Math & Physics exercise
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Gas Laws `Boyle's Law` = P_1 x V_1 = P_2 x V_2
V= Volume , P= Pressure
1) **Change the above formula to have P_1 alone on the left side of the equation**

`Charles' Law` = $\frac{V_1}{K_1} = \frac{V_2}{K_2}$ V= Volume , K= Constant — Volume increases by 1/273 per every ^oC
2) **Change the above formula to have K_2 alone on the left side of the equation**

`Combined Boyle's and Charles' Law Equation` $\frac{P_1 \cdot V_1}{K_1} = \frac{P_2 \cdot V_2}{K_2}$
3) **Change the above formula to have K_2 alone on the left side of the equation**

Speeds
`Indicated Airspeed` IAS = dynamic air pressure of air against a vehicle $p = \frac{1}{2}\rho\nu^2$
4) **Change the above formula to have ν alone on the left side of the equation**

`Mach Number` is the ratio of TAS to the local speed of sound
5) **What is the standard speed of sound in meters per second and kilometers per hour and miles per hour?**

Temperature Unit conversion
F = 9C/5+32 C = 5/9(F-32) K=C+273
6) **15^{o}C are F and K**

Energy can not be created nor destroyed. **E=MC^2**
7) **Change the above formula to have C alone on the left side of the equation**

Absolute Zero = 0 Kelvin = -273.15^o Celsius

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Multi-mode Cables have nowadays a loss (attenuation) of 0.5 dB/km at a wavelength of about 1300nm, whereas single-mode cables have loss of 0.25 dB/km at a wavelength of about 1500nm (year 2000).
8) **Indicate 1500nm in meters**

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Torque: T = r · F
where r is the vector from the axis of rotation to the point on which the force is acting F is the vector of force.
9) **60 inch pounds are how many foot pounds an Nm**

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Speed (symbol: ν) is the rate of motion, or equivalently the rate of change of position, expressed as distance d moved per unit of time t.
Speed is a scalar quantity with dimensions Length/Time Units of speed include:
meter per second, (symbol m/s), the SI derived unit kilometers per hour, (symbol km/h) miles per hour, (symbol mph) knot (nautical miles per hour) Mach, where Mach 1 is the speed of sound; Mach n is n times as fast. Mach 1 = 343 m/s (=speed of sound under average circumstances) = 1234.8 km/h speed of light in vacuum (symbol c) is one of the natural units c = 299,792,458 m/s [other important conversions] 1 m/s = 3.6 km/h 1 mph = 1.609 km/h 1 knot = 1.852 km/h = 0.514 m/s Vehicles often have a speedometer to measure the speed. The rate of change of speed with respect to time is termed acceleration.
10) **1.5 Mach are how many feet per second**

11) **What is the speed of light in**
knots
miles per hour
km/h

In physics, **acceleration** (symbol: α = lower case alpha) is defined as the rate of change (or time derivative) of velocity. It is thus a vector quantity with dimension length/time^2. In SI units, this is meter/second^2.

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Density is calculated by dividing the `how much` by the `how big`, and is expressed in grams per cubic centimeter (g/cm^3) or kilograms per meter cubic (**kg/m^3**). To find the **Specific Gravity** of a solid or liquid, you must know its density in kilograms per meter cubic (**kg/m^3**) or in grams per centimeter cubic (g/cm^3). Then, divide this density by the density of pure water in the same units. If you use kg/m^3, divide by 1000. If you use g/cm^3, divide by 1.
12) **15,000kg of fuel at a density of .8 are how many liters?**

13) **50,000 liters of fuel at a density of .8 are how many kg?**

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Decimal multiples and sub-multiples prefixes:					
Submultiple	**Prefix**	**Symbol**	**Multiple**	**Prefix**	**Symbol**
10^{-1}	deci	d	10	deca	da
10^{-2}	centi	c	10^{2}	hecto	h
10^{-3}	milli	m	10^{3}	kilo	k
10^{-6}	micro	μ	10^{6}	mega	M
10^{-9}	nano	n	10^{9}	giga	G
10^{-12}	pico	p	10^{12}	tera	T
10^{-15}	femto	P	10^{15}	peta	P
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1 SI (International System) Units

Sl (International System) Units :		
Physical Quantity	**Name of Unit**	**Symbol**
length	meter	m
mass	kilogram	kg
time	second	s
thermodynamic temperature	kelvin	K
electric current	ampere	A
luminous intensity	candela	cd
amount of substance	mole	mol
Derived Sl Units with special names:		
Physical Quantity	**Name of Unit**	**Symbol**
frequency	hertz	Hz
energy	joule	J
force	newton	N
power	watt	W
pressure	pascal	Pa
electric charge	coulomb	C
electric potential difference	volt	V
electric resistance	ohm	Ω
electric conductance	siemens	S
electric capacitance	farad	F
magnetic flux	weber	Wb
inductance	henry	H
magnetic flux density	tesla	T
luminous flux	lumen	lm
illuminance	lux	lx
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Formulas you should be familiar with
Linear motion Distance x = $\nu \cdot t$ = distance · time
acceleration $\alpha = \frac{\nu}{t}$ = velocity / time
`linear acceleration:` distance x = 0.5 ·$\nu \cdot t$
distance x = 0.5 ·$\alpha \cdot t^2$ $\quad \nu = \alpha \cdot t$
x in m = metre , ν in $\frac{m}{s}$, α in $\frac{m}{s^2}$
F = force in N = newton , m = mass in kg
Force = m ·α
Volume V in m^3 , m = mass in kg , Density ρ in $\frac{kg}{m^3}$
$\rho = \frac{m}{V}$
Weigh = Force = m · g , where g is acceleration due to gravity ($9.81 \frac{m}{s^2}$)
Torque = M for moment = F · d (Force · distance)