\ 383\ 701\ 5(28) \times 10^{-31} kg$
Mass of a Proton	$m_p \approx 1.672\ 621\ 923\ 69(51) \times 10^{-27} kg$
Mass of a Neutron	$m_n \approx 1.674\ 927\ 498\ 04(95) \times 10^{-27} kg$
Electric Permittivity	$\epsilon_0 \approx \frac{1}{\mu_0 c^2} \approx 8.854\ 187\ 812\ 8 \times 10^{-12} \frac{C^2}{Nm^2}$
Magnetic Permeability	$\mu_0 \approx 1.256\ 637\ 062\ 12(19) \times 10^{-6} \frac{N}{A^2}$
Boltzmann Constant	$k_B = 1.380\ 649 \times 10^{-23} \frac{J}{K}$
Coulomb Constant	$k_e = \frac{1}{4\pi\epsilon_0} \approx 8.987\ 551\ 792\ 3 \times 10^9 \frac{Nm^2}{C^2}$
Faraday Constant	$F = eN_A = 9.648\ 533\ 212 \times 10^4 \frac{C}{mol}$
Planck Constant	$h = 6.626\ 070\ 15 \times 10^{-34} Js$
Avogadro Constant	$N_A = 6.022\ 140\ 76 \times 10^{23} / mole$
Ideal Gas Constant	$R = 0.082\ 057\ 366\ 080 \frac{L\ atm}{mole\ K} = 8.314\ 462\ 618 \frac{J}{mole\ K}$

Momentum (Linear Momentum)		
Momentum	$p = mv$	$kg \cdot m/s$
Impulse	$\Delta p = F \cdot \Delta t$ $\Delta p = p_{final} - p_{initial}$	$N \cdot s$ or $kg \cdot m/s$ The change in momentum.
Collision Types	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Elastic Collision</p> <p>Kinetic energy and momentum are conserved</p>  </div> <div style="text-align: center;"> <p>Inelastic Collision</p> <p>Kinetic energy is not conserved, but momentum is conserved</p>  </div> </div> <p style="text-align: center; font-size: small;">ScienceFacts.net</p>	
Newton's Cradle	Example of an elastic collision	

Angular Momentum		
Angular Momentum	$L = mvr$ (point mass moving in a circle)	$kg \cdot m^2/s$
Spinning Tire	<p>A spinning bicycle tire requires effort to tilt since it has angular momentum (L).</p> <p>You must apply a torque (τ) to change the angular momentum.</p>	

Conservation Laws		
Conservation of Linear Momentum: $\mathbf{p}_i = \mathbf{p}_f$	Conservation of Energy: $E_i = E_f$	Conservation of Angular Momentum: $\mathbf{L}_i = \mathbf{L}_f$
Conservation of Energy	The capacity for doing work. "Energy can neither be created nor destroyed".	
Conservation of Momentum	When the net external force is zero: $\mathbf{p}_{before} = \mathbf{p}_{after}$	
Conservation of Angular Momentum	When the sum of the torques is zero: $\mathbf{L}_{before} = \mathbf{L}_{after}$	



Chapter 10: Periodic Motion

Term	Equations and Descriptions	
Periodic Motion	Motion that repeats itself in equal intervals of time.	
Hooke's Law	The restoring force exerted by an elastic object is directly proportional to the distance it is displaced from its equilibrium position.	
Amplitude	The maximum extent of a periodic motion, defined from the equilibrium position.	
Simple Harmonic Motion	Periodic motion produced by a restoring force that is directly proportional to the distance from the equilibrium position.	
Damped Harmonic Motion	Periodic motion whose amplitude decreases over time.	
Spring		
Spring Force	$F_s = -k \cdot \Delta x$	N
Equilibrium		
Spring Force Graph		Linear $y = mx + b$ $F = kx + 0$
Spring Period	$T_s = 2\pi \sqrt{\frac{m}{k}}$	s
	The period of a mass / spring system depends on π because it is a one-dimensional projection of uniform circular motion.	
Max. Spring PE	At the amplitude of a mass / spring system's motion, the restoring force is the greatest, and the speed of the mass is zero.	
Max. Spring KE	At the equilibrium position of a mass / spring system's motion, the restoring force zero, and the speed of the mass is at its maximum value.	
Spring Energy	$PE_s = \frac{1}{2}k\Delta x^2$	$KE_s = \frac{1}{2}mv^2$
	$TE_s = \frac{1}{2}kA^2$	A is amplitude in $x(t) = A \cos(2\pi ft + \phi)$

Pendulum		
Simple Pendulum		
Small Displacement Simplification	A simple pendulum will exhibit simple harmonic motion if the angle that represents its amplitude is small. That is because the restoring force is directly proportional to the displacement only when $\sin \theta \approx \theta$.	
Pendulum Period	$T_p = 2\pi \sqrt{\frac{\ell}{g}}$	s
Simple Harmonic Motion (SHM)		
Damped Harmonic Motion		
Mnemonic	<p><i>"Life is Good, if you are a MonKey."</i></p> $T_p = 2\pi \sqrt{\frac{\ell}{g}} \text{ and } T_s = 2\pi \sqrt{\frac{m}{k}}$	

