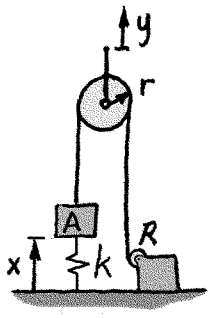
HONOR PLEDGE - I pledge my honor that during this examination
I neither gave nor received assistance.

Name: _____ Signed: _____

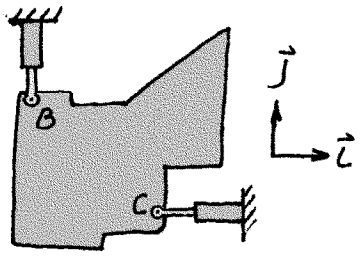
1. The reel R is reeling in rope at 5 m/s and the rate at which it is taking in rope is increasing at 7.81 m/s^2. The top pulley is being raised at 2 m/s and the rate at which is is being raised is increasing at 1 m/s^2. How fast is the block A moving and what is the tension in the rope? At the illustrated instant the spring (spring constant of 10 N/m) is extended 0.5 m from its rest length. The block A has a weight of 10 N.



2. The illustrated vertical and horizontal links are designed to position the irregular plate. B can move vertically and C can move horizontally. $\boldsymbol{r}_{C/B} = (2\boldsymbol{i} - 2\,\boldsymbol{j})$ m.

   (a) Where is the instantaneous center of rotation with respect to B?

   (b) Your technician tells you that $\boldsymbol{v}_B = -20\,\boldsymbol{j}$ m/s and $\boldsymbol{v}_C = -10\boldsymbol{i}$ m/s and the magnitude of the body's angular velocity is given by $|\omega| = 10$ rad/s. Is he correct?



3. Explicitly state what you're solving for and how. Box your answers. One word answers aren't acceptable. They'll get zero credit, whether correct or not. Demonstrate clearly that you know what you're doing - don't leave me guessing. These are general instructions. Now please continue with the real exam.

4. Two particles, A and B, approach as shown, A moving in the negative $\boldsymbol{j}$ direction with speed 10 m/s and B moving up with speed 20 m/s. $m_A = 2\,\text{kg}$, $m_B = 1\,\text{kg}$. After colliding, particle A has velocity $(5\boldsymbol{e}_n - \frac{10}{\sqrt{2}}\boldsymbol{e}_t)\,\text{m/s}$. $\boldsymbol{e}_t$ and $\boldsymbol{e}_n$ are aligned at 45° to $\boldsymbol{i}$, $\boldsymbol{j}$, as shown.

   (a) Write out the symbolic equations you can use to fully characterize the problem. (You don't have to use them if you see a more efficient approach - this is just to verify that you understand what the full set of equations are.)

   (b) What is the velocity of body B after the collision?

   (c) What is the coefficient of restitution between the two bodies?