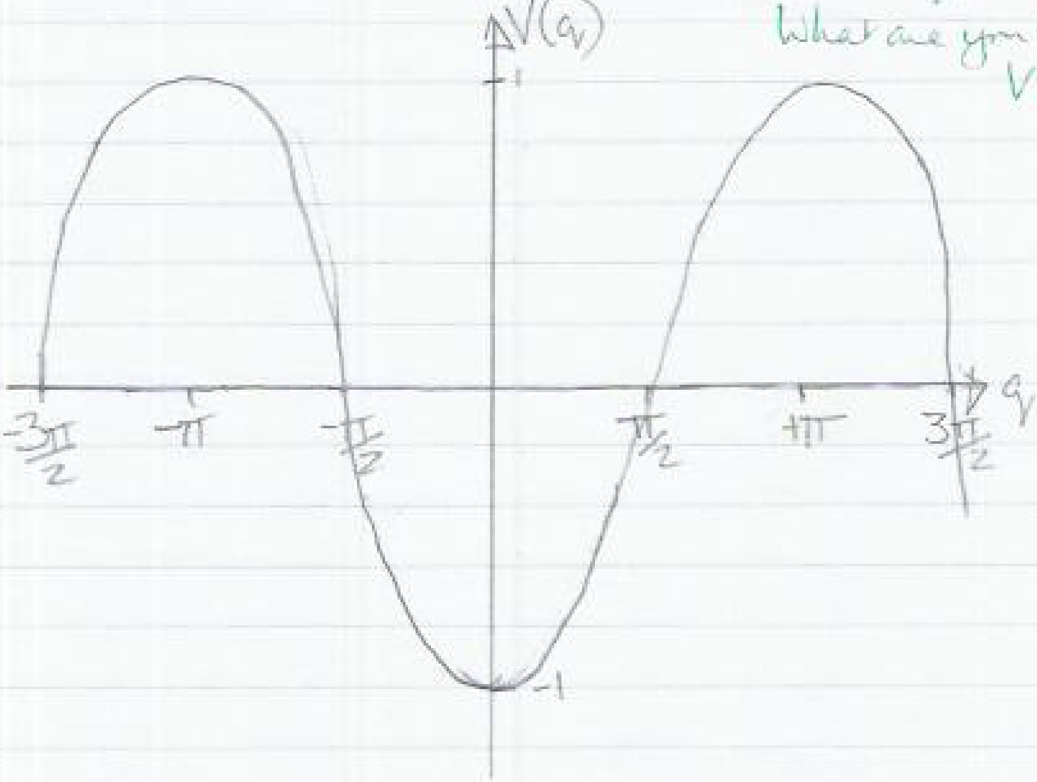
$$\frac{p^2}{2(1+a\sin q)} = E+\cos q$$

$$p^2 = 2(1+a\sin q)(E+\cos q)$$

$$p = \sqrt{2(1+a\sin q)(E+\cos q)}$$

This isn't a hamiltonian of simple mechanical type

What are you defining V to be?



At the saddle points $((2n+1)\pi, 0)$ $V(q)$ is a maximum $\therefore$ in order for a contour to connect all the saddle points $E+\cos(2n+1)\pi = 0$ $\therefore E = -\cos(2n+1)\pi = --1 = 1$. If $E=1$ then since $\cos(2n+1)\pi = -1$ $p = \sqrt{2(1+a\sin(2n+1)\pi)(1+-1)} = 0$ as required $\therefore$ There is a contour with $E=1$ ✓ connecting all the saddle points. This value for E is also the separatrix energy ✓

For $E>1$, $E+\cos q > 0$ for all q, since minimum value of $\cos q = -1$. Since $(1+a\sin q)>0$ as $0<a<1$, $|p|>0$ for all q and motion is rotational. ✓

For $E<1$, $E+\cos q = 0$ has roots