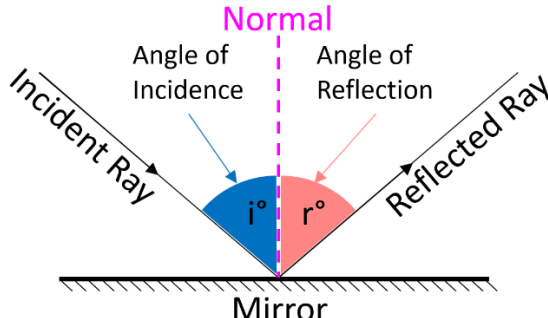
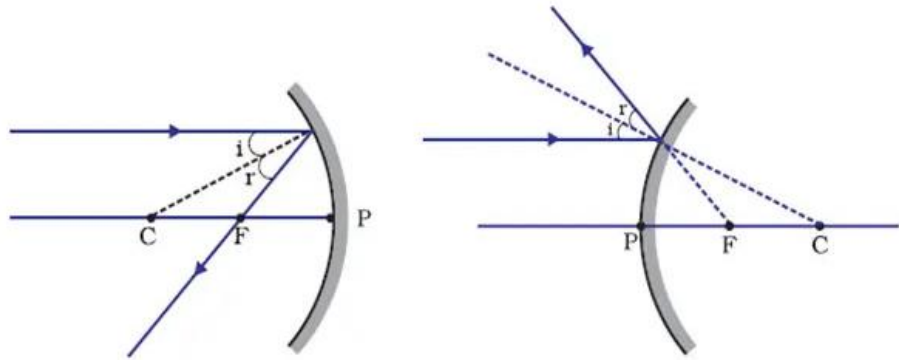
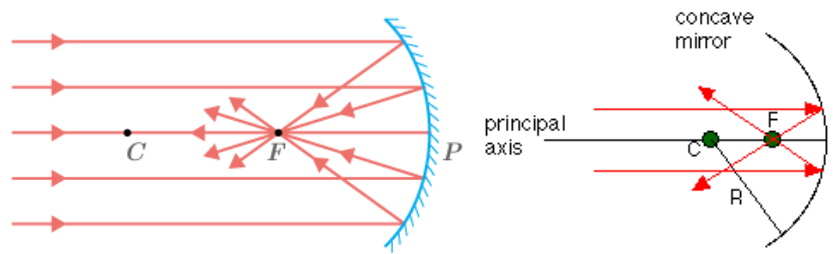
Chapter 11: Sound and Light

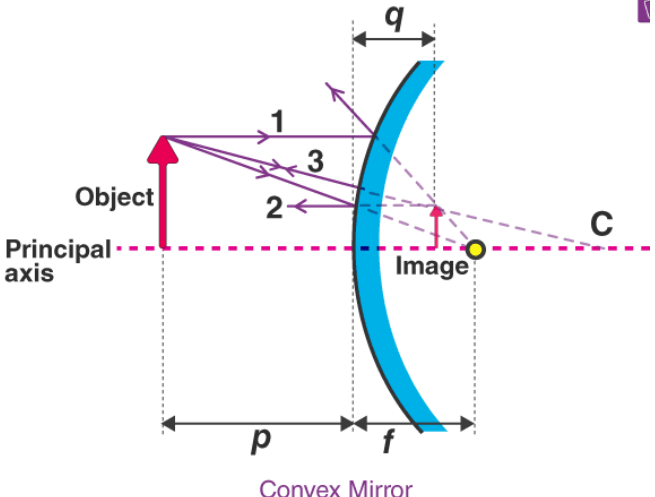
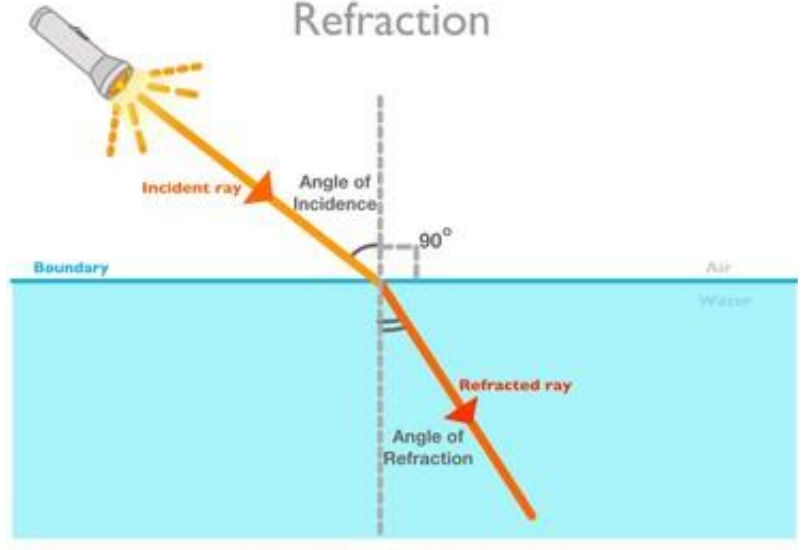
Term	Equations & Descriptions
Oscillations	Regular variation in magnitude around a central point.
Wavelength	The distance between two crests or two troughs of a wave.
Transverse Wave	A wave whose oscillation is perpendicular to its translational motion.
Longitudinal Wave	A wave whose oscillation is parallel to its translational motion.
	<p>The diagram illustrates two types of waves. The top part shows a transverse wave (blue) with labels for 'Direction of wave propagation' (right), 'Amplitude' (height from equilibrium), 'Trough' (bottom), and 'Crest' (top). A blue square oscillates vertically. The bottom part shows a longitudinal wave (red) with labels for 'Rarefaction' (spread-out) and 'Compression' (tight). A red square oscillates horizontally.</p>
Doppler Effect	A change in the observed frequency of a wave caused by the motion of the wave's source and/or the observer.
Sound	
Sonic Waves	Waves that the <u>typical</u> person can hear, with frequencies of 20 Hz – 20,000 Hz.
Ultrasonic Waves	Waves with frequency greater than 20,000 Hz. ($f > 20 \text{ kHz}$)
Infrasonic Waves	Waves with frequency lower than 20 Hz. ($f < 20 \text{ Hz}$)
Timbre	<p>The character of a sound that is not based on the <u>frequency</u> or <u>amplitude</u> of the main sound wave. Examples:</p> <ul style="list-style-type: none"> • air vs. bone conduction • flute vs. violin
Wave-Particle Duality	<p>The concept that light, as well as many subatomic particles, have the properties of both particles and waves.</p> <p style="text-align: center;">Thomas Young's Double-Slit Experiment</p> <p>The diagram shows a 'Light Source' on the left emitting light that passes through a 'Metal Sheet' with two slits. The light waves from the slits interfere, creating a pattern on a 'Screen' on the right.</p>

