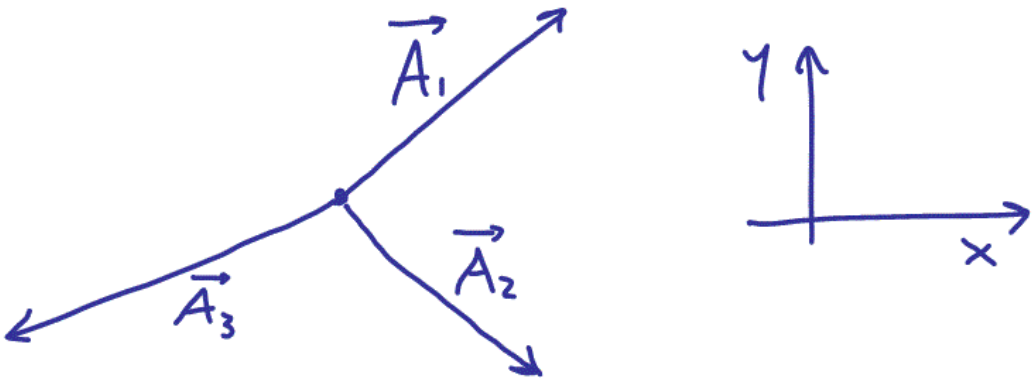
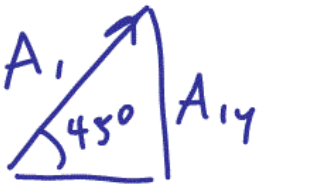
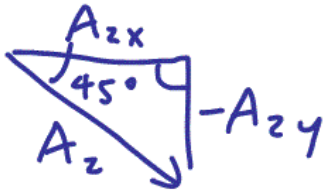
Example: Adding Vectors by Components

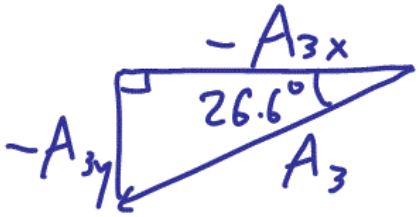
- $A_1 = 1.41$ m, up and to the right, 45.0° above the horizontal.
- $A_2 = 1.41$ m, down and to the right, 45.0° below the horizontal.
- $A_3 = 2.24$ m, down and to the left, 26.6° below the horizontal.
- Find the sum $A_1 + A_2 + A_3$.

Define







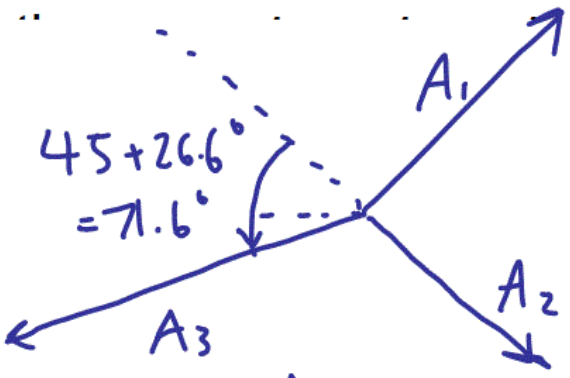


	x	y
$\vec{A}_1$	$1.41 \cos 45°$	$1.41 \sin 45°$
$\vec{A}_2$	$1.41 \cos 45°$	$-1.41 \sin 45°$
$\vec{A}_3$	$-2.24 \cos 26.6°$	$-2.24 \sin 26.6°$
	↑ sum of these = 0.00	↑ sum of these = −1.00 m

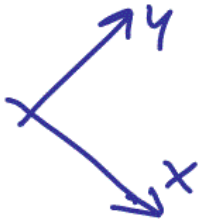
$\Rightarrow$ $\vec{A}_{sum}$ $\vec{A}_{sum} = 1.00$ m, down

Example: Adding Vectors by Components

- $A_1 = 1.41\ \text{m}$, up and to the right, 45.0° above the horizontal.
- $A_2 = 1.41\ \text{m}$, down and to the right, 45.0° below the horizontal.
- $A_3 = 2.24\ \text{m}$, down and to the left, 26.6° below the horizontal.



Define

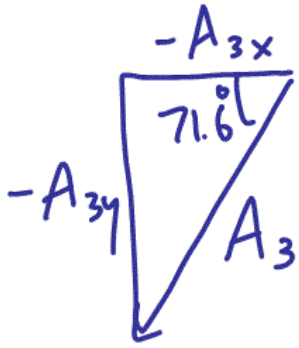


$\Rightarrow A_{1y} = A_1$

$A_{1x} = 0$

$A_{2x} = A_2$

$A_{2y} = 0$



	x	y
$\vec{A}_1$	0	+1.41
$\vec{A}_2$	+1.41	0
$\vec{A}_3$	$-2.24 \cos 71.6°$	$-2.24 \sin 71.6°$
$\vec{A}_{sum}$	+0.703 m	−0.715 m

$$\left|\vec{A}_{sum}\right| = \sqrt{0.703^2 + 0.715^2} = 1.00\ m$$

$$\theta = \tan^{-1}\left(\frac{0.703}{0.715}\right) \simeq 45^\circ$$