

Vector Problem Set

2D Kinematics – HW#1

Name: _____

Date: _____ Period: _____

I. RESOLVING VECTORS

1. Calculate the horizontal and vertical components of each vector. These vectors are expressed using matrix notation which is just <magnitude, direction>.

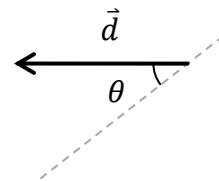
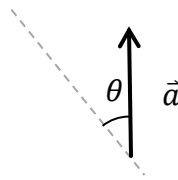
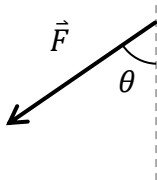
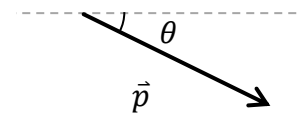
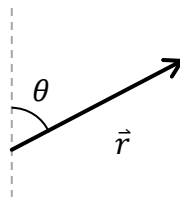
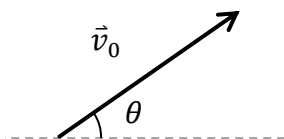
(a) $\vec{d} = \langle 20.0 \text{ m}, 60.0^\circ \rangle$

(b) $\vec{v} = \langle 35 \text{ m/s}, 120^\circ \rangle$

(c) $\vec{F} = \langle 110 \text{ N}, 30.0^\circ \rangle$

(d) $\vec{p} = \langle 12 \text{ kgm/s}, 90^\circ \rangle$

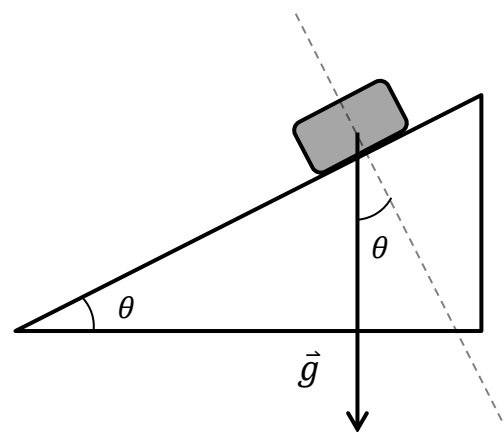
2. Resolve each vector first by drawing the horizontal and vertical components as referenced to the horizontal line. Next label the magnitude of each component in terms of the given symbols.



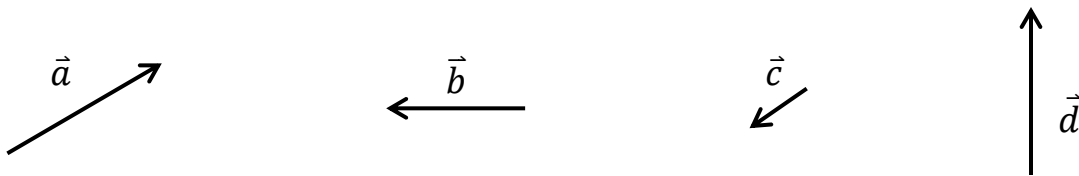
3. A block slides down a frictionless ramp as shown in the picture. Even though gravity pulls the block straight down, the ramp prevents the block from accelerating straight down. Instead, the block accelerates down the ramp.

(a) Determine the magnitude of the block's acceleration.

(b) Briefly comment on how changing the angle of the incline affects the acceleration of the block.



II. ADDING VECTORS GRAPHICALLY



4. You are only drawing pictures for this part, there are no calculations. Use the vectors shown above to draw the resultant vector from each vector operation. Your pictures don't have to be perfect, but they should accurately represent both the magnitude and direction of the resultant vector.

(a) $\vec{a} + \vec{b}$

(b) $\vec{c} + \vec{d}$

(c) $\vec{b} + \vec{d}$

(d) $\vec{a} - \vec{b}$

(e) $\vec{d} - \vec{b}$

(f) $\vec{a} - \vec{d}$

II. ADDING VECTORS BY COMPONENTS

5. Suppose that vector \vec{a} from above has magnitude 12 meters and direction 30° and vector \vec{b} has magnitude 10 meters and direction 180° . What is the magnitude and direction of $\vec{a} + \vec{b}$?