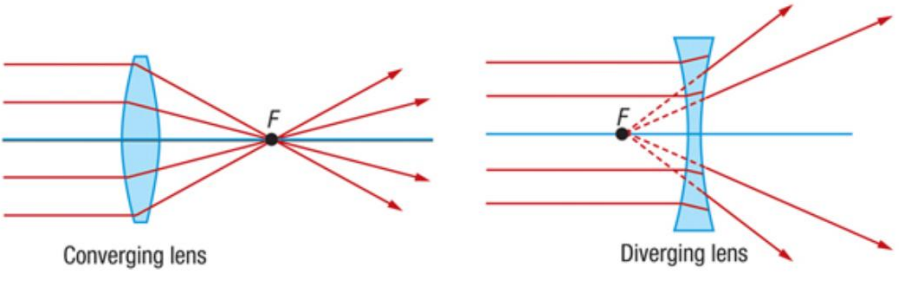
Frequency	$f = \frac{v}{\lambda}$	Frequency and wavelength are inversely proportional; when one increases, the other decreases.																					
Medium	A wave oscillates a medium so that energy can move from one place to another.																						
Sound Volume & Frequency	<ul style="list-style-type: none"> The higher the <u>amplitude</u> of a sound wave, the higher the <u>volume</u> of the sound. The higher the <u>frequency</u> of a sound wave, the higher the <u>pitch</u> of the sound. 																						
Speed of Sound	$v_{\text{sound}} = 331.3 \frac{\text{m}}{\text{s}} + 0.606 \frac{\text{m/s}}{^{\circ}\text{C}} \cdot T_C$ <p>Where T_C is the temperature in Celsius.</p> <ul style="list-style-type: none"> The speed of sound increases with increasing elasticity and <u>decreasing density</u>. In general, it travels faster in <u>solids</u>, slower in <u>liquids</u>, and slowest in <u>gases</u>. For solids and gases, the lower the density, the faster the speed of sound. 																						
	<table border="1"> <thead> <tr> <th>Physical State</th> <th>Medium</th> <th>Velocity (m/s)</th> <th>Velocity (mph)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Gas</td> <td>Air (0°C)</td> <td>331</td> <td>740</td> </tr> <tr> <td>Air (25°C)</td> <td>346</td> <td>774</td> </tr> <tr> <td>Helium (0°C)</td> <td>972</td> <td>2,174</td> </tr> <tr> <td>Liquid</td> <td>Water (25°C)</td> <td>1,490</td> <td>3,333</td> </tr> <tr> <td>Solid</td> <td>Iron</td> <td>5,130</td> <td>11,472</td> </tr> </tbody> </table>		Physical State	Medium	Velocity (m/s)	Velocity (mph)	Gas	Air (0°C)	331	740	Air (25°C)	346	774	Helium (0°C)	972	2,174	Liquid	Water (25°C)	1,490	3,333	Solid	Iron	5,130
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Doppler Effect (Sound)	$f_{\text{observed}} = \left(\frac{v_{\text{sound}} \pm v_{\text{observer}}}{v_{\text{sound}} \pm v_{\text{source}}} \right) \cdot f_{\text{stationary}}$ <p>The diagram illustrates the Doppler effect with a central ambulance labeled 'Source' moving to the right. Concentric blue circles represent sound waves. To the left, an observer hears a 'Lower frequency (lower pitch)' shown as a red wave with a long wavelength. To the right, an observer hears a 'Higher frequency (higher pitch)' shown as a red wave with a short wavelength.</p>																						
	<ul style="list-style-type: none"> When a <u>source</u> of sound is moving, the frequency in front of the source is higher than the frequency behind the source. When the <u>observer</u> is moving, the frequency is higher as the observer moves towards the source, and it is lower as the observer moves away from the source. 																						
	<ul style="list-style-type: none"> <u>Add</u> v_{observer} when the observer is moving <u>towards</u> the source. <u>Subtract</u> it when the observer is moving <u>away</u> from the source. 																						
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Light	
Electromagnetic Spectrum	<p>The prefix “nano” is abbreviated with “n” and means 10^{-9}. $c = f\lambda$</p> <p style="text-align: center;">Roy G. Biv: Red, Orange, Yellow, Green, Blue, Indigo, Violet</p>
Photoelectric Effect	$KE_{e_max} = h \cdot f - \phi$ <p>KE_{e_max} (Max. electronic kinetic energy) $h = 4.14 \times 10^{-15} \text{ eV} \cdot \text{s}$ (Planck's constant) ϕ (Work function) expressed in eV (electron-volt).</p> <p>If $h < 0$, then the electron cannot leave the metal when struck by a photon.</p> <p style="text-align: center;">Potassium - requires 2.0 eV to eject an electron</p>
Electron-Volt	$1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$
Doppler Effect (Light)	<ul style="list-style-type: none"> Blueshift: <u>Higher</u> frequency, so the star is moving <u>towards</u> the earth. Redshift: <u>Lower</u> frequency, so the star is moving <u>away</u> from the earth.

