Addition of Vectors

Read from **Lesson 1** of the **Vectors and Motion in Two-Dimensions chapter** at **The Physics Classroom**:
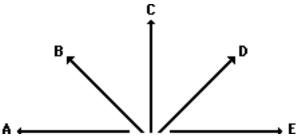
> **http://www.physicsclassroom.com/Class/vectors/u3l1b.html**
> **http://www.physicsclassroom.com/Class/vectors/u3l1c.html**

MOP Connection: Vectors and Projectiles: sublevels 2, 3 and 4

1.   Aaron Agin recently submitted his vector addition homework. As seen below, Aaron added two vectors and drew the resultant. However, Aaron Agin failed to label the resultant on the diagram. For each case, identify the resultant (A, B, or C). Finally, indicate what two vectors Aaron added to achieve this resultant (express as an equation such as X + Y = Z) and approximate the direction of the resultant.

	Resultant is: _____ Vector Eq'n: _____ Dir'n of R: _____
	Resultant is: _____ Vector Eq'n: _____ Dir'n of R: _____
	Resultant is: _____ Vector Eq'n: _____ Dir'n of R: _____

2.   Consider the following five vectors.

Sketch the following and draw the resultant (R). Do <u>not</u> draw a scaled vector diagram; merely make a sketch. Label each vector. Clearly label the resultant (R).
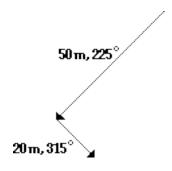
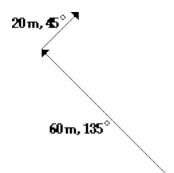**A + B + D**   **A + C + D**   **B + C + E**

Math Skill:
Vectors that make right angles to each other can be added together using Pythagorean theorem. Use Pythagorean theorem to solve the following problems.

3. While Dexter is on a camping trip with his boy scout troop, the scout leader gives each boy a compass and a map. Dexter's map contains several sets of directions. For the two sets below, draw and label the resultant (**R**). Then use the Pythagorean theorem to determine the magnitude of the resultant displacement for each set of two directions. **PSYW**

    a.   Dexter walked 50 meters at a direction of 225° and then walked 20 meters at a direction of 315°.

    b.   Dexter walked 60 meters at a direction of 135° and then walked 20 meters at a direction of 45°.

50 m, 225°

20 m, 315°

20 m, 45°

60 m, 135°

4. In a classroom lab, a Physics student walks through the hallways making several small displacements to result in a single overall displacement. The listings below show the individual displacements for students A and B. Simplify the collection of displacements into a pair of N-S and E-W displacements. Then use Pythagorean theorem to determine the overall displacement.

Student A	Student B
2 m, North	2 m, North
16 m, East	12 m, West
14 m, South	14 m, South
2 m, West	56 m, West
12 m, South	12 m, South
46 m, West	36 m, East
Σ E-W = _____	Σ E-W = _____
Σ N-S = _____	Σ N-S = _____
Overall Displacement:	Overall Displacement: