8.01L SUMMARY OF EQUATIONS

Note: Quantities shown in **bold** are vectors.

$\mathbf{v} = d\mathbf{r}/dt \quad \mathbf{a} = d\mathbf{v}/dt$

For *constant* acceleration $\mathbf{a}$, if at $t = 0$ $\mathbf{r} = \mathbf{r}_0$ and $\mathbf{v} = \mathbf{v}_0$:

$$\mathbf{v} = \mathbf{v}_0 + \mathbf{a}t$$
$$\mathbf{r} = \mathbf{r}_0 + \mathbf{v}_0 t + \tfrac{1}{2}\mathbf{a}t^2$$

Adding relative velocities ("wrt" is short for "with respect to"): $\mathbf{v}_{\substack{A \\ wrt \\ B}} + \mathbf{v}_{\substack{B \\ wrt \\ C}} = \mathbf{v}_{\substack{A \\ wrt \\ C}}$

$\sum \mathbf{F} = 0 \Leftrightarrow \mathbf{a} = 0$ (static equilibrium)

Physical Constants:

$g = 9.8\ m/s^2$ Use the approximate value $g = 10\ m/s^2$ where told to do so.

Conversion reminder:

π radians $= 180^o$

Lazy Physicist 's Favorite Angle: (to be used when calculators are not allowed):

36.9^o and 53.1^o are the angles of a 3-4-5 right triangle so:

$\sin(36.9°) = \cos(53.1°) = 0.60 \quad \cos(36.9°) = \sin(53.1°) = 0.80$

Solution to a Quadratic Equation: If $ax^2 + bx + c = 0$ then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$