Chapter 12: Optics

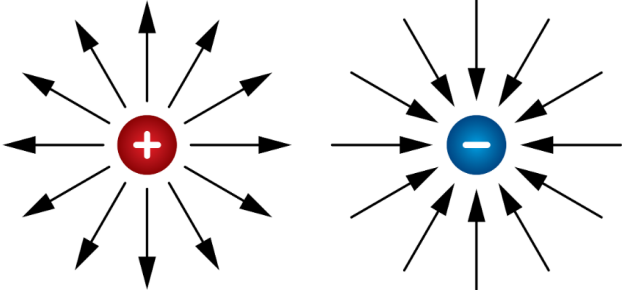
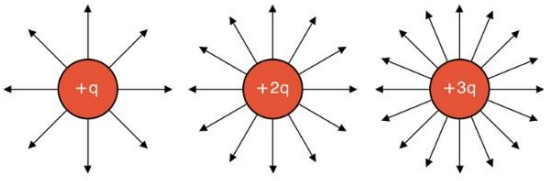
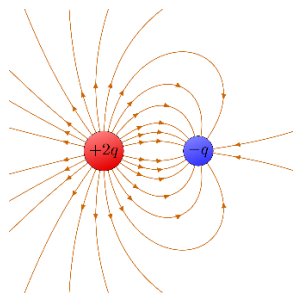
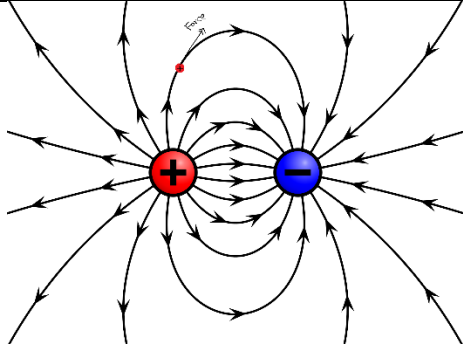
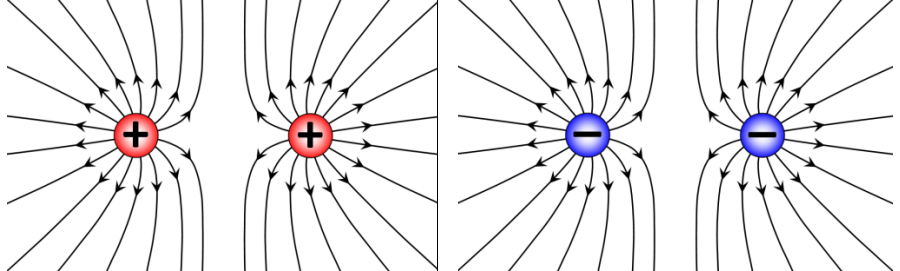

Term	Equations & Descriptions	
Law of Reflection	<p>When light reflects off a surface, the angle of incidence equals the angle of reflection.</p> 	
Reflection (Throwback)	 <p>(a) concave mirror (b) convex mirror</p>	
Focal Length (F)	$F = \frac{R}{2}$	R is the radius
Concave Spherical Mirror	 <ol style="list-style-type: none"> 1. Light that travels to a spherical mirror will be reflected so that it travels through the mirror's focal point. 2. Light that travels through the <u>focal point</u> and then hits the spherical mirror will be reflected so that it travels horizontally. 3. Light that travels through the <u>center</u> that defines a spherical mirror will reflect so that it travels directly backwards, through the center again. 	

