8.4, # 92: Given $F_1 = -12\mathbf{i} + 8\mathbf{j}$, $F_2 = -9\mathbf{i} - 15\mathbf{j}$, and $F_3 = 11\mathbf{i} + 7\mathbf{j}$, find the resultant force $\mathbf{R}$ and the additional force $\mathbf{F}$ needed for the object to be in static equilibrium.

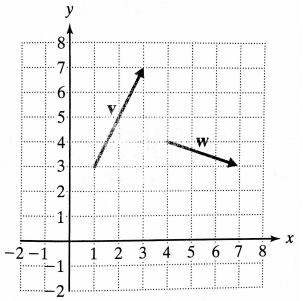
8.4, # 96: Two forces act on an object with an angle of 63° between them. If the magnitude of the first force is 48 N and the magnitude of the second force is 70 N, find the magnitude of the resultant force to the nearest Newton.

8.4, # 13 extended: Given a vector $\mathbf{v}$ with initial point $P(4,-1)$ and terminal point $Q(7,-6)$ and vector $\mathbf{w}$ with initial point $R(5,7)$ and terminal point $S(2,12)$, (a). Determine whether $\mathbf{v} = \mathbf{w}$ in two ways: (1) comparing their magnitudes and directions; (2) using component form.

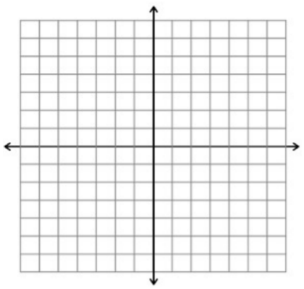
(b). What is the terminal point of $\mathbf{v}$ if its initial point is placed at R?

(c). Let $\mathbf{r} = \langle 2, 5\rangle$. Compute $2\mathbf{r} - (\mathbf{w} + \mathbf{v})$

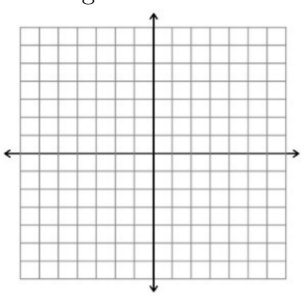
8.4, # 17,18: Use $\mathbf{v}$ and $\mathbf{w}$ in the image below to sketch the following as described.



(a). $\mathbf{v} + \mathbf{w}$, first using head-to-tail method, then by drawing $\mathbf{v}$ and $\mathbf{w}$ with the same initial point.



(b). $\mathbf{v} - \mathbf{w}$, first using head-to-tail method, then by drawing $\mathbf{v}$ and $\mathbf{w}$ with the same initial point.



8.4, # 54: Let c be an arbitrary scalar and $\mathbf{v} = \langle a_1, b_1\rangle$ be an arbitrary vector. Prove $||c\mathbf{v}|| = |c|\|\mathbf{v}\|$.

8.4, # 55, extended: Find the unit vector in the direction of $\mathbf{v} = 20\mathbf{i} - 21\mathbf{j}$. Then, find the direction angle ($0° \leq \theta \leq 360°$) for $\mathbf{v}$, rounding to 1 decimal place.

8.4, # 72: Given $||\mathbf{v}|| = \sqrt{17}$ and $\theta = \frac{4\pi}{3}$, write $\mathbf{v}$ in component form.

8.4, # 84: The velocity of a ship is given by the vector $-6.4\mathbf{i} + 7.7\mathbf{j}$ mph.
(a). Find the speed of the ship. Round to the nearest mph.

(b). Find the bearing of the ship. Round to the nearest degree.

8.4, # 85: A plane travels N30°W at 450 mph and encounters a wind blowing due west at 30 mph.
(a). Express the velocity of the plane $\mathbf{v}_p$ relative to the air in terms of $\mathbf{i}$ and $\mathbf{j}$.

(b). Express the velocity of the wind $\mathbf{v}_w$ in terms of $\mathbf{i}$ and $\mathbf{j}$.

(c). Express the true velocity of the plane $\mathbf{v}_T$ in terms of $\mathbf{i}$ and $\mathbf{j}$ and find the true speed of the plane.