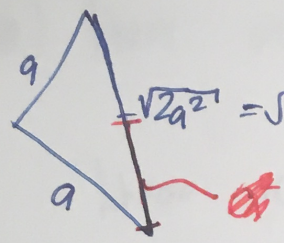
Phys 121, Final, Fall 2003

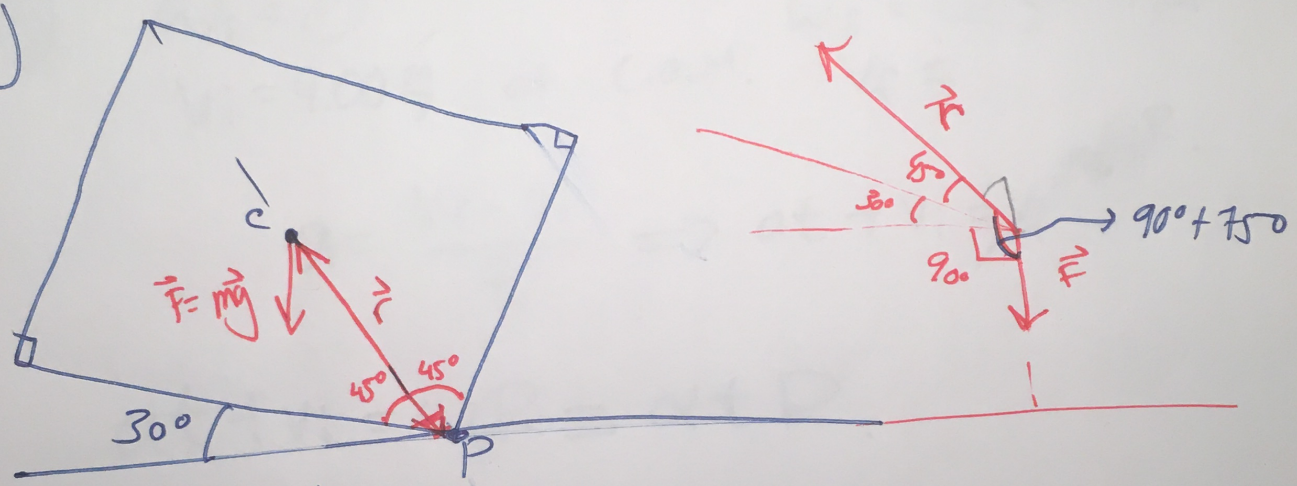
6a)



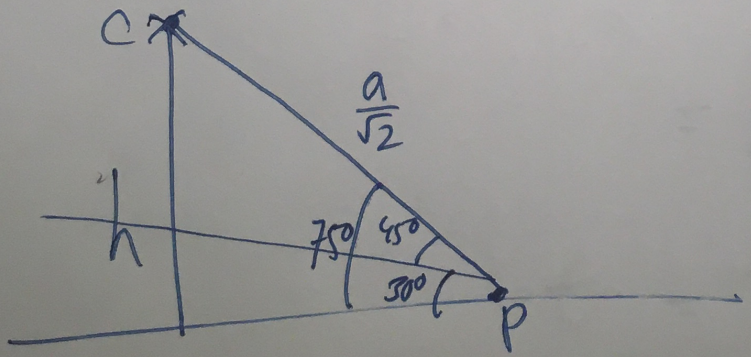
$2a^2 = \left(\sqrt{2a^2}\right)^2 = 2a^2$

$\frac{\sqrt{2}}{2}a = \frac{a}{\sqrt{2}}$

b)

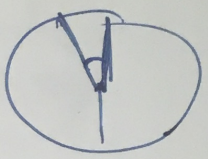


c) Initial height



$\frac{a}{\sqrt{2}} \sin(75°) = h.$

7a)
b)
c) linear acceleration at circumference:



$$\alpha R = a$$

linear acceleration at C.O.M. $\Rightarrow F = ma$.

d). $\omega_i = 0$, $v_i = 9.00 \frac{m}{s}$ at C.O.M. $v_f =$ $\omega_f = \alpha t + \omega_i$

$$a = \frac{v_f - v_i}{t} \Rightarrow at + v_i = v_f = \omega_f R.$$

$$at + v_i = \omega_f R = \alpha t R.$$

$$at - \alpha t R = -v_i$$

$$t = \frac{-v_i}{a - \alpha R} = \frac{v_i}{\alpha R - a}$$

$$= \frac{9.00 \frac{m}{s} \, s}{4.90 \frac{rad}{s^2} (1.400 m) - (-0.980 \frac{m}{s^2})}$$

$$t = 3.06 \, s$$