ME 2210 Dynamics Handout #5b: Homework: 15.106, 15.108, 15.110, 15.112, 15.116, 15.126, 15.130, 15.135

15.105 A 900-mm rod rests on a horizontal table. A force **P** applied as shown produces the following accelerations: $\mathbf{a}_A = 3.6$ m/s^2 to the right, $\alpha = 6$ rad/s^2 counterclockwise as viewed from above. Determine the acceleration (*a*) of point *G*, (*b*) of point *B*.

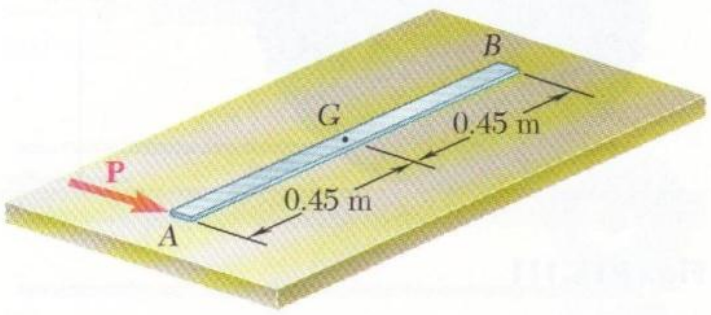

Fig. P15.105 and P15.106

15.106 In Prob. 15.105, determine the point of the rod that (*a*) has no acceleration, (*b*) has an acceleration of 2.4 m/s^2 to the right.

15.107 A 10-ft steel beam is lowered by means of two cables unwinding at the same speed from overhead cranes. As the beam approaches the ground, the crane operators apply brakes to slow down the unwinding motion. At the instant considered the deceleration of the cable attached at *A* is 12 ft/s^2, while that of the cable at *B* is 5 ft/s^2. Determine (*a*) the angular acceleration of the beam, (*b*) the acceleration of point *C*.

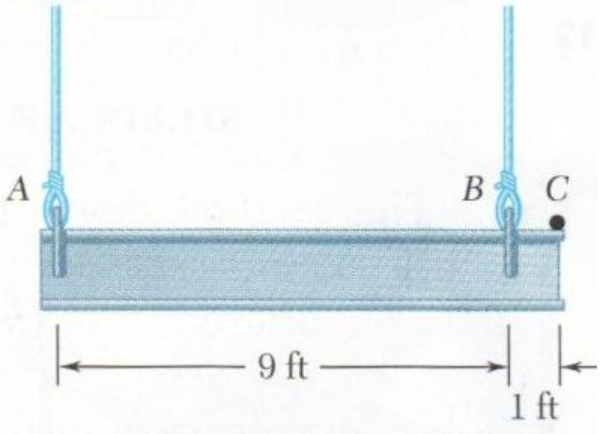

Fig. P15.107 and P15.108

15.108 The acceleration of point C is 1 ft/s^2 downward and the angular acceleration of the beam is 0.8 rad/s^2 clockwise. Knowing that the angular velocity of the beam is zero at the instant considered, determine the acceleration of each cable.

15.109 and 15.110 Bar BDE is attached to two links AB and CD. Knowing that at the instant shown link AB has zero angular acceleration and an angular velocity of 3 rad/s clockwise, determine the acceleration (a) of point D, (b) of point E.

