Physics Cheat Sheet

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Representation of motion

Motion Diagram	Dots that are created in evenly spaced intervals. Larger gaps relate to larger velocity.
Positi-on-Time	Straight line represents constant velocity. Larger gradient large velocity.
Free body	Object is represented as a particle with tails representing forces. Tails represent direction and magnitude.

Newton's Laws of motion

1st Law	If the forces are balanced then the object will maintain its current state of motion.
2nd Law	Relationship stating net force is equal to the acceleration times mass. More mass means increased resistance to change in acceleration.
3rd Law	Forces have action-reaction pairs which are equal in magnitude but opposite in direction. These forces act on different objects.

Thermal Physics

Heat	Transfer of thermal energy
Temper-ature	The average speed of all of the particles

Heat flow continues until the average kinetic energy of each atom is the same.

Geometrical optics

Electromagnetic waves come in different wavelengths. Some within the visible spectrum and some outside of it.

Reflection and transmission of waves occur at any change in medium that the waves travel through.

The law of reflection	The angle of incident light is equal to the reflected light

Ray diagrams can be drawn to locate the position of the image

Light bends in relation to the normal when the medium changes.

Fast - Slow - Towards

Slow - Fast - Away

Refractive index and optical density both have an effect on light speed.

The critical angle is when the refracted ray is 90 degrees to the normal. Meaning no light enters the second medium.

Vectors vs Scalars

Scalars - Physical quantities with magnitude but no direction. Scalars can be negative. Some examples are temperature, speed, energy and time.
Vectors - Physical quantities with both magnitude and direction. Examples include forces, displacement, velocity and accele-ration.

Useful equation

Gravity	*F=mg*
2nd Law	*F= ma*
Velocity	*v= u + at*
Displacement	$v= ut + 1/2 at^2$

Useful equation (cont)

Other	$v^2=u^2+2as$
Kinetic energy	$KE=1/2mv^2$
Thermal change	*Q=mc(T2-T1)*
Ohm's Law	*V=IR*
Power	$P=VI$, $P=I^2R$, $P=V^2/R$

v = final velocity
u = initial velocity
a = acceleration
g = gravitational acceleration
t = time
P = power
V = Voltage
I = Current
R = Resistance
T = temperature
c = heat capacity
s = distance

Waves

Logitudinal waves	Contractions caused by pushing and pulling
Transverse waves	Waves caused by up and down motions
Frequency	Number of crests in a given time
Period	Time between two identical points on a wave
Wavelength	Distance between two crests

Speed increases in lower density and higher force mediums

Superp-osition	Sum of the two waves at a specific point

Wavelength multiplied by frequency is equal to speed of the wave

If speed increases frequency stays constant, amplitude

Motion

Time	Total time that has passed since t=0
Time interval	Difference between two times
Distance	Movement of object including double backs (Scalar)
Position	Location of an object relative to origin (Vector)
Displacement	A change in position (Vector)

Energy

Energy can be transferred across system boundaries through work, heat flow, or particle transfer.

Work	External forces cause movement in a system. Positive work causes movement in the same direction.

Initial energy and work must always be equal to final energy.

Methods of heat transfer

Radiation	Transferred through collision of particles
Convection	Occurs in fluids and relies on changes of density during heating.
Radiation	Heat travelling in infrared waves that can pass through vacuums.

Electricity

Positive charges can attract neutral objects

Voltage	potential difference - work done per unit charge
Ohmic vs non-ohmic	Ohmic resistors have constant resistant irrespective to the voltage across.

In series the voltage changes across resistors and bulbs. Current stays constant.

In parallel current splits and voltage stays constant. The more resistance you add in parallel the more current will flow.

Voltage can be calculated by finding the previous voltage and subtracting IR of the resistor.