

Name \_\_\_\_\_ Section \_\_\_\_\_

**ES204**  
Examination III  
February 13, 1998

Problem	Score
1	/30
2	/30
3	/40
Total	/100

Show all work for credit  
AND  
Turn in your signed help sheet  
AND  
Stay in your seat until the end of class

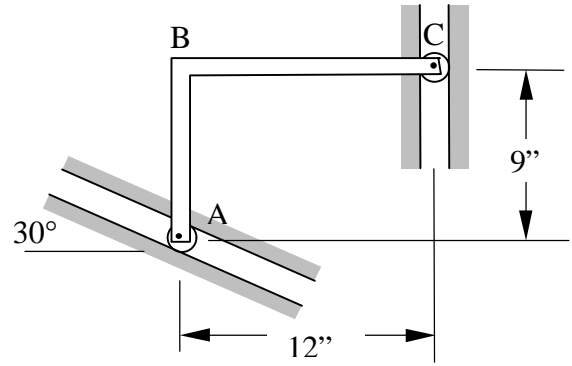
NOTE:  
Set up all the equations first and save the solutions to the end.

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**Problem 1**

30 pts  
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The velocity of point A is 10 in/s down the slot and its acceleration is  $100 \text{ in/s}^2$  up the slot when in the position shown. Determine the acceleration of point C.

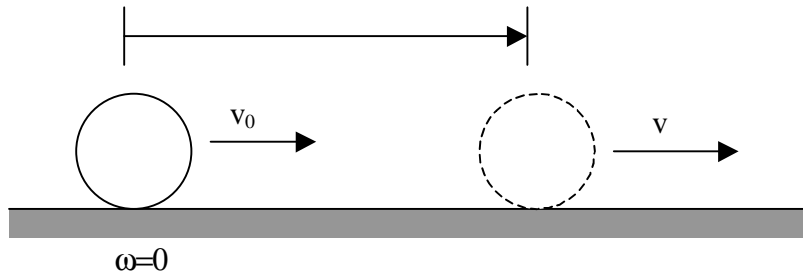


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**Problem 2**

35 pts  
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A bowling ball with radius 4.3 in. has a radius of gyration about its center of gravity of 3.28 in. If the ball is released with a velocity of 20 ft/s but with no angular velocity as it touches the alley floor, compute the time before the ball begins to roll without slipping. The coefficient of friction between the ball and the floor is 0.2.



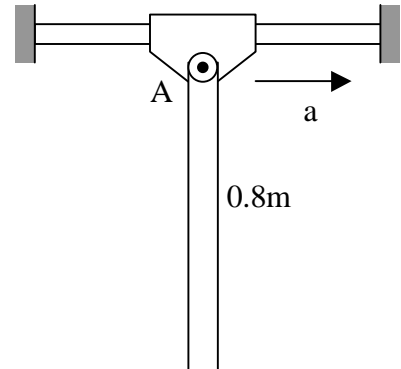
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**Problem 3**

40 pts  
Feb. 13, 1998

End A of the uniform 5 kg bar is pinned freely to the collar which has an acceleration  $a = 4 \text{ m/s}^2$  along the fixed horizontal shaft. If the bar has a clockwise angular velocity  $\omega = 2 \text{ rad/s}$  as it swings past vertical determine

- the components of the force on the bar at A for this instant,
- the angular acceleration of the rod for the instant shown.



**Note: Save all algebra until the end. Just getting a list of unknowns and equations is 95% of the problem.**