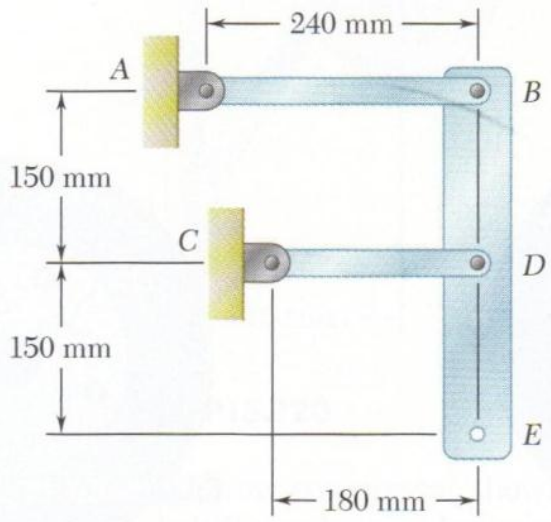

Fig. P15.109

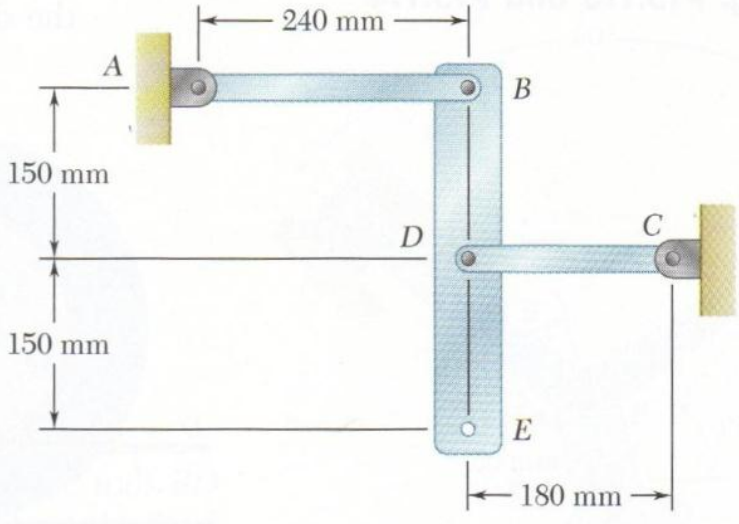

Fig. P15.110

15.111 An automobile travels to the left at a constant speed of 48 mi/h. Knowing that the diameter of the wheel is 22 in., determine the acceleration (*a*) of point *B*, (*b*) of point *C*, (*c*) of point *D*.

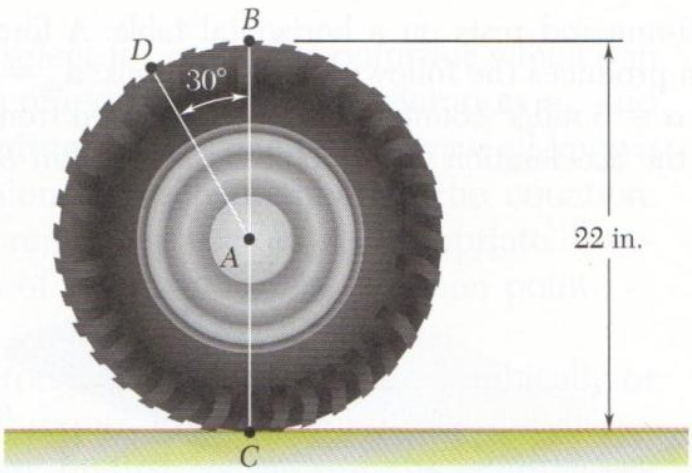

Fig. P15.111

15.112 A carriage *C* is supported by a caster *A* and a cylinder *B*, each of 50-mm diameter. Knowing that at the instant shown the carriage has an acceleration of 2.4 m/s^2 and a velocity of 1.5 m/s, both directed to the left, determine (*a*) the angular accelerations of the caster and of the cylinder, (*b*) the accelerations of the centers of the caster and of the cylinder.

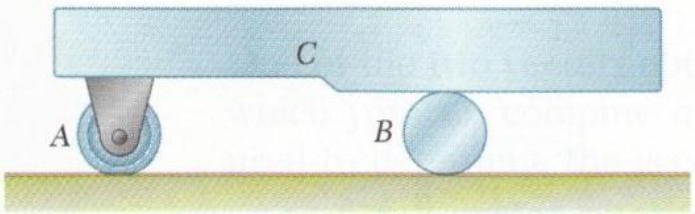

Fig. P15.112

15.115 and 15.116 A 3-in.-radius drum is rigidly attached to a 5-in.-radius drum as shown. One of the drums rolls without sliding on the surface shown, and a cord is wound around the other drum. Knowing that at the instant shown end *D* of the cord has a velocity of 8 in./s and an acceleration of 30 in./s^2, both directed to the left, determine the accelerations of points *A*, *B*, and *C* of the drums.

