A certain plane has an air speed (relative to air) of $110 \mathrm{~m} / \mathrm{s}$.
a. The plane is flying directly South when it encounters a crosswind of $45 \mathrm{~m} / \mathrm{s}$ blowing to the West. What is the plane's total resultant velocity? Include a vector diagram.
b. If the plane wants to return to it's original heading of due South, what heading should it make in order to compensate for the crosswind? Include a vector diagram.
a.)


$$
\begin{aligned}
& V_{T}^{2}=V_{1}^{2}+V_{2}^{2} \\
& \begin{aligned}
V_{T} & =\sqrt{110^{2}+45^{2}} \\
& =118.8 \\
& =120 \mathrm{~m} / \mathrm{s}
\end{aligned} .=\text {. } 18
\end{aligned}
$$

$$
V_{T}=120_{\mathrm{n}} / \mathrm{s} 22^{\circ}\left(W_{\text {of }}\right)
$$

$$
\begin{aligned}
\tan \theta=\frac{45}{110} \quad \theta & =\tan ^{-1}\left(\frac{45}{110}\right) \\
& =22^{\circ}
\end{aligned}
$$

b.)


$$
\begin{aligned}
& \sin \theta=\frac{45}{10} \\
& \theta=\sin ^{-1}\left(\frac{45}{110}\right) \\
& =24^{\circ}(E \circ f S)
\end{aligned}
$$

