

Student ID: 

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Surname: O'Donovan

Given Name: \_\_\_\_\_

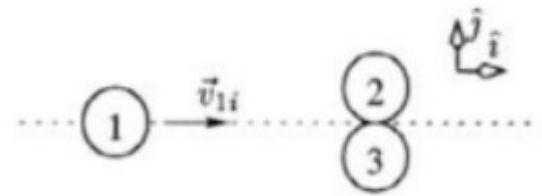
PHYS121 2005F

Test #2

17:00-19:00 Saturday 2005-11-12

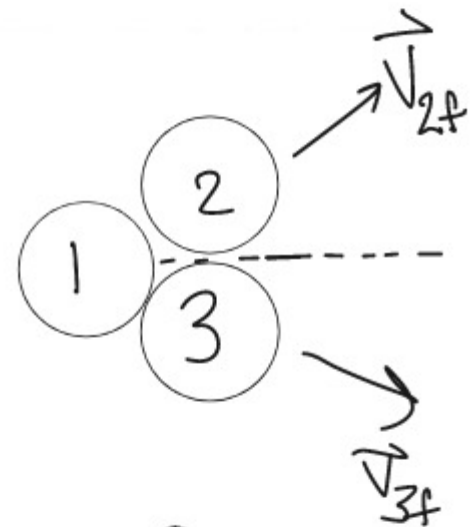
5. Two identical pucks of mass  $m$  and radius  $r$  are in contact and at rest on a frictionless horizontal surface. A third identical puck is sliding along the surface with a velocity  $\vec{v}_{1i}$  such that it will strike the two stationary pucks simultaneously in a perfectly elastic two dimensional collision.

- (1) (a) Below the diagram to the right draw the system at the moment of contact of the three pucks. Add vectors representing the directions of final velocities,  $\vec{v}_{2f}$  &  $\vec{v}_{3f}$ , of the two initially stationary pucks.

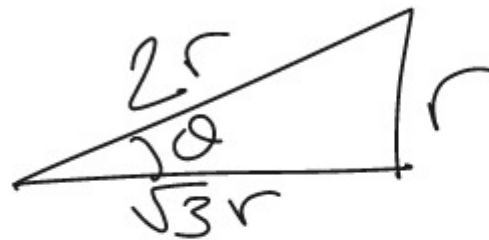


- ~~(1) (a) Below the diagram to the right draw the system at the moment of contact of the three pucks. Add vectors representing the directions of final velocities,  $\vec{v}_{2f}$  &  $\vec{v}_{3f}$ , of the two initially stationary pucks.~~

- (3) (b) What will be the directions,  $\theta_1$ ,  $\theta_2$  &  $\theta_3$ , of the velocities of the three pucks with respect to the direction of  $\hat{i}$  unit vector after the collision?



$$\sin \alpha = \frac{1}{2}$$
$$\cos \alpha = \frac{\sqrt{3}}{2}$$



$$\Rightarrow \begin{aligned} \theta_1 &= 0, \pi \\ \theta_2 &= +\pi/6 \\ \theta_3 &= -\pi/6 \end{aligned}$$

- (1) (c) What is the ratio of the final speeds of the two initially stationary pucks,  $v_{2f}/v_{3f}$ ?

$$\frac{v_{2f}}{v_{3f}} = 1$$

- (5) (d) What will be the final speed of the initially moving puck,  $v_{1f}$ ?