Show all work to receive credit for the problem (even if it is simple computations). Remember to answer all word problems in context.

1. Given the following sets of vectors, compute the magnitude and direction of the resultant:

$$\vec{f}=\left⟨1\right⟩ \vec{g}=\left⟨3\right⟩ \vec{h}=5 @ 30°$$

* 1. $\vec{f}+ \vec{g}$
	2. $\vec{2g}-\vec{h}$
	3. $\vec{f}-g+\frac{1}{2}\vec{h}$
1. Given the following set of vectors, compute the following:

$$\vec{a}=\left⟨2\right⟩ \vec{b}=\left⟨3\right⟩ \vec{c}=\left⟨-2\right⟩ \vec{d}=\left⟨0\right⟩ \vec{e}=\left⟨0\right⟩ $$

* 1. $\vec{a}+ \vec{b}-3\vec{d}$
	2. $\vec{b}-\frac{1}{2}\vec{a}+3\vec{e}$
	3. $\vec{c} ⋅\vec{e}$
	4. $\vec{a} ⋅\vec{e}$
	5. $\vec{a}×\vec{e}$
	6. $\vec{b}×\vec{d}$
	7. $(\vec{c}×\vec{d}) ⋅\vec{a}$
	8. Are vectors $\vec{a} and \vec{c}$ perpendicular?
	9. Are vectors $\vec{d} and \vec{e}$ perpendicular?
1. What would the missing value of $\vec{q}$ need to be to make $\vec{q} and \vec{z}$ perpendicular?

$$\vec{q}=\left⟨2\right⟩ \vec{z}=\left⟨4\right⟩$$

1. Vector **A** has a magnitude of 860 and an angle of elevation of 31°. Vector **B** has a magnitude of 343 and an angle of elevation of 18°. Determine the resultant vector’s magnitude, direction, AND components.
2. An object is moving with a speed of 78 miles/hour in an x-y coordinate system. Its direction is that described by a 218° angle in standard position. What are the *X* and *Y* components of the velocity of the object?
3. Two forces, **F1** and **F2**, are pulling on the same object. **F1** is a force of 250 lb with a bearing of S 38° E. **F2** is a force of 190 lb with a bearing of N 57° E. Use the component to find the single force that equivalently replaces these two forces. Express the resultant with magnitude and direction.
4. Draw the displacement vector **D** that has a magnitude of 12cm at an angle of 40°.
5. An airplane is headed due north with a speed of 215 mph. The wind is blowing from the east at a speed of 54 mph. What is the bearing and speed of the plane’s shadow on the ground?
6. Two cables are used to suspend a box weighing 800 pounds between a rock and a hard place as shown below. Determine the amount of force that each cable exerts to keep the box level as shown in the situations given below:

ROCK

Hard Place

* 1. Both cables form a 22° angle with the box.
	2. Both cables form an 87° angle with the box.
	3. One cable forms a 25° angle with the box while the other cable forms a 54° angle with the box.
1. Using the component method, find the magnitude and direction (as an angle in standard position) of the resultant after adding these three displacement vectors.



1. An airplane is flying at 450 mph. Winds are blowing at 60 mph. Describe all possible speeds of the airplane.