

## Physics 11 Formula Sheet

### Kinematics

$$d = \bar{v}t$$

$$v = v_o + at$$

$$\bar{v} = \frac{v + v_o}{2}$$

$$v^2 = v_o^2 + 2ad$$

$$d = v_o t + \frac{1}{2}at^2$$

### Forces

$$F_{net} = ma$$

$$F_g = mg$$

$$F_{fr} = \mu F_N$$

$$F = -kx$$

$$MA = \frac{F_{load}}{F_{effort}} = \frac{d_{effort}}{d_{load}}$$

### Energy

$$W = Fd$$

$$W = \Delta E$$

$$E_k = \frac{1}{2}mv^2$$

$$E_p = mgh$$

$$P = \frac{W}{t}$$

$$\Delta E_{thermal} = mc\Delta T$$

$$efficiency = \frac{W_{out}}{W_{in}} = \frac{P_{out}}{P_{in}}$$

### Waves

$$T = \frac{1}{f}$$

$$v = f\lambda$$

$$f = f_s \left( \frac{v}{v \pm v_s} \right)$$

### Electric Circuits

$$I = \frac{Q}{t}$$

$$V = IR$$

$$P = IV$$

$$R_{series} = R_1 + R_2 + \dots + R_n$$

$$\frac{1}{R_{parallel}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$$

$$V_t = \mathcal{E} - Ir$$

## Table of Constants

Acceleration due to gravity near Earth's surface.	$g = 9.8 \text{ m/s}^2$
Speed of light.....	$c = 3.00 \times 10^8 \text{ m/s}$
Elementary charge.....	$e = 1.60 \times 10^{-19} \text{ C}$
Specific heat capacity $c$	
water.....	$4.18 \times 10^3 \text{ J/kg}^\circ\text{C}$
ice.....	$2.06 \times 10^3 \text{ J/kg}^\circ\text{C}$
methanol.....	$2.45 \times 10^3 \text{ J/kg}^\circ\text{C}$
iron.....	$4.46 \times 10^2 \text{ J/kg}^\circ\text{C}$
aluminum.....	$9.03 \times 10^2 \text{ J/kg}^\circ\text{C}$
copper.....	$3.85 \times 10^2 \text{ J/kg}^\circ\text{C}$
lead.....	$1.30 \times 10^2 \text{ J/kg}^\circ\text{C}$

## Metric Prefixes

Basic unit (e.g., meter, gram , liter).....	1
centi- (c-).....	0.01
milli- (m-).....	0.001
micro- ( $\mu$ -).....	0.000 001
kilo- (k-).....	1000
mega- (M-).....	1 000 000
giga- (G-).....	1 000 000 000

## Mathematical Equations

**For Right-angled Triangles:**

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

Pythagorean theorem:  $a^2 + b^2 = c^2$ , where  $c$  is the hypotenuse.

**Circle:**

$$\text{Circumference} = 2\pi r$$

$$\text{Area} = \pi r^2$$

**Quadratic formula:**

The general quadratic equation  $ax^2 + bx + c = 0$  has the following roots:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$