Quiz 0

Friday, September 3

In a certain coordinate system, a neutron is located at the position $\vec{r}_n =< -1, 3, 0 >$ m relative to the origin. A proton is located at $\vec{r}_p =< 5, 2, 0 >$, relative to the same origin.

1. What is the position of the proton *relative to* that of the neutron?
2. What is the distance between the proton and neutron?
3. What is the unit vector pointing from neutron to proton?

1. $\vec{r}_{p-n} = \vec{r}_p - \vec{r}_n$

$= \langle 5, 2, 0 \rangle_m - \langle -1, 3, 0 \rangle m$

$= \boxed{\langle 6, -1, 0 \rangle m}$

2. $|\vec{r}_{p-n}| = \sqrt{6^2 + (-1)^2} = \boxed{6.08 \text{ m}}$

3. $\hat{r}_{p-n} = \dfrac{\vec{r}}{|\vec{r}|} = \dfrac{\langle 6, -1, 0 \rangle}{6.08} = \boxed{\langle 0.99, -0.16 \rangle}$