Honors PreCalculus
Test 2D Vectors

Name ____________________
Per ________ Date ____________

No Calculator may be used on this section.

1. The scalar k is equal to 4. Vectors $\mathbf{v}_1$ and $\mathbf{v}_2$ are defined as $\mathbf{v}_1 = \langle -3,5 \rangle$ and $\mathbf{v}_2 = \langle 2,-1 \rangle$. Evaluate $\mathbf{k}\,\mathbf{v}_1 + \mathbf{v}_2$. Then find the magnitude and direction of $\mathbf{k}\,\mathbf{v}_1 + \mathbf{v}_2$.

$4\langle -3,5\rangle + \langle 2,-1\rangle$

$\langle -12, 20\rangle + \langle 2,-1\rangle = \langle -10, 19\rangle$

$\text{Mag} = \sqrt{(-10)^2 + 19^2}$

89
19
179
19
361

1. $\sqrt{461}$, central $180 - \tan^{-1}\left(\frac{19}{10}\right)$

bearing $270 + \tan\left(\frac{19}{10}\right)$

2. Find the unit vector in the direction of (7, -24).

2. $\left\langle \frac{7}{25}, \frac{-24}{25} \right\rangle$

3. Let $\mathbf{u} = \langle -1,-1 \rangle$. Find the vector $\mathbf{v}$ such that $\mathbf{u} \bullet \mathbf{v} = -6$ and $|\mathbf{v}| = \sqrt{18}$.

$v = \langle x, y \rangle$ $\quad -x + -y = -6 \quad \sqrt{x^2+y^2} = \sqrt{18}$

$x + y = 6$

$y = 6 - x$

$x^2 + (6-x)^2 = 18$ $\quad 2x^2 - 12x + 18 = 0$ $\quad \frac{36}{-18}{18}$

$x^2 + 36 - 12x + x^2 = 18$ $\quad x^2 - 6x + 9 = 0$

$\cancel{36 - 12x = 18}$ $\quad (x-3)^2 = 0 \quad x = 3$

$\cancel{-12x = -18}$

$\cancel{x = \frac{18}{12} = \frac{3}{2}}$

$\vec{v} = \cancel{\langle \frac{3}{2}, \frac{9}{2} \rangle}$ $\quad \cancel{y = \frac{12}{2} - \frac{3}{2}}$

$y = 6 - 3$ $\quad \cancel{y = \frac{9}{2}}$

$y = 3$

3. $\cancel{\langle \frac{3}{2}, \frac{9}{2} \rangle}$

$\langle 3, 3 \rangle$

4. Which of the following vectors are orthogonal?

A. $\langle 1,2 \rangle$ and $\langle 2,4 \rangle$
B. $\langle 1,2 \rangle$ and $\langle -1,-2 \rangle$
C. $\langle -1,-2 \rangle$ and $\langle 1,-1 \rangle$
D. $\langle -1,-2 \rangle$ and $\langle -2,1 \rangle$ ✓

$2 + -2 = 0$

4. D