<p>Convex Spherical Mirror</p>	 <p style="text-align: center;">Convex Mirror</p>																			
<p>Virtual Image</p>	<p>An image formed from the <u>extrapolation</u> of light rays.</p>																			
<p>Real Image</p>	<p>An image formed by the <u>intersection</u> of reflected light rays.</p>																			
<p>Refraction (Bend)</p>	 <p style="text-align: center;">shutterstock.com · 1818760151</p>																			
<p></p>	<p>A change in direction of a light ray caused by passage from one medium to another.</p>																			
<p>Index of Refraction</p>	$n = \frac{c}{v}$ $n = \frac{\text{speed of light in a vacuum}}{\text{speed of light in the medium}}$ $\frac{n_1}{n_2} = \frac{v_2}{v_1}$	<table border="1"> <thead> <tr> <th>Medium</th> <th>Index of Refraction</th> </tr> </thead> <tbody> <tr> <td>air</td> <td>1.0003</td> </tr> <tr> <td>water</td> <td>1.333</td> </tr> <tr> <td>ethanol</td> <td>1.361</td> </tr> <tr> <td>ice</td> <td>1.309</td> </tr> <tr> <td>glass, crown</td> <td>1.52</td> </tr> <tr> <td>glass, flint</td> <td>1.66</td> </tr> <tr> <td>fused quartz</td> <td>1.458</td> </tr> <tr> <td>diamond</td> <td>2.419</td> </tr> </tbody> </table>	Medium	Index of Refraction	air	1.0003	water	1.333	ethanol	1.361	ice	1.309	glass, crown	1.52	glass, flint	1.66	fused quartz	1.458	diamond	2.419
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<p>Snell's Law</p>	$n_1 \sin \theta_1 = n_2 \sin \theta_2$																			





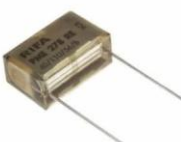


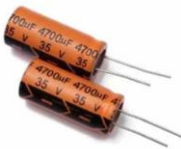


Spherical Aberration	A loss of definition in an image due to the <u>spherical</u> nature of a lens or mirror.
Chromatic Aberration	A loss of definition in an image due to different <u>wavelengths</u> being focused at different points.
Lenses	 <p style="text-align: center;">Converging lens Diverging lens</p> <ul style="list-style-type: none"> • Lenses refract light according to Snell's Law. • Converging lenses have <u>positive</u> focal length. • Diverging lenses have <u>negative</u> focal length.
Converging Lens	<ol style="list-style-type: none"> 1. Light that travels <u>horizontally</u> to a converging lens will travel out through the focal point on the other side of the lens. 2. Light that travels through the <u>focal point</u> and then hits a converging lens will travel out horizontally on the other side of the lens. 3. Light that travels through the very <u>center</u> of the lens will experience no deflection.
Diverging Lens	<ol style="list-style-type: none"> 1. Light that travels <u>horizontally</u> to a diverging lens will travel out of the lens as if they came from the focal point on the side from which they entered the lens. 2. Light that is headed to the <u>focal point</u> on the other side of a diverging lens will leave the lens horizontally. 3. Light that travels through the very <u>center</u> of the lens will experience no deflection.

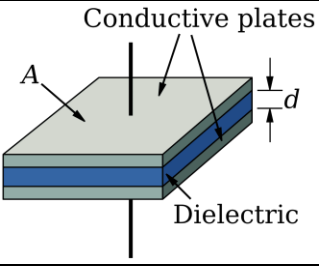
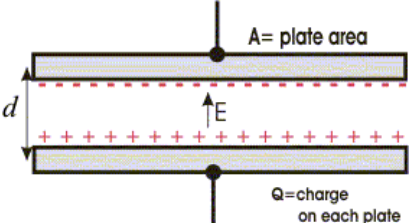

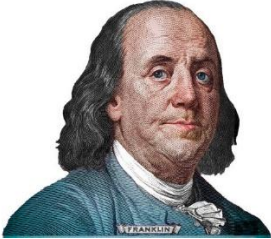

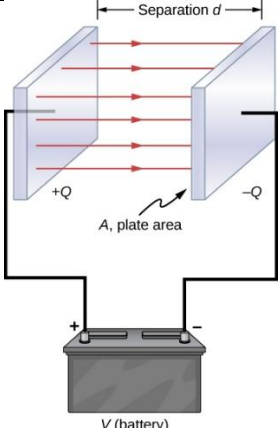
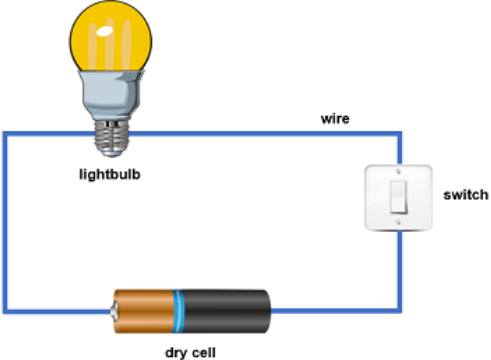
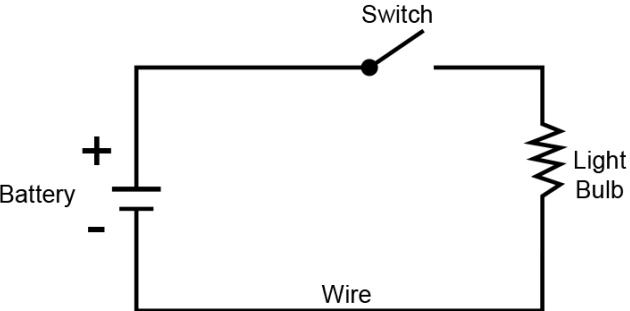
Chapter 13: The Electrostatic Force

