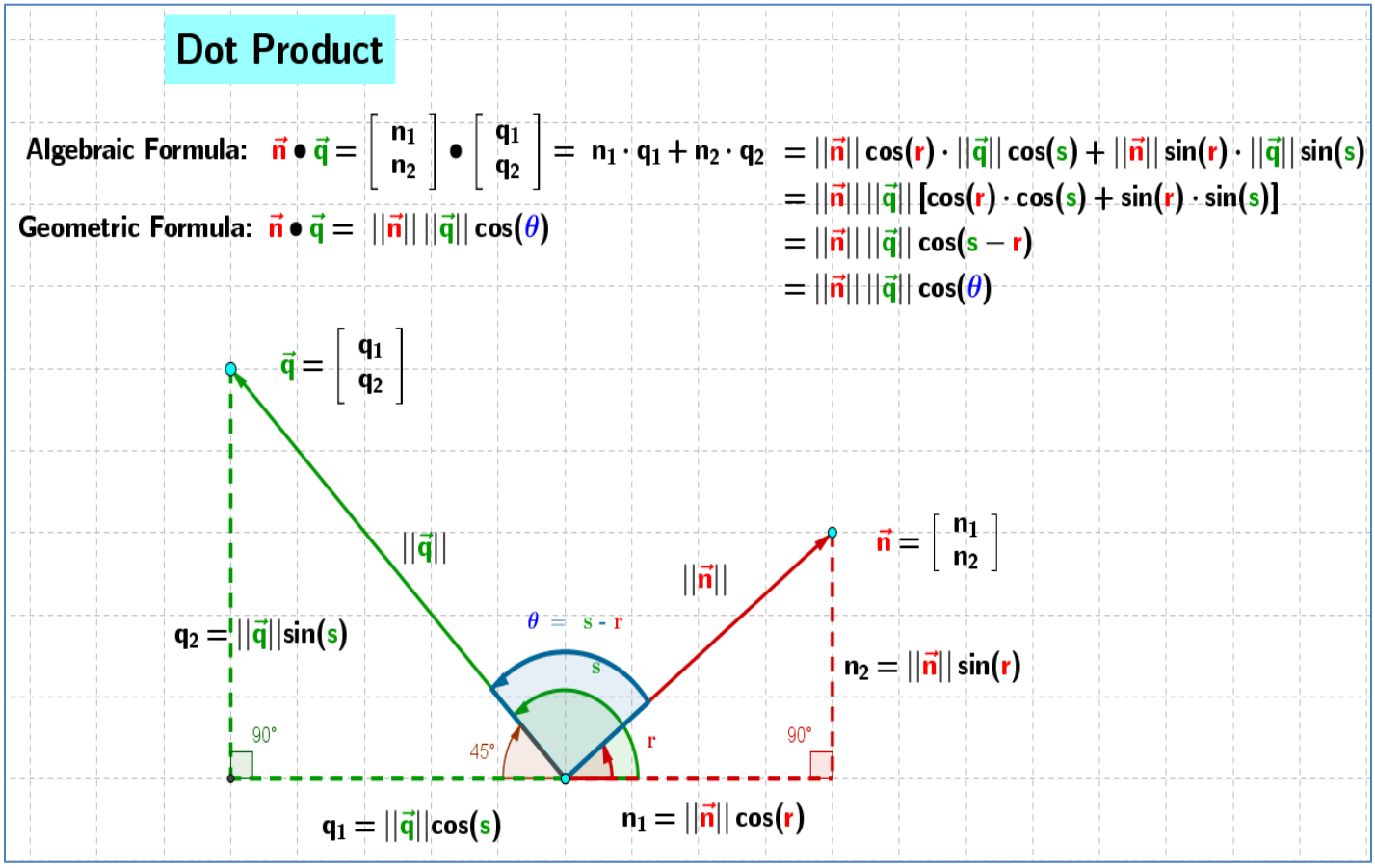
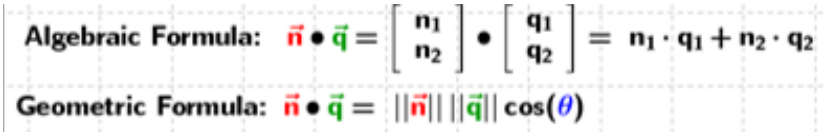
# Student Activity: The Dot Product



