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| **Physics 20 Formula Sheet** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Formula** | | | | | | **Variables** | | | | **Manipulations** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| \*constant velocity\* | | | | | | *v ,* d , t | | | |  | | | | | | | | | | | | | | |  | | | | | | | | | | | |
|  | | | | | | a , *v*f, *v*i , t | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Uniform Acceleration |  | | | | | d , *v*f , *v*i , t | | | |  | | | | | | | | | |  | | | | | | | |  | | | | | | | | |
| \*vertical motion\* | | | | | d , *v*i , t , a | | | |  | | | | | | | |  | | | | | | | | | | | | If *v*i = 0, | | | | | | |
|  | | | | | d , *v*f , *v*i , a | | | |  | | | | | | | | | |  | | | | | | | |  | | | | | | | | |
| Net Force | | | | Weight | | F , m , a , g | | | |  | | | | | |  | | | | |  | | | | |  | | | | | \*on a flat surface\* | | | | | |
|  | | | | | | Ff , µ , FN | | | |  | | | | | | | |  | | | | | | | \*on an incline\* | | | | | | \*on an incline\* | | | | | |
| \*in motion\* | | | | \*based on position\* | | , m , *v* | | | , m , g , h |  | | | | |  | | | |  | | | | | |  | | | | | | Top: ET = Ep  Bottom: ET = Ek  Middle:  ET = Ep + Ek  or | | | | | |
|  | |  | | |  | W , F , d | | | W , P , t |  | | | | |  | | | |  | | | | |  | | | | | | |  | | | | |  |
|  | | | | | | For free falling objects, | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Circular Motion** | | | | | | **Vertical Circles** | | | | | | | | **Universal Gravity** | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | or  If or , then: | | | | | | | | **Kepler** | | | | | | | | | **Gravity Force** | | | | | | | | | | | **Orbital Period** | | |
|  | | | | | | | | |  | | | | | | | | | | |  | | |
|  | | | | | | | | | | |  | | |
|  | | | | | | | | | | |  | | |
| **Horizontal Circles** | | | | | | | | **Gravity Fields** | | | | | | | | | **Orbital Velocity** | | | | | | | | | | | **Constants** | | |
| or  on a flat road:  \*on a banked curve\* | | | | | | | | Test Object:  Source Object: | | | | | | | | |  | | | | | | | | | | |  | | |
| **Projectile Motion** | | | | | | | **Conservation of Energy** | | | | | | | | | | | | | | | | | | | | **Energy of SHM** | | | | | | | | | | |
|  | | |  | | | |  | | | | |  | | | | | | | | | | | | | | |  | | | | | | | | | | |
| If | | | | **Waves** | | | | | | | | | | | | | | | **Springs** | | | | | | | | | | | | | | | |
|  | | | | | |  | | | | | | | | |  | | | | | | | | | |  | | | | | |
| **Sound** | | | | | | |  | | | |  | | | | | |  | | | | |  | | | | | | | | | | |  | | | | |
| T = temperature | | | | | | |
| speed of sound in 0ºC air = 331 m/s | | | | | | | **Stretched Strings & Air Columns** | | | | | | | | | | | | | | | **Pendulums** | | | | | | | | | | | | | | | |
| 1st Open Harmonic (and strings):    1st Closed Harmonic: | | | | | | | | | | | | | | |  | | | | | | |  | | | | | |  | | |
| \*or use conservation of energy to find velocity, height, or energy\* | | | | | | | | | | | | | | | |
| **Harmonics** | | | | | | | | | | | | | | | | | **Doppler Effect** | | | | | | | | | | | | | | | | | | | | |
| Open columns and strings: | | | | | | | Closed columns: | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | |
| **Trigonometry** | | | | | | | | | | | | | | | | | **Shortcuts** | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | A  B  C | | | | | | | | | km/h m/s | | | | | | | | | | | | | | | | | | | | |
| kg g | | | | | | | | | | | | | | | | | | | | |
| 1nm = 1 x 10-9 m | | | | | | | | | | | | | | | | | | | | |
| **Plane Forces** | | | | | | | | | | | | | | | | | **Direction** | | | | | | | | | | | | | | | | | | | | |
| Normal Force Force of Friction  Parallel Force Gravitational Force  Perpendicular Force Applied Force | | | | | | | | | | | | | | | | | 90º  0º (360º)  180º  270º  N  E  S  W | | | | | | | | | | | | | | | | | | | | |