Find a unit vector in the direction of $u=<-2,4>$

1) First find the magnitude of u using the Pythagorean Theorem.

$\text{magnitude of } u=\sqrt{(-2)^2 + (4)^2}$	Pythagorean Theorem
$=\sqrt{4+16}$	Square
$=\sqrt{20}$	Add
$=\sqrt{4\cdot 5}$	Rewrite 20 as 4 times 5
$=\sqrt{4}\cdot\sqrt{5}$	Apply a basic rule of roots
$=2\sqrt{5}$	The square root of 4 is 2

2) Now divide the vector u by its magnitude to find the unit vector along u.

$\text{unit vector} = \frac{<-2,4>}{2\sqrt{5}}$	Setup the division by the magnitude
$=<\frac{-2}{2\sqrt{5}}, \frac{4}{2\sqrt{5}}>$	Distribute to each component
$=<\frac{-1}{\sqrt{5}}, \frac{2}{\sqrt{5}}>$	Simplify by dividing -2 by 2, and 4 by 2
$=<\frac{-1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}, \frac{2}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}>$	Setup the rationalization
$=< \frac{-\sqrt{5}}{5}, \frac{2\sqrt{5}}{5} >$	Complete the rationalization