Problem 1: Hibbeler, 16–42
The inclined plate moves to the left with a constant velocity \( v \). Determine the angular velocity and acceleration of the slender rod of length \( \ell \). The rod pivots about the step at \( C \) as it slides on the plate.

Problem 2: Hibbeler, 16–47
When the bar is at the angle \( \theta \), the rod is rotating clockwise at \( \omega \) and has an angular acceleration of \( \alpha \). Determine the velocity and acceleration of the weight \( A \) at this instant. The cord is 20 ft long.

Problem 3: Hibbeler, 16–62
At the instant shown, the truck is traveling to the right at 8 m/s. If the spool does not slip at \( B \), determine its angular velocity so that its mass center \( G \) appears to an observer on the ground to remain stationary.

Problem 4: Hibbeler, 16–90
Show that if the rim of the wheel and its hub maintain contact with the three tracks as the wheel rolls, it is necessary that slipping occurs at the hub \( A \) if no slipping occurs at \( B \). Under these conditions, what is the speed at \( A \) if the wheel has an angular velocity \( \omega \)?

Problem 5: Hibbeler, 16–115
The hoop is cast on the rough surface such that it has an angular velocity \( \omega = 4 \text{ rad/s} \) and an angular acceleration \( \alpha = 5 \text{ rad/s}^2 \). Also, its center has a velocity \( v_O = 5 \text{ m/s} \) and a deceleration \( a_O = 2 \text{ m/s}^2 \). Determine the acceleration of point \( A \) at this instant.
Problem 6: Hibbeler, 16–138
A girl stands at $A$ on a platform which is rotating with an angular acceleration $\alpha = 0.2 \text{ rad/s}^2$ and at the instant shown has an angular velocity $\omega = 0.5 \text{ rad/s}$. If she walks at a constant speed $v = 0.75 \text{ m/s}$ measured relative to the platform, determine the acceleration

a) when she reaches point $D$ in going along the path $ADC$, $d = 1 \text{ m}$; and

b) when she reaches point $B$ if she follows the path $ABC$, $r = 3 \text{ m}$.  

see textbook for figure