

Name _____ Section _____

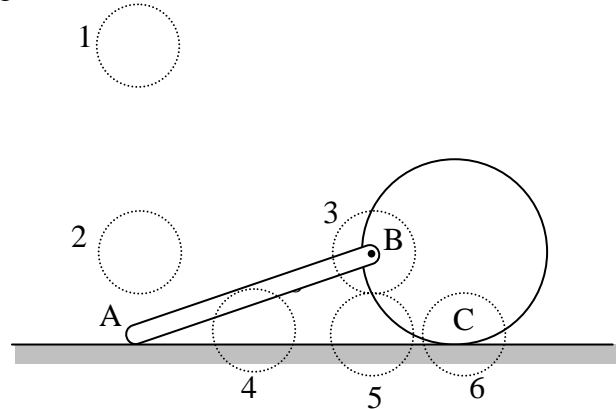
ES204
Examination II
January 22, 2004

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

1.1 At the instant shown, where is the instantaneous center of zero velocity for rod AB assuming the disk rolls without slipping on the ground? The regions are shown by dotted lines.

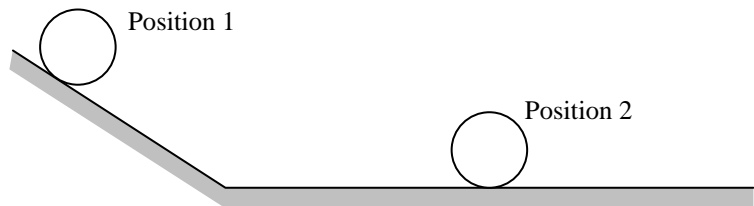
- a) region 1
- b) region 2
- c) region 3
- d) region 4
- e) region 5
- f) region 6



1.2 The tire rolls without slipping down the incline. The energy of the tire is equal to its kinetic energy plus its gravitational potential energy. Which of the following statements is true?

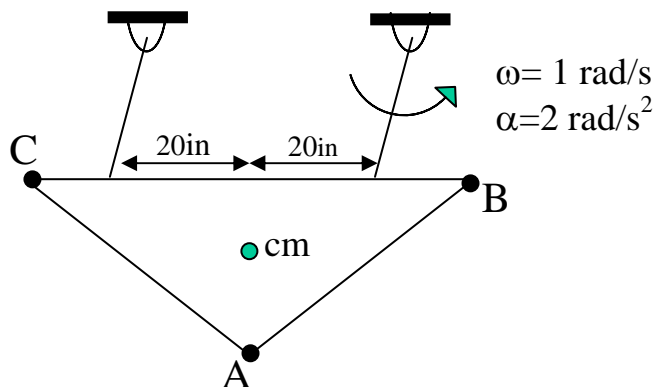
- a) The energy of the tire at position 1 is greater than the energy of the tire at position 2
- b) The energy of the tire at position 1 is less than the energy of the tire at position 2
- c) The energy of the tire at position 1 is equal to the energy of the tire at position 2
- d) We can't determine in which position the tire will have a larger energy until we have defined a datum for the problem.

Explain your answer:



1.3 At the instant shown, the *cables* rotate with the given ω and α and are both cables at angles of 15 degrees from vertical. What is the angular velocity of the plate at this instant?

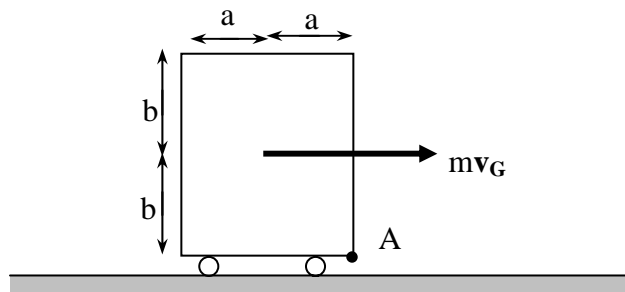
- a) 0 rad/s
- b) 1 rad/s
- c) 2 rad/s
- d) 3 rad/s
- e) not enough information given (you need the length of the cables).



