

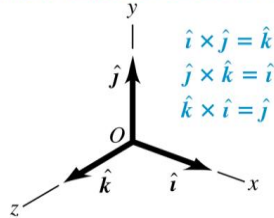
THINGS THAT YOU **NEED TO REMEMBER** AND THAT **WILL NOT** BE PROVIDED ON THE FORMULA SHEET FOR THE TEST

VECTOR OPERATIONS

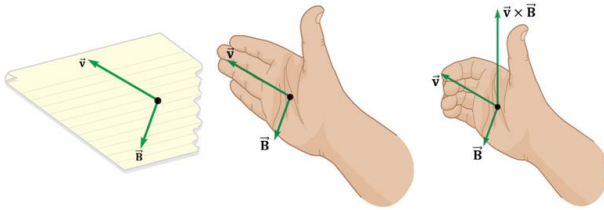
$$\vec{A} = A_x \hat{i} + A_y \hat{j} + A_z \hat{k}$$

$$|\vec{A}| = A = \sqrt{A_x^2 + A_y^2 + A_z^2}$$

A right-handed coordinate system



$$\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$$

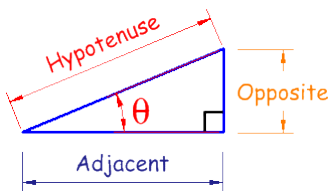


I will give you the formulas for dot product and magnitude of the cross product, but your calculations will be quicker if you have them memorized!

TRIGONOMETRY

$$\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

$$\cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$$



$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\text{Opposite}}{\text{Adjacent}}$$

KINEMATICS

$$\vec{v}_{ave} = \frac{\Delta \vec{r}}{\Delta t}; \vec{v} = \frac{d\vec{r}}{dt}; \vec{a}_{ave} = \frac{\Delta \vec{v}}{\Delta t}; \vec{a} = \frac{d\vec{v}}{dt}$$

CIRCULAR MOTION

$$\omega = \frac{d\theta}{dt}; \alpha = \frac{d\omega}{dt}; \omega = \frac{2\pi}{T} = 2\pi f; s = \theta r$$

CONSTANTS

$$g = 9.81 \text{ m/s}^2$$

NEWTON'S SECOND LAW

$$\vec{F}_{total} = m\vec{a}$$

FORCES

$$F_{grav} = \frac{GMm}{r^2}$$

$$f_k = \mu_k F_N; f_{s,max} = \mu_s F_N$$

$$F_{spring} = -kx$$

SIMPLE HARMONIC MOTION

$$f = \frac{1}{T}; \omega = \frac{2\pi}{T} = 2\pi f$$

$$F_{x,total} = -kx$$

WORK AND ENERGY

$$W = \vec{F} \cdot \Delta \vec{r} \quad \text{if } \vec{F} \text{ is constant}$$

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

$$PE_{grav,local} = mgy$$

$$PE_{spring} = \frac{1}{2}kx^2$$

$$P_{ave} = \frac{W}{\Delta t}$$

IMPULSE, MOMENTUM, AND COLLISIONS

$$\vec{p} = m\vec{v}$$

*Definitions of elastic, inelastic, completely
inelastic collisions*