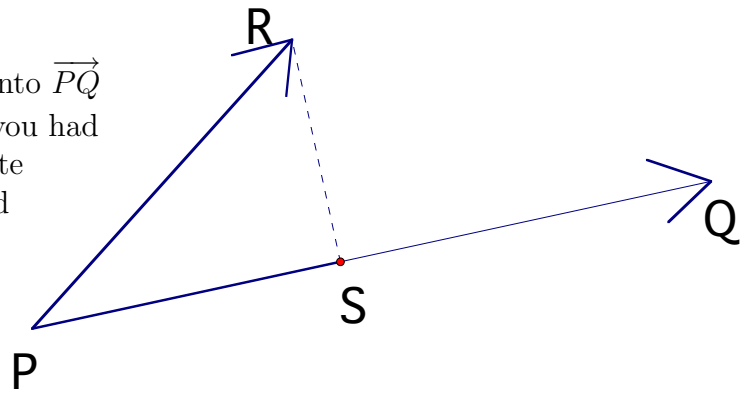
Dot Products

1. For each pair of $\overrightarrow{v}$ and $\overrightarrow{w}$, determine if the two vectors are parallel, perpendicular, or neither.

   - $\overrightarrow{v} = \langle 2, 2, -1 \rangle$ and $\overrightarrow{w} = \langle 5, -4, 2 \rangle$

   - $\overrightarrow{v} = \langle 3, 7, -\frac{1}{2} \rangle$ and $\overrightarrow{w} = \langle -1, -\frac{7}{3}, \frac{1}{6} \rangle$

2. Consider the projection $\overrightarrow{PR}$ onto $\overrightarrow{PQ}$ shown to the right as $\overrightarrow{PS}$. If you had the components (or appropriate coordinates), outline a method for finding the components of the vector $\overrightarrow{PS}$.



Dots & Crosses...

1. Verify that the vector $\langle 1, -1, -1 \rangle$ is perpendicular to the vector $\langle 1, -1, -1 \rangle \times \langle \frac{1}{2}, 1, \frac{1}{2} \rangle$.

2. Find a unit vector orthogonal to both $\overrightarrow{i} + \overrightarrow{j} + \overrightarrow{k}$ and $2\overrightarrow{i} + \overrightarrow{k}$.

3. Find the area of the triangle PQR if $P(0, -2, 0$, $Q(4, 1, -2)$, and $R(5, 3, 1)$.