Find the vector that has length 6 and points in the same direction as the vector \( \mathbf{v} = (-3, 4, -1) \).

You must show your procedure and explain it (using words) in order to receive credit. You will not receive credit if you just write down a final answer and I am not able to see how you arrived at that answer.

**Solution:** The length of the vector \( \mathbf{v} \) is

\[
|\mathbf{v}| = \sqrt{(-3)^2 + (4)^2 + (-1)^2} = \sqrt{26}.
\]

Thus the unit vector that points in the same direction as \( \mathbf{v} \) is

\[
\mathbf{u} = \frac{1}{|\mathbf{v}|} \mathbf{v} = \frac{1}{\sqrt{26}} (-3, 4, -1) = \left( \frac{-3\sqrt{26}}{26}, \frac{2\sqrt{26}}{13}, \frac{-\sqrt{26}}{26} \right).
\]

The vector with length 6 that points in the same direction as \( \mathbf{v} \) is thus

\[
6\mathbf{u} = \left( \frac{-9\sqrt{26}}{13}, \frac{12\sqrt{26}}{13}, \frac{-3\sqrt{26}}{13} \right).
\]