DATE: _____

6.2 Dot Product of Vectors (*Target 8C & 8D*)

RALLY COACH

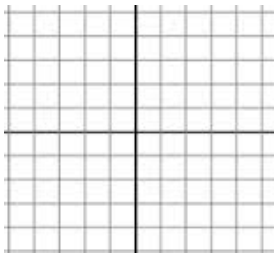
Find the component form of $\overrightarrow{AB}$ and find the magnitude of $\overrightarrow{AB}$.

1. $A\ (2,4),\ B\ (-1,3)$

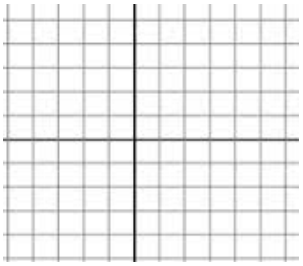
1. $A\ (4,-2),\ B\ (5,-5)$

Let $\vec{v} = \langle 2, -1 \rangle$ and $\vec{w} = \langle -3, 1 \rangle$. Find $\vec{u}$ and sketch the vector operation.

2. $\vec{u} = 2\vec{v}$



2. $\vec{u} = -2\vec{w}$



Find the unit vector.

3. $\vec{v} = \langle -2,5 \rangle$

3. $\vec{v} = \langle 3, -2 \rangle$

Find the direction angle of the vector.

4. $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$

4. $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j}$

Sketch the two vectors. Find the angle between the two vectors

5. $\mathbf{v} = 3\mathbf{i} + 2\mathbf{j}$, $\mathbf{w} = -3\mathbf{i} + \mathbf{j}$

5. $\mathbf{v} = -2\mathbf{i} + \mathbf{j}$, $\mathbf{w} = 2\mathbf{i} + 4\mathbf{j}$

Find $\mathbf{u} \cdot \mathbf{v}$.

6. $|\vec{u}| = 8$, $|\vec{v}| = 12$, and angle between $\vec{u}$ and $\vec{v}$ is 60°.

6. $|\vec{u}| = 4$, $|\vec{v}| = 5$, and angle between $\vec{u}$ and $\vec{v}$ is 120°.

Now, WORK TOGETHER.

7. Which pairs of vectors are orthogonal?

(A) $\vec{v} = \langle 3, -2 \rangle, \vec{w} = \langle -1, 2 \rangle$

(B) $\vec{v} = \langle -2, 0 \rangle, \vec{w} = \langle 0, 5 \rangle$

(C) $\vec{v} = \langle 3, -6 \rangle, \vec{w} = \langle 2, 1 \rangle$

(D) $\vec{v} = \langle 2, -3 \rangle, \vec{w} = \langle -2, 3 \rangle$

8. Find *k* so that $\vec{u}$ and $\vec{v}$ are orthogonal.

$\vec{u} = -4k\vec{\imath} + 5\vec{\jmath}, \vec{v} = 2\vec{\imath} - 6\vec{\jmath}$

WORK Problems from **http://www.physicsclassroom.com/calcpad/energy/problem**

9. Renatta Gass is out with her friends. Misfortune occurs and Renatta and her friends find themselves getting a *work*out. They apply a cumulative force of 1080 N to push the car 218 m to the nearest fuel station. Determine the work done on the car.

10. Hans Full is pulling on a rope to drag his backpack to school across the ice. He pulls upwards and rightwards with a force of 22.9 Newtons at an angle of 35 degrees above the horizontal to drag his backpack a horizontal distance of 129 meters to the right. Determine the work (in Joules) done upon the backpack.

11. Lamar Gant, U.S. powerlifting star, became the first man to deadlift five times his own body weight in 1985. Deadlifting involves raising a loaded barbell from the floor to a position above the head with outstretched arms. Determine the work done by Lamar in deadlifting 300 kg to a height of 0.90 m above the ground.

12. Sheila has just arrived at the airport and is dragging her suitcase to the luggage check-in desk. She pulls on the strap with a force of 190 N at an angle of 35° to the horizontal to displace it 45 m to the desk. Determine the work done by Sheila on the suitcase.

13. While training for breeding season, a 380 gram male squirrel does 32 pushups in a minute, displacing its center of mass by a distance of 8.5 cm for each pushup. Determine the total work done on the squirrel while moving upward (32 times).