Pre-Calculus Chapter 6b Test Review Worksheet #1

1. What's a vector?
2. What does computing the dot product between 2 vectors tell you?

3. Suppose $u=\langle 1,5 \rangle$ and $v=\langle -2,3 \rangle$. Sketch $\mathbf{u} - 2\mathbf{v}$ and then find...

   (a) $|v|$
   (b) 3u-4v
   (c) $u \bullet v$

4. Given $\triangle ABC$ with $A(0,1), B(2,5)$, $C(6,1)$. Find $m\angle C$.

5. An airplane's velocity is 540 mph at $S30°E$. Wind is blowing from the southwest at 50 mph. Find its true direction and speed.

6. An airplane has airspeed of 500 kilometers per hour bearing $N45°E$. The wind is 60 kilometers in the direction $N30°W$. find the resultant vector representing the path of the plane relative to the ground. What is the ground speed of the airplane? What is the direction? Round to nearest hundredth.

7. A filing cabinet is dragged 15 feet across the floor, using a force of 82 pounds. Find the work done if the direction of the force is $53°$ above the horizontal. Round to the nearest hundredth.

8. Now you're pulling your sister up a $40°$ incline (you live in a very hilly neighborhood obviously) with a force of 60 pounds. How much does the wagon/sister combo weigh?

9. A 500-pound motorcycle is headed up a hill inclined at $12°$. What is the
   force required to keep the motorcycle from rolling down the hill at the red light? Round to nearest hundredth.

10. Find the dot product of $u = \langle -9,4 \rangle$ and $v = \langle 1,3 \rangle$

11. Find the angle between the vectors $u = 7i + 2j$ and $v = -4j$. Round to nearest hundredth.

12. Are the vectors $u = \langle 6,-4 \rangle$ and $v = \langle 2,-3 \rangle$ orthogonal?

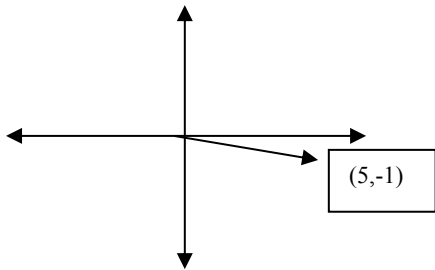13. Find the value of k so that the vectors u and v are orthogonal

$$u = 2i + j$$
$$v = -i - kj$$

Answers

1. A vector is any quantity that has both magnitude and direction.
2. The dot product between two vectors gives information about the angle between them. More specifically, if the dot product is 0, the angle between the vectors is 90 degrees.

3. a. $|v| = \sqrt{13}$ b. $\langle 11,3 \rangle$ c. 13

(5,-1)

4. $m\angle C = 45°$
5. 529.267 mph; $S\,35.235°\,E$
6. $518.78\ \text{Kilometers per hour};\ N38.59°E$
7. 740.23 foot-pounds
8. 93.343 pounds
9. 103.96 lbs
10. $u \bullet v = 3$
11. $105.95°$
12. No, the vectors are not orthogonal
13. k = -2