

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



**ES204**  
Examination I  
December 20, 1996

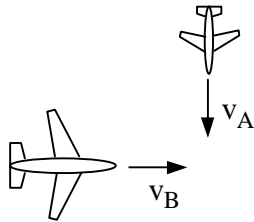
Problem	Score
1	/30
2	/30
3	/40
Total	/100

Show all work for credit  
AND  
Turn in your signed help sheet

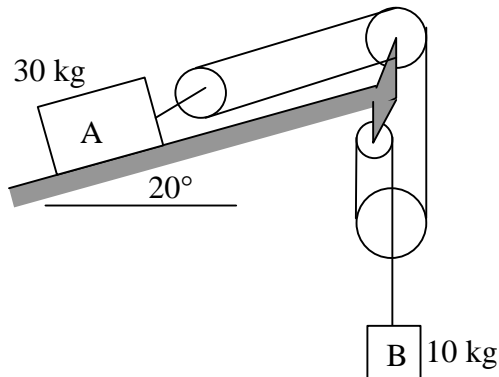


 **Merry Christmas! Frohe Weihnachten!** 

- 1a) A passenger aircraft B is flying east with a velocity of 500 km/hr. A military jet traveling south with a velocity of 1200 km/hr passes under B at a slightly lower altitude. What speed does A appear to have to a passenger in B?
- a) 700 km/hr    b) 1700 km/hr    c) 1200 km/hr    d) 1300 km/hr    e) none of the these

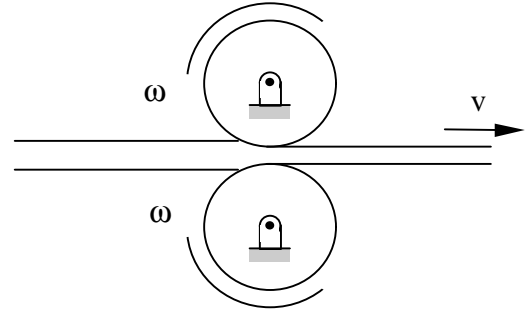


- 1b) Block A has a velocity of 6 ft/s up the incline. What is the velocity of B at this instant.
- a) 2 ft/s down    b) 4 ft/s down    c) 6 ft/s down    d) 18 ft/s down    e) none of the these



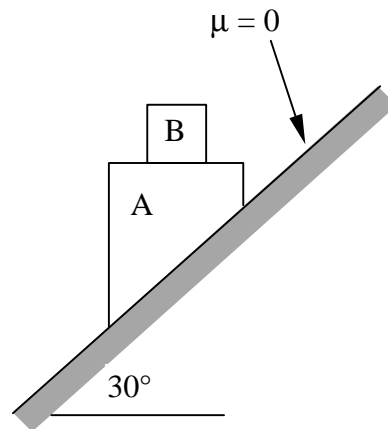
- 1c) A particle is released from rest at  $x=0$  and experiences an acceleration  $a=3x^2 \text{ m/s}^2$ . What is the velocity of the particle when  $x = 3 \text{ m}$ ?

- 1d) Sheet metal is made thinner by running it through a series of rollers of radius 0.5 ft. Assuming there is no slipping between the rollers and the sheet metal and the rollers are rotating at 20 rpm, determine the velocity of the sheet metal.

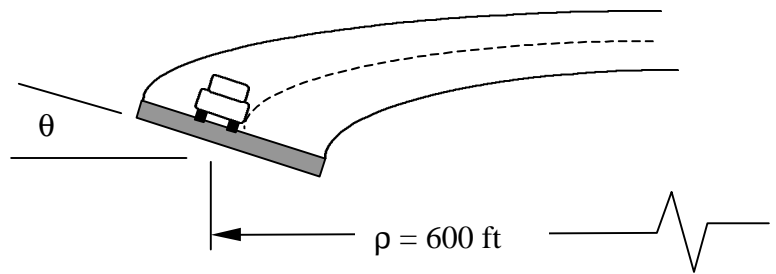


- 1e) The system shown is released from rest in the position shown. Qualitatively the normal force between block A and B is (circle one)

- a) less than the weight of B
- b) equal to the weight of B
- c) greater than the weight of B



Determine the banking angle  $\theta$  of the circular track (see the figure) so that the wheels of the sports car shown will not have to depend upon friction to prevent the car from sliding either up or down the curve. The car travels at a constant speed of 100 ft/s. The track radius is 600 ft.



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**Problem 3**

40 pts  
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The crate has a weight of 75 kg and rests on the floor of a truck elevator for which the coefficient of static friction is  $\mu_s = 0.4$ . Determine the largest angular acceleration  $\alpha$ , starting from rest, which the parallel links AB and DE can have without causing the crate to slip. No tipping occurs. (Hint: The normal force between the block and the lift is not equal to the weight.)

