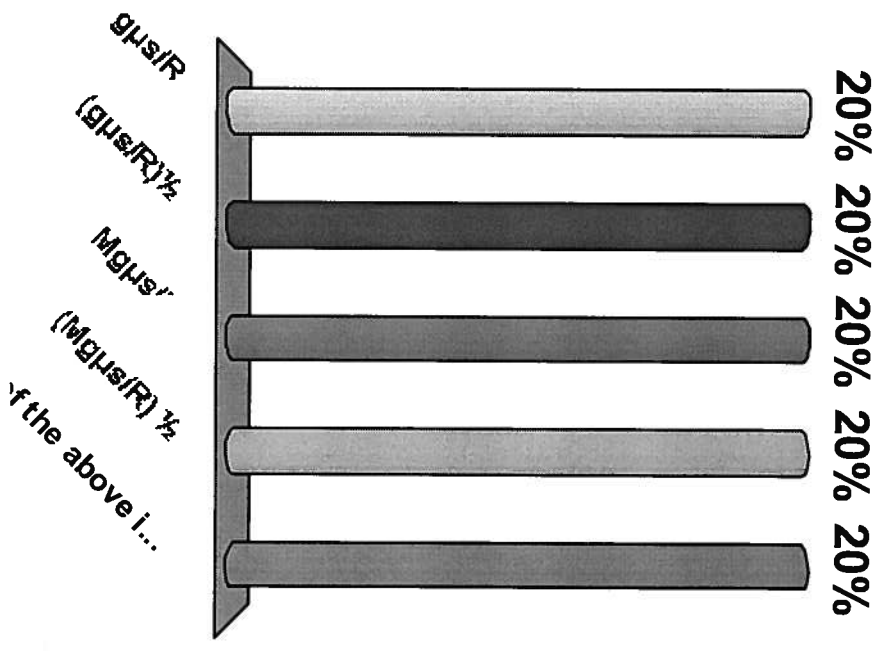
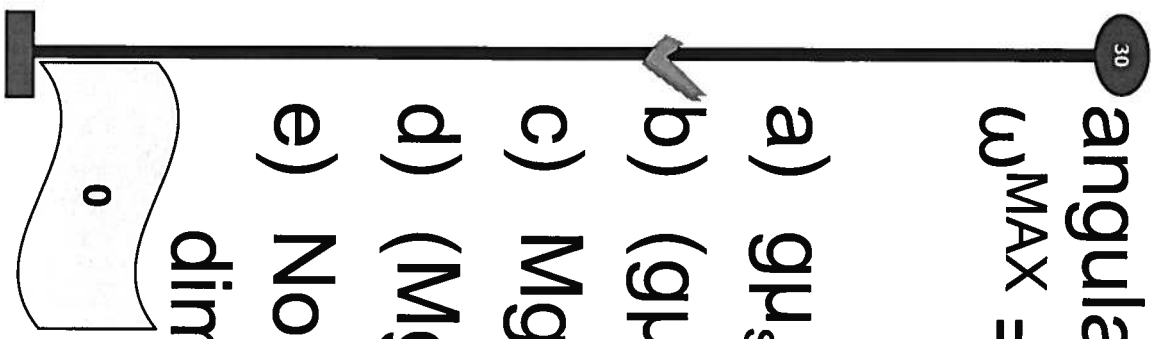
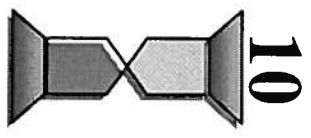


A mass,  $M$ , sits at  $R$  from the center of a rotating platform, and  $\mu_s = 0.3$ . At what

angular speed,  $\omega^{MAX}$ , does  $M$  first slide?

$\omega^{MAX} =$

- a)  $g\mu_s/R$
- b)  $(g\mu_s/R)^{1/2}$
- c)  $Mg\mu_s/R$
- d)  $(Mg\mu_s/R)^{1/2}$
- e) None of the above is dimensionally correct.



## The correct answer is

**b)  $\omega_{MAX} = (g\mu_s/R)^{1/2}$ , as follows.**

- The mass begins to slide when the centripetal force required to keep it moving in the circle of radius, R, first exceeds the maximum force of static friction between the mass and the platform; i.e., when
- $F_{\text{centripetal}} = MR\omega^2 > \mu_s|N| = \mu_s Mg = F_{\text{friction}}^{\text{Max}}$
- Therefore (cancelling M on right and left)  
 $\omega_{MAX}^2 = (g\mu_s/R)$ , and  
 $\omega_{MAX} = (g\mu_s/R)^{1/2}$ : b) is correct.
- Also, only answer b) has Dimension  $[1/T] = [g/R]^{1/2}$  required for  $\omega$ .