21. It should be mentioned that an efficient way to work this vector addition problem is with the cosine law for general triangles (and since $\vec{a}$, $\vec{b}$ and $\vec{r}$ form an isosceles triangle, the angles are easy to figure). However, in the interest of reinforcing the usual systematic approach to vector addition, we note that the angle $\vec{b}$ makes with the $+x$ axis is 135° and apply Eq. 3-5 and Eq. 3-6 where appropriate.

(a) The x component of $\vec{r}$ is $10\cos 30^\circ + 10\cos 135^\circ = 1.59$ m.

(b) The y component of $\vec{r}$ is $10\sin 30^\circ + 10\sin 135^\circ = 12.1$ m.

(c) The magnitude of $\vec{r}$ is $\sqrt{1.59^2 + 12.1^2} = 12.2$ m.

(d) The angle between $\vec{r}$ and the $+x$ direction is $\tan^{-1}(12.1/1.59) = 82.5^\circ$.