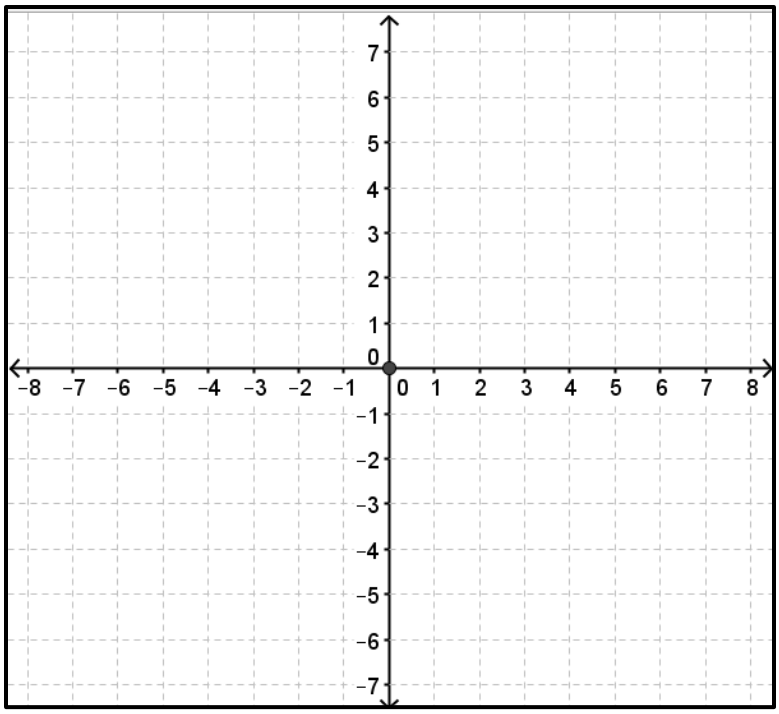

Set the dot product definitions (algebraic and geometric) equal to each other. Note:




Use this equation to find the angle between vectors $\vec{u}$ and $\vec{p}$. $\vec{u} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ and $\vec{p} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$

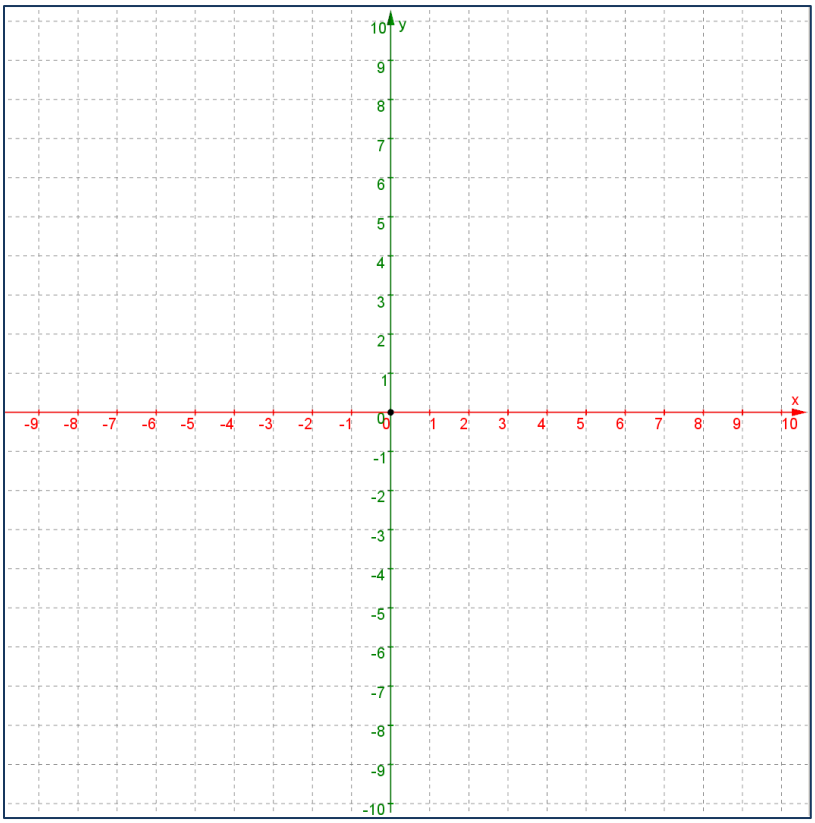
(The angle requested will always be between 0° and 180°)

