7. We denote the two forces $\vec{F}_1$ and $\vec{F}_2$. According to Newton's second law, $\vec{F}_1 + \vec{F}_2 = m\vec{a}$, so $\vec{F}_2 = m\vec{a} - \vec{F}_1$.

(a) In unit vector notation $\vec{F}_1 = (20.0\,\text{N})\hat{\text{i}}$ and

$$\vec{a} = -(12\sin 30^\circ\ \text{m/s}^2)\hat{\text{i}} - (12\cos 30^\circ\ \text{m/s}^2)\hat{\text{j}} = -(6.0\,\text{m/s}^2)\hat{\text{i}} - (10.4\,\text{m/s}^2)\hat{\text{j}}\ .$$

Therefore,

$$\begin{aligned} \vec{F}_2 &= (2.0\,\text{kg})\left(-6.0\,\text{m/s}^2\right)\hat{\text{i}} + (2.0\,\text{kg})\left(-10.4\,\text{m/s}^2\right)\hat{\text{j}} - (20.0\,\text{N})\hat{\text{i}} \\ &= (-32\,\text{N})\hat{\text{i}} - (21\,\text{N})\hat{\text{j}}\ . \end{aligned}$$

(b) The magnitude of $\vec{F}_2$ is

$$\left|\vec{F}_2\right| = \sqrt{F_{2x}^2 + F_{2y}^2} = \sqrt{(-32)^2 + (-21)^2} = 38\ \text{N}\ .$$

(c) The angle that $\vec{F}_2$ makes with the positive x axis is found from $\tan\theta = F_{2y}/F_{2x} = 21/32 = 0.656$. Consequently, the angle is either 33° or $33^\circ + 180^\circ = 213^\circ$. Since both the x and y components are negative, the correct result is 213°.