Review 6.4 Precalculus w/ Trig Name _____
Period _____

1. Use the vectors $\mathbf{u} = \langle -1,4 \rangle$ , $\mathbf{v} = \langle 2,3 \rangle$, and $\mathbf{w} = \langle 1,-4 \rangle$ to find the indicated quantity. Circle the word whether the result is a vector or a scalar.

a) $\mathbf{u}\cdot\mathbf{v} =$ $-2+12 = 10$ Is it a vector or scalar?

b) $\mathbf{u}\cdot\mathbf{w} =$ $-1-14 = -17$ Is it a vector or scalar?

c) $\mathbf{v}\cdot\mathbf{w} =$ $2+-12 = 10$ Is it a vector or scalar?

d) $(\mathbf{u}\cdot\mathbf{v})\mathbf{w} =$ $\langle 1,-4\rangle 10 = \langle 10,-40\rangle$ Is it a vector or scalar?

2. a) Create two vectors that are orthogonal so the dot product = 0. $\langle 3,4\rangle$ $\langle 4,-3\rangle$

b) Create two vectors that are parallel. $\langle 3,4\rangle$ $\langle 4,8\rangle$

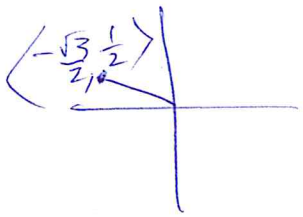
3. Find the angle to the nearest thousandth of a degree between vectors $\mathbf{u} = 4\mathbf{i} + 3\mathbf{j}$ and $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$.

$\langle 4,3\rangle \langle -2,5\rangle$ $\cos\theta = \dfrac{u\cdot v}{\|u\|\|v\|}$

$\dfrac{-8+15}{5\cdot\sqrt{29}} = \dfrac{7}{5\sqrt{29}} = \cos\theta$ $\cos^{-1}\left(\dfrac{7}{5\sqrt{29}}\right) = \approx 74.932^\circ$

4. Find the value of $\mathbf{u}\cdot\mathbf{v}$, where $\theta$ is the angle between $\mathbf{u}$ and $\mathbf{v}$, if $\|u\| = 5$ and $\|v\| = 4$, $\theta = \dfrac{5\pi}{6}$.

(Use the unit circle for trig functions.)




$\cos\dfrac{5\pi}{6} = \dfrac{u\cdot v}{5\cdot 4}$

$-\dfrac{\sqrt{3}}{2} = \dfrac{u\cdot v}{20}$

$-10\sqrt{3} = u\cdot v$

5. A sport utility vehicle with a gross weight of 4500 pounds is parked on a slope of 6°. Assume that the only force to overcome is the force of gravity. Find the force required to keep the vehicle from rolling down the hill then find the force perpendicular to the hill. Round both answers to the nearest thousandth of a pound.

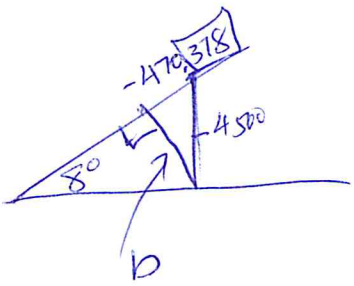
$\text{Force}_{\text{downhill}} =$ 470.378 ~~ft lbs~~ pounds

$\text{Force}_{\text{perpendicular}} =$ 4473.349 lbs

$\langle 0, -4500 \rangle \langle \cos 6°, \sin 6° \rangle$

$-4500 \cdot \sin 6°$

$\sqrt{4500^2 - 470.378^2}$




6. A force of 50 pounds in the direction of 20° above the horizontal is required to slide a table across a floor. Find the work done to the nearest thousandth of a foot-pound if the table is dragged 12 feet.

Work = Dist · Force · $\cos\theta$

$12 \cdot 50 \cdot \cos 20°$

$600 \cos 20° \approx 563.816$ ft lbs