Rules of Engagement

Kinematic Motion Problems

1. Draw a motion diagram
2. Draw Reference Frame
3. Label Positions A, B, etc
4. Find pos, vel, time for each position
5. Find equation & solve

Force Problems

1. Draw picture
2. Draw ref. Frame
3. Draw FBD
4. Redraw force diagram replacing the object by a dot**.**
5. Resolve all force into x and y components
6. Show $\sum F_x = ma_x$, and $\sum F_y = ma_y$
7. Solve for unknown

Projectile Motion Problems

1. Draw picture
2. Draw ref. Frame
3. Mark on picture points A and B
4. Write down in neat column form values for position, velocity, acceleration and time in both x and y directions at both points A & B..
5. Remember, $x_B = v_{Ax}\Delta t + x_A$ because $a_x = 0$
6. Remember, $y_B = -.5\ g\ \Delta t^2 + v_{Ay}\ \Delta t + y_A$ because the object is just a falling body in the vertical direction.
7. Solve for the required quantity.

Momentum Problems

1. Draw 2 pictures --- before and after
2. Indicate system!!
3. Draw the reference frame
4. Indicate on picture initial and final values of momentum
5. Solve

Work Problems

1. Draw figure
2. Circle the system
3. Draw ref. Frame and show 0 ref. Level
4. Draw bar chart
5. Write equations and solve

Equilibrium Problems

1.Draw picture
2. Draw ref. Frame
3. Draw FBD
4. Resolve all force into x and y components
5. Show $\sum F_x =$ _____ =0,
and $\sum F_y =$ _____ =0
6. Choose a pivot point P
7. Show $\sum \tau =$ _____= 0
8. Solve system of equations for unknowns

Circular Motion Problems

1. Draw FBD with one axis in the radial direction.
2. Make **TOWARD** the center the positive direction.
3. Sum forces in radial direction equals m v^2/r.
4. Solve for unknown

Rotational Dynamics problems.

1. Draw a FBD.
2. Set $\sum \tau =$ _____= $I\alpha$
3. Set $\sum F =$ _____ = ma, keeping in mind that a is not always equal to $r\alpha$, but may be $\pm r\alpha$, depending upon the reference frame. And remember, if rotation is clockwise, $\alpha < 0$!
4. Solve for unknown.

Buoyancy Problems

1. Draw a picture.
2. Remember F_B = the weight of the fluid displaced.
3. $\sum F_x =$ _____ = 0
4. Solve for x.