Term	Equations & Descriptions	
Electrostatic Force	A force that is produced by the electric charges of two or more stationary objects.	
Charge of an Electron	$e^- \approx -1.602 \times 10^{-19}$ Coulombs (C)	
Electric Charge	$1q = 1C \approx 6.24 \times 10^{18}$ electrons or protons $1C \approx 6$ billion billion e^-	
Triboelectric Charging (Charging by Friction)	Producing two charged objects by rubbing them together.	
Charging by Conduction	Charging an uncharged object by <u>touching</u> it to a charged object, allowing charges to move out of the charged object and into the uncharged object.	
Charging by Induction	Charging an uncharged object by using a charged object to <u>push</u> charges out of the uncharged object and <u>not</u> allowing those charges to return.	
	<div style="display: flex; justify-content: space-around; text-align: center;"> <div> <p>Charging by friction</p> </div> <div> <p>Charging by conduction</p> </div> <div> <p>Charging in induction</p> </div> </div>	
Micro	The prefix "micro" is abbreviated with "μ" and means 10^{-6} or 1/1,000,000.	
Coulomb's Law	$F = k \frac{q_1 q_2}{r^2}$	$F = G \frac{m_1 m_2}{r^2}$
	Coulomb's Law has the same form as Newton's Law of Gravitation.	
Coulomb Constant	$k \approx 8.99 \times 10^9 \frac{N \cdot m^2}{C^2}$	$G \approx 6.67 \times 10^{-11} \frac{m^3}{kg \cdot s^2}$
Electrostatic Force with Multiple Charges	<p style="text-align: center;">Red is + Black or Blue is -</p>	
	<p>Use trig to break down vectors into x-axis and y-axis components.</p> $A_x = r \cos \theta \quad A_y = r \sin \theta$ $C_x = A_x + B_x \quad C_y = A_y + B_y$ $C = \sqrt{C_x^2 + C_y^2}$ $\theta = \tan^{-1} \frac{C_y}{C_x}$	



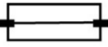


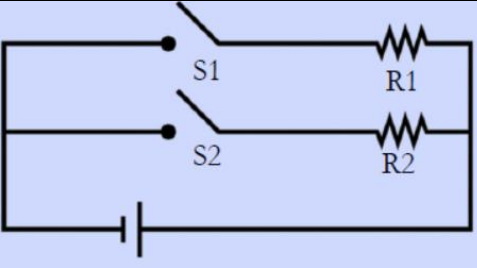
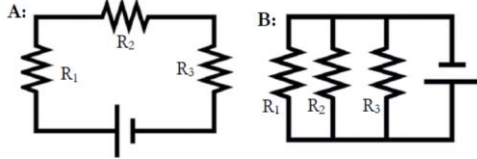
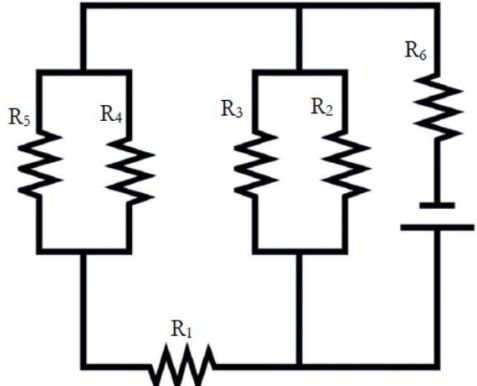
Electric Field Line Rules	<ol style="list-style-type: none"> 1. Electric field lines point directly towards negative charges and directly away from positive charges. 2. The number of lines going into or out of a particle are proportional to the charge on the particle. 3. Electric field lines cannot cross. 4. The lines show you the direction a positive charge will accelerate, and the closeness of the lines in the charge's vicinity is proportional to the magnitude of the force. 	
Rule 1 Example		
Rule 2 Example	<p style="text-align: center;">Density of Electric Field Lines</p>  <p style="text-align: center;">Line density around +q < Line density around +2q < Line density around +3q</p>	
Rule 3 Example		
Rule 4 Example		
Conductor	A substance in which electrons flow freely from particle to particle.	
Insulator	A substance in which electrons do <u>not</u> flow freely from particle to particle.	
		
Electric Field Strength	$F = Eq$	$F = ma$

Chapter 14: Electricity Has Potential!

