38. (a) The force at the equilibrium position $r = r_{eq}$ is

$$F = -\left.\frac{dU}{dr}\right|_{r=r_{eq}} = 0 \quad \Rightarrow \quad -\frac{12A}{r_{eq}^{13}} + \frac{6B}{r_{eq}^{7}} = 0$$

which leads to the result

$$r_{eq} = \left(\frac{2A}{B}\right)^{\frac{1}{6}} = 1.12\left(\frac{A}{B}\right)^{\frac{1}{6}}.$$

(b) This defines a minimum in the potential energy curve (as can be verified either by a graph or by taking another derivative and verifying that it is concave upward at this point), which means that for values of r slightly smaller than r_{eq} the slope of the curve is negative (so the force is positive, repulsive).

(c) And for values of r slightly larger than r_{eq} the slope of the curve must be positive (so the force is negative, attractive).