**Transforming Linear Algebra Education with GeoGebra Applets**
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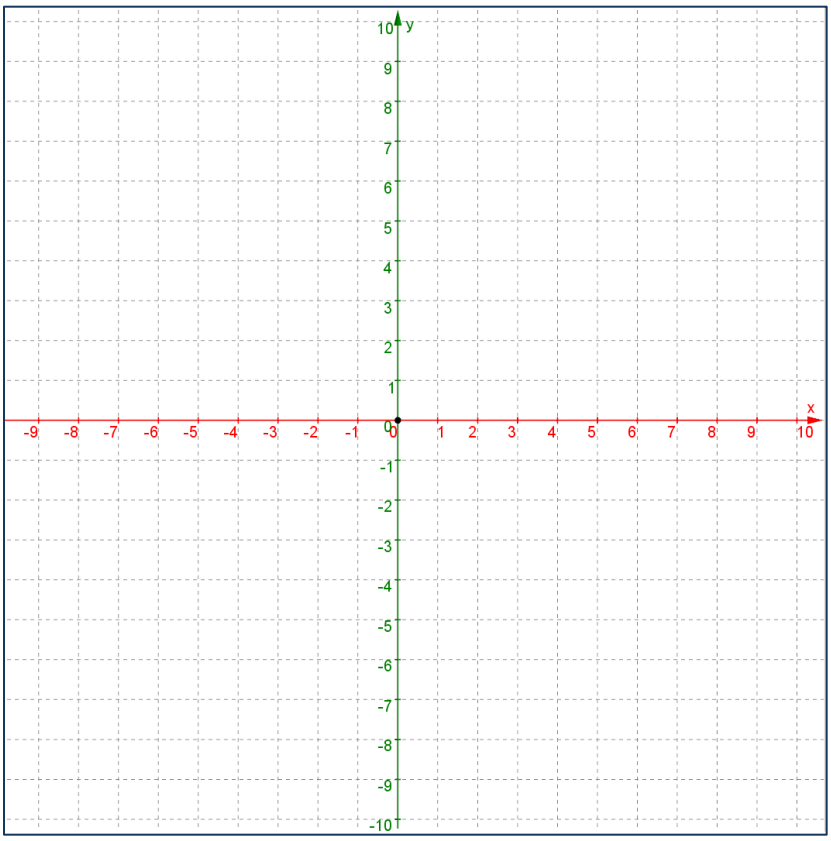
Draw and label the vectors $\vec{u} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ and $\vec{p} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ in standard position.

Draw and label the angle between the vectors.



Sketch vector $\vec{w} = \begin{bmatrix} 4 \\ 10 \end{bmatrix}$ in standard position and find the dot product of vectors $\vec{u} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ and $\vec{w}$.

Calculate and label the angle between vectors $\vec{u}$ and $\vec{w}$.




$\vec{u} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ Sketch vector $\vec{u}$ and $-\vec{u}$ in standard position and find the dot product of vectors $\vec{u}$ and $-\vec{u}$

What is the angle between $\vec{u}$ and $-\vec{u}$?

Does the dot product equation confirm your observation?

Make a conjecture about the value of the dot product of a vector with itself. Then find that dot product.

Make a conjecture about the value of the dot product of two perpendicular vectors. Then find that dot product.