Worksheet 4
Wind Mill Pumping Plant Design

Given:

A community garden is being built. Garden developers want to utilize drip irrigation and a windmill to irrigate the garden. Plan the system based on the following criteria:

Number of rows: 40	Row width: 1 ft
Outlet spacing: 12 in	Row length: 100 ft
Product flow rate: 0.2 GPM/100 ft	
Drip operating pressure: 10 psi	Assume 5psi loss through fittings and valve
Daily water requirement: 0.25 in/day	Depth to water table: 50 feet
Iron Man 6m Windmill	Assume "light winds" pumping capacity

Step 1: Determine Irrigation Water Requirements

1. What is the *irrigated area* (in square feet)?

2. What is the *daily irrigation water requirement* (per row)?

3. What is the *total daily water requirement* for the entire garden?

Step 2: Determine Required Storage Capacity

4. What is the *flow rate* (per row)?

5. What is the *flow rate* for the entire garden in gallons per minute (GPM)? In gallons per hour (GPH)?

6. What is the minimum water storage *tank height* needed to supply the in-let pressure requirements for the system?

Step 3: Determining Pumping Capacity

7. What is the *elevation* to be pumped?

8. What is the *pumping capacity* of the windmill in gallons per hour?

Elevation Feet - Meters	LIGHT WINDS		FAIR WINDS		STRONG WINDS	
	Cylinder Diameter Inches - MM	Water Pumped per Hour Gallons - Cu M	Cylinder Diameter Inches - MM	Water Pumped per Hour Gallons - Cu M	Cylinder Diameter Inches - MM	Water Pumped per Hour Gallons - Cu M
10 - 3	16 - 400	7470 - 28.3	18 - 460	13860 - 52.5	18 - 460	18900 - 71.6
16 - 5	14 - 350	5700 - 21.6	16 - 400	10960 - 41.5	16 - 400	14915 - 56.5
23 - 7	12 - 300	4200 - 15.9	14 - 350	8370 - 31.7	14 - 350	11432 - 43.3
33 - 10	10 - 250	2900 - 11	12 - 300	6150 - 23.3	14 - 350	11432 - 43.3
50 - 15	8 - 200	1875 - 7.1	10 - 250	4277 - 16.2	12 - 300	8236 - 31.8
66 - 20	7 - 180	1505 - 5.7	8 - 200	2745 - 10.4	10 - 250	5834 - 22.1
100 - 30	6 - 150	1055 - 4	7 - 180	2218 - 8.4	8 - 200	3722 - 14.1
130 - 40	5 - 130	790 - 3	6 - 150	1530 - 5.8	7 - 180	3088 - 11.5
165 - 50	4 3/4 - 120	660 - 2.5	5 - 130	1162 - 4.4	6 - 150	2112 - 8