4 A nucleus P undergoes α-decay to form nucleus Q.

(a) Complete the equation for this decay.

$$^{215}_{84}\text{P} \rightarrow \,\_\!\_\,\text{Q} + \,\_\!\_\,\alpha$$ [2]

(b) **(i)** State the principle of conservation of momentum.

.....

.....

..... [2]

(ii) Before the decay, nucleus P has a speed of $3.2 \times 10^5\,\text{m s}^{-1}$. After the decay, nucleus Q is stationary.

Calculate the speed of the alpha particle after the decay.

speed = ... m s^{-1} [2]

[Total: 6]