Worksheet 2 – Peak Water Demand and Storage Capacity

1. Using the PET and turf coefficient tables below, calculate the average daily peak water demand, $ET_{peak\ daily,}$ (in inches) for the following locations. For daily peak water demand, select the month with the highest average monthly PET value. Assume a bermudagrass turfgrass.

   a. El Paso   _____ (month)   _____ $ET_{peak\ daily}$ (inches)

   b. Dallas   _____ (month)   _____ $ET_{peak\ daily}$ (inches)

   c. Brownsville   _____ (month)   _____ $ET_{peak\ daily}$ (inches)

   d. Waco   _____ (month)   _____ $ET_{peak\ daily}$ (inches)

Average Monthly PET – (inches/month)

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Abilene	2.08	2.57	4.14	5.48	6.47	7.65	8.36	7.46	5.48	4.21	2.67	2.08	58.65
Amarillo	1.84	2.27	3.73	5.06	5.89	7.51	8.08	7.29	5.61	4.05	2.4	1.78	55.51
Austin	2.27	2.72	4.34	5.27	6.39	7.15	7.22	7.25	5.57	4.38	2.74	2.21	57.51
Brownsville	2.65	3.03	4.48	5.17	6.03	6.32	6.68	6.65	5.21	4.34	3.01	2.59	56.16
College Station	2.2	2.71	4.22	5.2	6.25	6.89	7.1	6.85	5.6	4.3	2.8	2.2	56.32
Corpus Christi	2.42	2.95	4.28	5.17	5.95	6.43	6.68	6.65	5.21	4.34	3.01	2.59	55.68
Dallas/Ft. Worth	2.0	2.46	3.96	5.14	6.21	7.06	7.40	7.25	5.49	4.19	2.59	2.10	55.85
Del Rio	2.47	3.01	4.76	6.01	6.98	7.41	7.57	7.41	5.77	4.35	2.91	2.36	61.01
El Paso	2.74	3.53	6.07	8.19	9.83	11.12	9.19	8.94	7.69	5.89	3.58	2.49	79.26
Galveston	2.2	2.6	4.1	5.0	6.11	6.6	6.2	6.0	5.5	4.2	2.8	2.3	53.61
Houston	2.36	2.83	4.32	5.01	6.11	6.57	6.52	6.08	5.57	4.28	2.9	2.35	54.9
Lubbock	2.35	2.63	4.41	5.53	6.93	7.73	7.63	7.2	5.54	4.19	2.61	2.33	59.08
Midland	2.2	2.78	4.46	5.91	7.21	8.2	9.23	8.62	6.95	4.31	2.78	2.16	64.81
Port Arthur	2.25	2.63	3.95	5.09	6.12	6.6	5.81	5.61	5.46	4.18	2.76	2.23	52.69
San Angelo	2.88	3.13	5.31	7.01	8.48	9.16	9.29	8.49	6.60	5.08	3.37	2.54	71.34
San Antonio	2.42	2.9	4.42	5.47	6.47	6.97	7.31	6.99	5.64	4.44	2.85	2.36	58.24
Uvalde	2.44	2.95	4.62	5.85	6.7	7.21	7.5	7.31	5.7	4.4	2.89	2.36	59.93
Victoria	2.35	2.87	4.29	5.77	6.39	6.7	6.92	6.7	5.36	4.41	2.93	2.33	57.02
Waco	2.13	2.62	4.03	5.31	6.45	7.15	7.40	7.5	5.7	4..41	2.7	2.17	53.16
Weslaco	2.5	2.57	3.96	4.9	6.12	6.53	7.0	6.58	4.79	3.96	2.85	2.29	54.05
Wichita Falls	1.94	2.46	4.07	5.50	6.7	7.54	7.97	7.72	5.79	4.3	2.62	1.95	58.56

Averages were computed using climatic data over the entire period of record available from the National Weather Service and compared to ETo rates based on the standardized Penman-Monteith equation where available. (August 2005)

Turf Coefficients	
Warm Season	0.6
Cool Season	0.8
Sports Turf	0.8

2. You plan to purchase a storage tank to hold 7 days worth of water. This water will be used to irrigate a vegetable garden during the summer. The vegetable garden is 20 feet wide and 40 feet long. The peak daily water use is 0.25 inches during the summer.

    a. What is the total 7-day water use for the vegetable garden?

        i. _____ (inches)

        ii. _____ (feet)

    b. What is the total area of the vegetable garden? _____ (square feet)

    c. What is the storage capacity required to hold 7-days worth of water?
       HINT: 1 cubic foot = 7.48 gallons

        i. _____ (gallons)

        ii. _____ (cubic feet)

3. A 1200 gallon storage tank is used to supply water for a residential flower bed. During the summer, peak daily water demand is 0.30 inches. The total irrigated area is 1500 square feet.

    a. How many gallons of water must be replaced each day to refill the storage tank?

    b. If totally filled, how many days worth of water will the storage tank provide if you can only allow the water to drop to 25% of total storage capacity?

USEFUL FORMULAS AND CONVERSION FACTORS

Peak Daily Water Demand

$$ET_{peak\ daily} = ET_o x T_c$$

$ET_{peak\ daily}$ = daily peak water demand (inches/day)
Et_o = reference evapotranspiration rate (inches/day)
T_c = turf coefficient (dimensionless)

Gallons to Inches

$$Inches = \frac{Gallons}{square\ feet \times 0.6234}$$

Inches to Gallons

$$Gallons = Inches \times square\ feet \times 0.6234$$

Gallons to Cubic Feet

$$Cubic\ feet = \frac{Gallons}{7.48}$$

Cubic Feet to Gallons

$$Gallons = Cubic\ feet \times 7.48$$

Other Conversion Factors

43,560 square feet = one acre
27,154 gallons = one acre-inch of water
325,851 gallons = one acre-foot of water

Area Formulas for Geometric Shapes

Square: Area = Length X Length
Rectangle: Area = Length x Width
Triangle: Area = ½ Height x Base
Circle: Area = 3.14 x Radius x Radius, or 3.14 x Diameter x Diameter ÷ 4