10 A particle P of mass m kg is moving on a smooth horizontal surface under the action of two constant horizontal forces $(-4\mathbf{i}+2\mathbf{j})$N and $(a\mathbf{i}+b\mathbf{j})$N. The resultant of these two forces is $\mathbf{R}$N. It is given that $\mathbf{R}$ acts in a direction which is parallel to the vector $-\mathbf{i}+3\mathbf{j}$.

(a) Show that $3a+b=10$. **[3]**

It is given that $a=6$ and that P moves with an acceleration of magnitude $5\sqrt{10}\,\mathrm{m\,s^{-2}}$.

(b) Determine the value of m. **[4]**