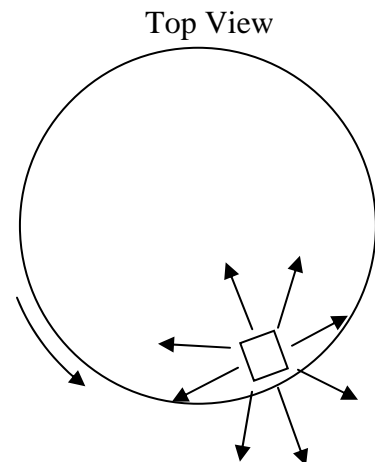
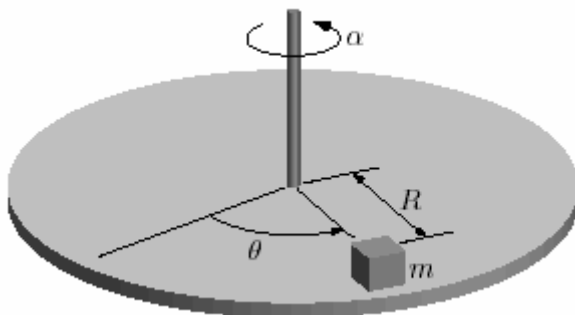
1.4 If $\vec{\omega} = \omega \hat{k}$ rad/s and $\vec{r} = 4\hat{i} + 3\hat{j}$ m determine $\vec{\omega} \times \vec{r}$

1.5 For the object shown below what is the magnitude of the angular momentum about point A?

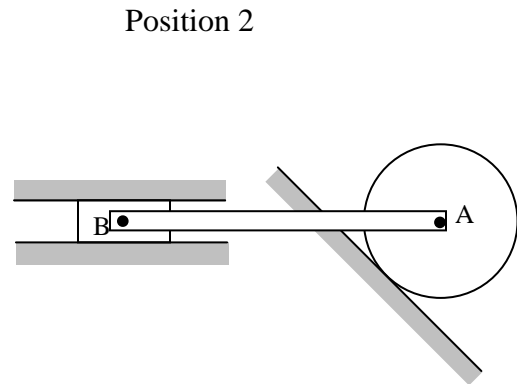
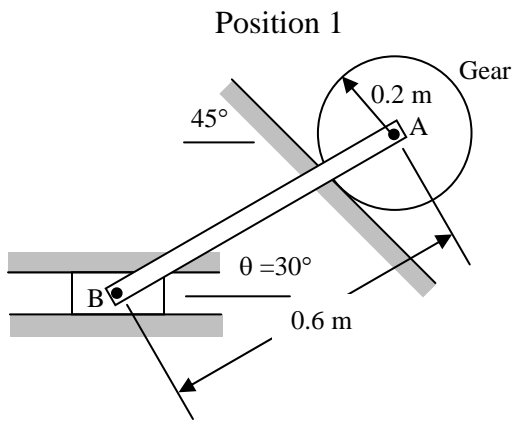
- a) 0
- b) $mv_G a$
- c) $mv_G b$
- d) $mv_G \sqrt{a^2 + b^2}$



1.6) The table shown below starts from rest and speeds up so that the block experience a constant tangential acceleration, a_t . Assume the block does not slip on the table. What is the direction of the friction force when the speed of the block is, v ? Circle the direction the best shows the direction of the friction force.

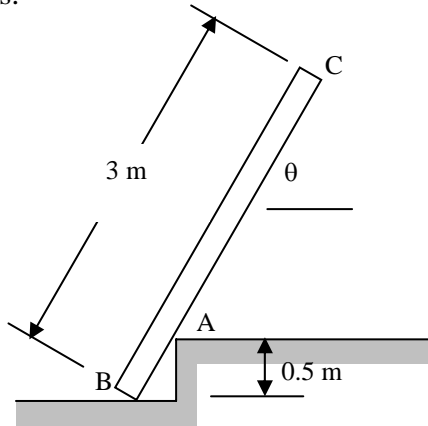


The gear has a mass of 2 kg and a radius of gyration of 0.19 m. The connecting link (slender rod) and the slider block at B have a mass of 4 kg and 1 kg, respectively. If the gear is released from rest in the position where $\theta = 30^\circ$, determine the equations necessary to determine the angular velocity of the gear when $\theta = 0^\circ$ as shown in position 2. Only a portion of the two tracks are shown. **Do not solve the equations.** Your solution should consist of a clear list of equations and unknowns.



Unknowns	Equation Number

The uniform pole has a mass of 15 kg and falls from rest when $\theta = 90^\circ$ until it strikes the edge at A, $\theta = 60^\circ$. If the pole begins to pivot about this point after contact, determine the equations necessary to determine the reactions at point A immediately after the impact. Assume that the pole does not slip at B as it falls. Do not solve the equations. Your solution should consist of a clear list of equations and unknowns.



Unknowns	Equation Number