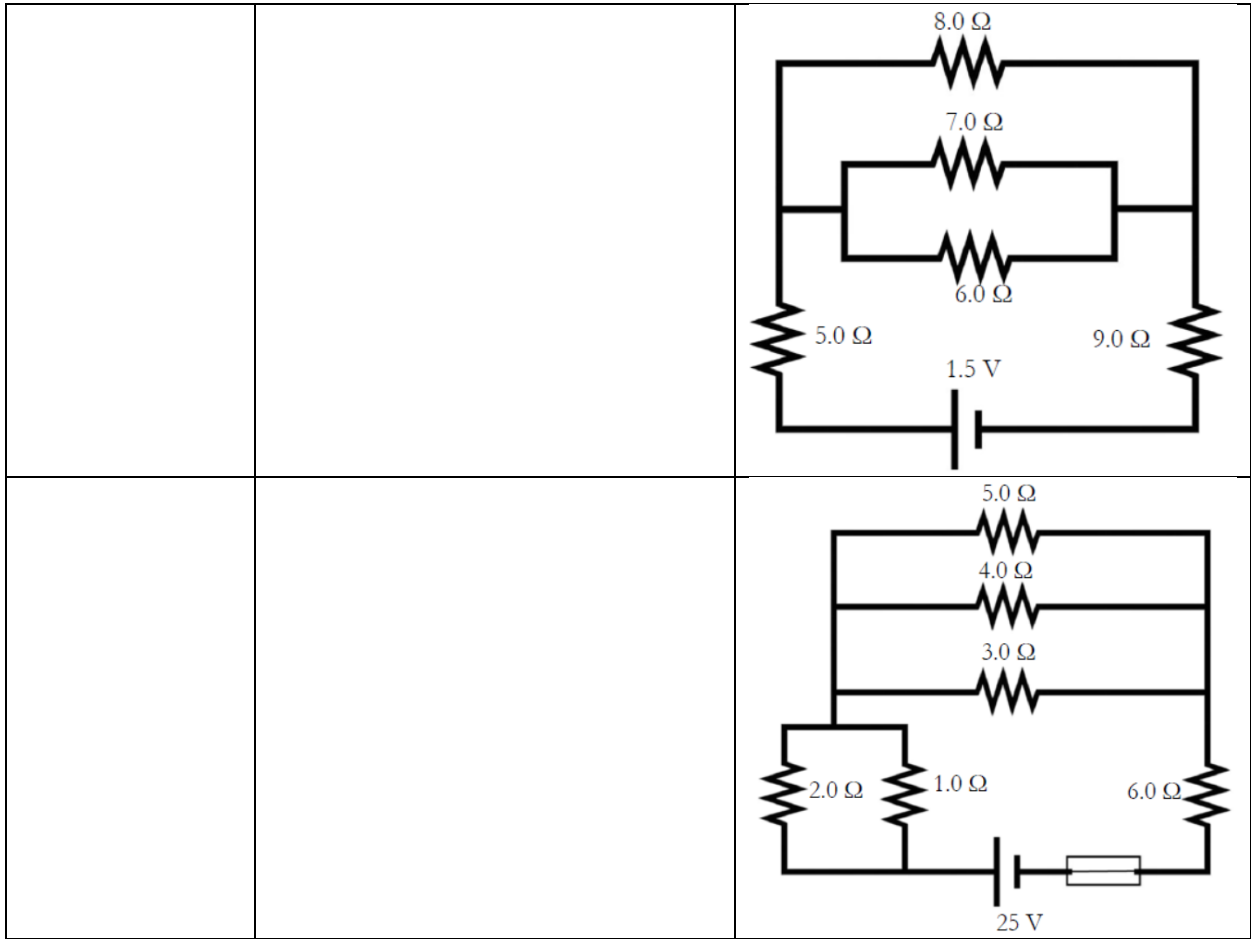
Term	Equations & Descriptions	
Electric Potential (V)	The potential energy of an electric field per unit charge. (V)	
Voltage (V)	Volt (V) = Joule/Coulomb ($\frac{J}{C}$)	 Alessandro Volta, Italian physicist
Stationary Point Charge Voltage	$V = k \frac{Q}{r}$	$k \approx 8.99 \times 10^9 \frac{N \cdot m^2}{C^2}$
Potential Energy (PE)	$PE = q \cdot V$ $\Delta PE = q \cdot \Delta V$ $\Delta PE = PE_f - PE_i = KE = \frac{1}{2}mv^2$	
Potential Difference (ΔV)	How much the potential changes between two positions in an electric field. (V)	
	$\Delta V = V_f - V_i$	
Electron Volt (eV)	The kinetic energy an electron gains after moving through a potential difference of 1 volt.	
	$1 eV = 1.602 \times 10^{-19} J$	
Capacitor	A device that stores electric charge, consisting of two conductors separated by an insulator.	  Fixed Capacitor  Mica Capacitor  Paper Capacitor  Film Capacitor  Ceramic Capacitor  Electrolytic Capacitor  Variable Capacitor  Polyester
Capacitance (C)	A measure of how well a system can store charge. (Farads, F)	
Electric Permittivity (ϵ)	A measure of how well a material resists the formation of an electric field.	
Permittivity of Free Space (ϵ_0)	$\epsilon_0 = 8.85 \times 10^{-12} \frac{F}{m}$ The lowest permittivity possible.	
Permittivity of Ceramic as the Dielectric	$\epsilon = 7.08 \times 10^{-8} \frac{F}{m}$	