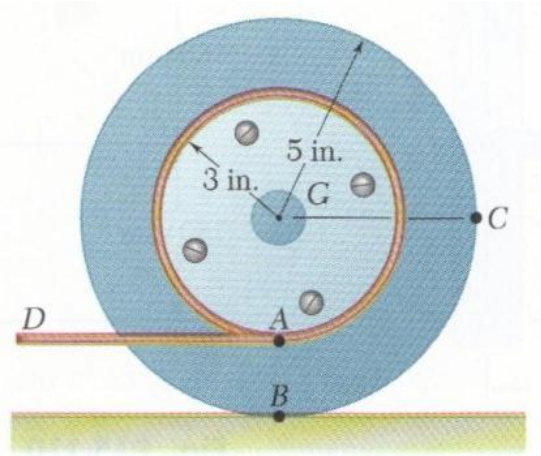

Fig. P15.115

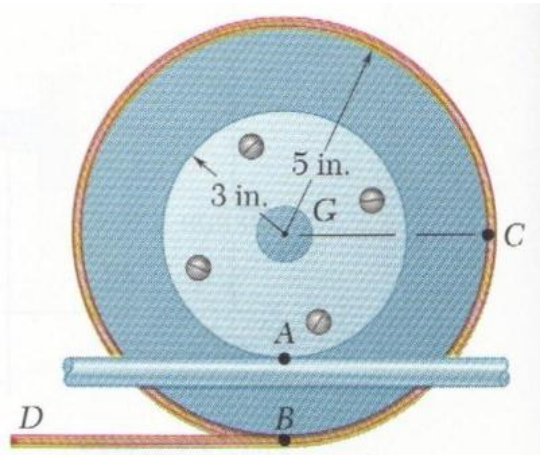

Fig. P15.116

15.118 The 18-in.-radius flywheel is rigidly attached to a 1.5-in.-radius shaft that can roll along parallel rails. Knowing that at the instant shown the center of the shaft has a velocity of 1.2 in./s and an acceleration of 0.5 in./s^2, both directed down to the left, determine the acceleration (*a*) of point *A*, (*b*) of point *B*.

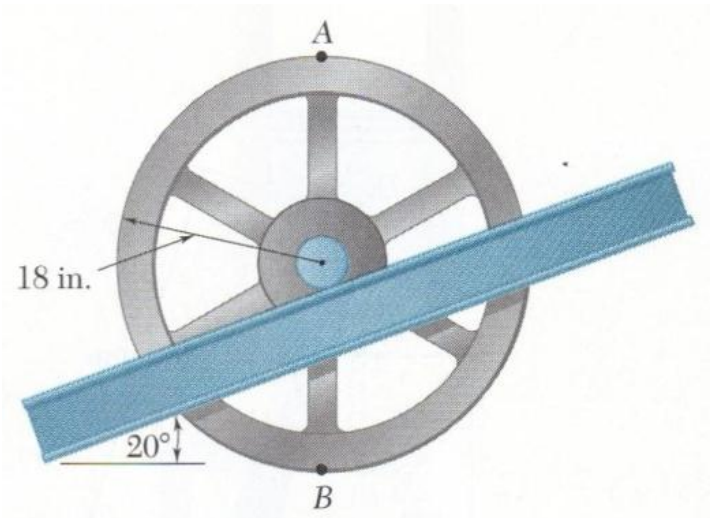

Fig. P15.118

15.119 In the planetary gear system shown the radius of gears A, B, C, and D is 3 in. and the radius of the outer gear E is 9 in. Knowing that gear A has a constant angular velocity of 150 rpm clockwise and that the outer gear E is stationary, determine the magnitude of the acceleration of the tooth of gear D that is in contact with (*a*) gear A, (*b*) gear E.

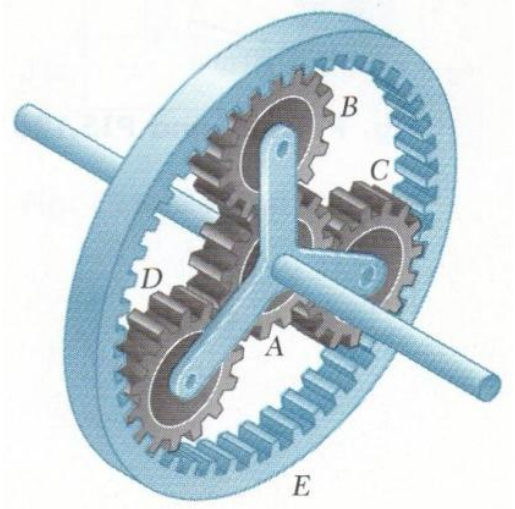

Fig. P15.119

15.125 Knowing that crank AB rotates about point A with a constant angular velocity of 900 rpm clockwise, determine the acceleration of the piston P when $\theta = 60°$.

