**Cost Efficiency Worksheet Example Answers**

The power output of your pump (PO) can be given by $P\_{o}=γQH\_{P}$, where $γ$ is the specific weight of water ($γ=$62.4 lbs/ft3), Q is the flow of the pump, and HP is the head the pump must overcome.

To begin, get everything in matching units. To find flow, measure how many gallons of water your pump can move in a given time. Covert the time to seconds, and gallons to ft3 (Hint: 7.48 gallons = 1 ft3). Also convert to feet the height difference between the two buckets.

**2.1 gallons = 0.28 ft3** Volume: **0.28** [ft3]

Time: **120** [s]

HP= **4** [ft]

Flow is a volume per time. In order to get the flow, divide the volume by the time:

**0.28 ft3/120 s=2.33x10-3 ft3/s** Flow, Q=**2.33x10-3** [ft3/s]

Calculate the power output of your pump using the equation:

$P\_{o}=γQH\_{P}$ \* (1.356 [watts]/ [ft lb/s])

**(62.4 lbs/ ft3)(2.33 x 10-3 ft3/s)(4 ft)=0.58 ft lb / s=0.79 W**

Po=**0.79**  [watts]

Finally, we want to know how cost effective your pump is. Divide total cost by your power output. ($/$P\_{o})$

**($21.65)(.79 W)=27.41 $/W** e=**27.41 $/W** [$/watts]

**Discussion Questions**

What factors made your pump a good design?

**Possible answers: Our pump was simple to operate, it worked well, it had a good efficiency, was visually appealing, etc.**

What was the most expensive aspect of your design? How could you reduce cost in this area?

**Possible answers: Our pump used a lot of PVC and was very big. We could make it smaller but still have it work well!**

What would you change in future designs?

**Possible answers: We could try a longer threaded rod to pump water easier.**