<p>Parallel Plate Capacitor</p>	 <p>Conductive plates Dielectric A d</p>	 <p>A= plate area d E Q=charge on each plate Figure 3</p>
$C = \frac{\epsilon \cdot A}{d}$		
<p>Ground (Electrical)</p>	<p>An infinite source of or sink for electrons.</p>	
<p>Conservation of Charge</p>	<p>A law that states the total charge of the universe cannot change.</p> <p>e.g., Charge cannot be created or destroyed, just moved around.</p>	 <p>Proposed by Benjamin Franklin</p>
<p>Charge in a Capacitor (Q)</p>	$Q = C \cdot \Delta V$	
<p>Battery Charging a Capacitor</p>	 <p>1000µF 3kΩ DURGAN</p>	 <p>Separation d +Q -Q A, plate area V (battery)</p>
<p>Electric Current</p>	<p>A stream of charges flowing through a conductor. Analogy: Water flowing through a hose.</p>	
<p>Conventional Current</p>	<p>Positive charge, as opposed to the actual flow of electrons.</p>	
<p>Electric Circuit</p>	<p>A conductive path that allows electric current to flow. Analogy: The wire is the water hose.</p>	
 <p>lightbulb wire switch dry cell</p>	 <p>Battery Switch Light Bulb Wire</p>	

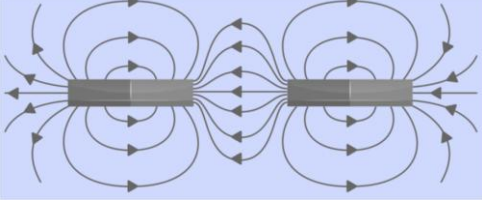
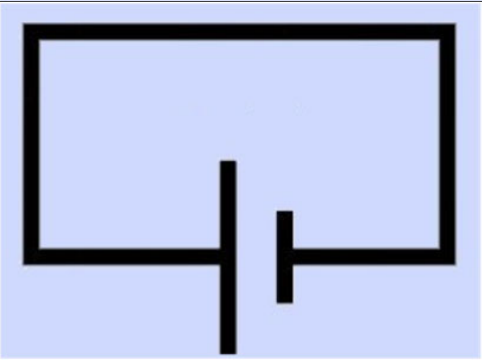
Chapter 15: Electric Circuits

Term	Equations & Descriptions	
Drift Velocity		
Resistor		
Battery (Voltage source)		
Fuse		
Capacitor		
Switch		
		
		
		

		<p>A circuit diagram featuring a 12 V battery at the top. A 2.0 Ω resistor is connected in series with the battery. Below this, a 1.8 Ω resistor is connected in parallel. Further down, a 1.6 Ω resistor is connected in parallel. At the bottom, there is a parallel combination of three resistors: 1.2 Ω, 1.4 Ω, and 1.0 Ω.</p>
		<p>A photograph showing two yellow AA batteries connected in series to a 9V battery. The positive terminal of the top AA battery is connected to the positive terminal of the 9V battery, and the negative terminal of the top AA battery is connected to the negative terminal of the 9V battery. The bottom AA battery is also connected in series to the 9V battery.</p>
		<p>A circuit diagram with a battery at the bottom. A 15 Ω resistor is connected in parallel with the battery, controlled by switch S1. A 25 Ω resistor is connected in parallel with the battery, controlled by switch S2.</p>
		<p>A circuit diagram with a battery at the bottom. A 15 Ω resistor and a 25 Ω resistor are connected in series with the battery.</p>



Chapter 16: Magnetism

Term	Equations & Descriptions	
Basic Law of Magnetism		
Magnetic Permeability (μ)		
Right-Hand Rule		
Diamagnetic Substance		
Paramagnetic Substance		
Ferromagnetic Substance		
Faraday's Law of Magnetic Induction		
Electromotive Force		
Alternating Current		
Direct Current		
Rectifier		
Inverter		
Lenz's Law		
		 <p>A diagram showing two bar magnets placed horizontally with their north poles facing each other. Magnetic field lines are shown as curved arrows originating from the north poles and pointing towards the south poles, illustrating the repulsive force between like poles.</p>
		 <p>A schematic diagram of a rectangular circuit. It consists of a closed loop of wire with a battery symbol (two vertical lines of unequal length) connected to the bottom side of the loop.</p>

Sources

These chapters and content are taken verbatim from the High School textbook:

- Dr. Jay L. Wile (2023). [Discovering Design with Physics](#), 1st Edition.

Image Sources

- Dr. Carl Rod Nave (1998). HyperPhysics, Conservation of Energy. <http://hyperphysics.phy-astr.gsu.edu/hbase/conser.html>