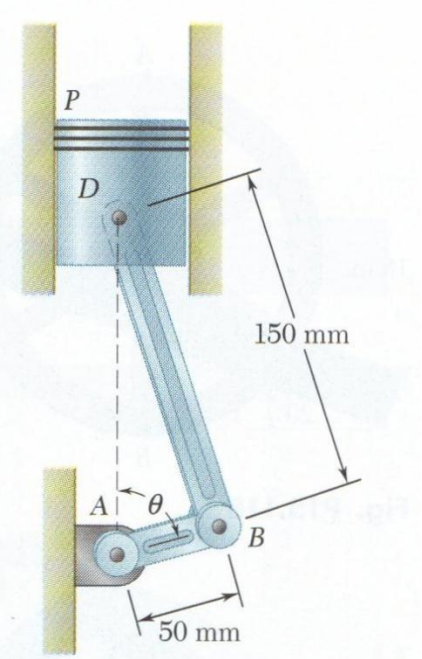

Fig. P15.125 and P15.126

15.126 Knowing that crank AB rotates about point A with a constant angular velocity of 900 rpm clockwise, determine the acceleration of the piston P when $\theta = 120°$.

15.129 Knowing that at the instant shown rod AB has a constant angular velocity of 6 rad/s clockwise, determine the acceleration of point D.

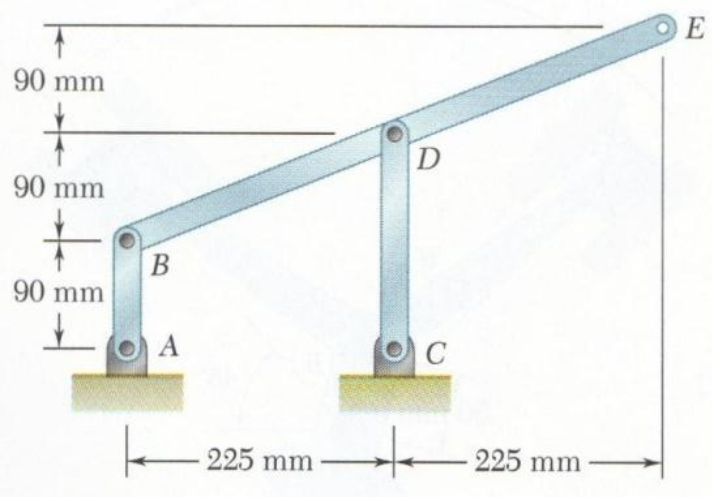

Fig. P15.129 and P15.130

15.130 Knowing that at the instant shown rod AB has a constant angular velocity of 6 rad/s clockwise, determine (*a*) the angular acceleration of member BDE, (*b*) the acceleration of point E.

15.133 and *15.134* Knowing that at the instant shown bar AB has a constant angular velocity of 4 rad/s clockwise, determine the angular acceleration (*a*) of bar BD, (*b*) of bar DE.

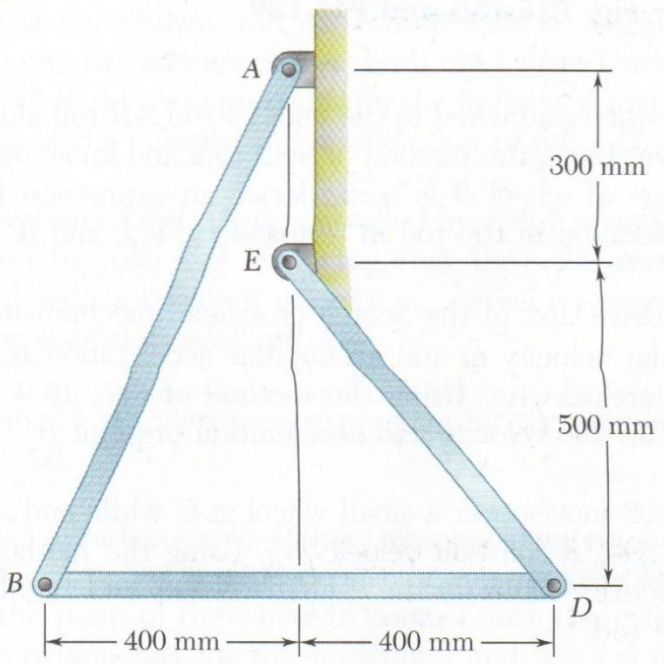

Fig. P15.133 and P15.135

15.135 and *15.136* Knowing that at the instant shown bar AB has an angular velocity of 4 rad/s and an angular acceleration of 2 rad/s^2, both clockwise, determine the angular acceleration (*a*) of bar BD, (*b*) of bar DE by using the vector approach as is done in Sample Prob. 15.8.