Statement of the problem:

A cubical vessel of of height 1 m is full of water.the minimum work done in taking water out from the vessel will be?

Solution:

The best way - to make a hole in the bottom of the vessel, in this case, the work is equal to zero.

But let's look at other ways

1) Drain the water

at the beginning potential energy of water is $mgh/2$, and then we raise the water to a level h, so work is:

$$A = mgh - \frac{mgh}{2} = \frac{mgh}{2}$$

$$A = \frac{1000 * 10 * 1}{2} = 5000\ (J)$$

2) Turn the vessel

at the beginning potential energy of water is $mgh/2$, and than we turn the vessel to 45°, where the center of mass is located at $\frac{\sqrt{2}}{2}h$, so:

$$A = \frac{\sqrt{2}mgh}{2} - \frac{mgh}{2} = \frac{mgh}{2}(\sqrt{2} - 1)$$

$$A = \frac{1000 * 10 * 1}{2}(1.41 - 1) = 2071\ (J)$$

so, method 2 is more economical