

Evaluating Tree Benefits

Name(s): _____

Location: _____

Date: _____

1. Select a tree to study. Use a field guide or other source to determine the tree's species.

Tree Species: _____

2. Determine the tree's diameter at breast height (DBH), and then measure the tree's height. Methods for collecting these measurements are described at the end of this student page.

DBH: _____ inches (or _____ cm)

Height: _____ feet (or _____ m)

3. Visit the Tree Benefits website (<http://www.treebenefits.com>) to determine the ecological services that your selected tree provides by entering the species name and DBH (in inches).

Record your findings below.

Overall Benefits

At current size: \$ _____ a year

If it continues to grow: \$ _____ a year

Stormwater

_____ gallons of storm water intercepted a year

Property Value

\$ _____

Energy

Electricity conserved (for cooling): _____ kilowatt/hours

Oil/Natural gas conserved (for heating): _____ therms

Air Quality

Ozone (O₃), deposited: _____

Volatile Organic Chemicals (VOC), avoided: _____

Nitrogen Dioxide (NO₂), deposited: _____Nitrogen Dioxide (NO₂), avoided: _____Sulfur Dioxide (SO₂), deposited: _____Sulfur Dioxide (SO₂) avoided: _____Particulates less than 10 microns (PM₁₀), deposited: _____Particulates less than 10 microns (PM₁₀), avoided: _____

Carbon Dioxide (CO₂)

Total pounds of atmospheric carbon reduced: _____

4. Describe any other ecosystem services or benefits provided by this tree.

Evaluating Tree Benefits (cont.)

How to Measure Diameter at Breast Height

Because some trees may be much wider at the base than others, foresters measure tree diameter using a standard called Diameter at Breast Height—or DBH. The DBH is the diameter of the tree at 4.5 feet (1.4 meters) above the ground.

First, use a tape measure to determine the circumference of the tree at 4.5 feet (1.4 meters) above the ground. This measurement is the Circumference at Breast Height (CBH). To obtain the diameter at breast height (DBH), divide the CBH by 3.14 (or π). The Tree Benefits website requires this measurement to be in inches.

$$\text{CBH} \div 3.14 = \text{DBH}$$

Foresters often use tools, such as a diameter tape or a biltmore stick, to measure diameter directly.

How to Measure Tree Height

One of the simplest methods for measuring a tree's height is setting up a proportion.

- Have a friend stand at the base of the tree while you walk a distance away from it.
- Hold a ruler at arm's length. Walk backward or forward until both the top and bottom of the ruler line up with the top and bottom of the tree.
- Note how tall your friend appears on the ruler (for example, 5 cm).
- Divide the length of the ruler by the apparent height of your friend. (For example, if the ruler is 30 cm, you would divide that number by the 5 cm from above, to get 6.)
- Multiply this number by the actual height of your friend. The result is the height of the tree. (For example, if your friend is 140 cm tall, you would multiply by 6, from above, to get 840 cm, or 8.4 m.)



How Much Carbon Is in a Tree?

Directions: Use this table to find a rough estimate of the amount of carbon stored in a tree using the tree's diameter at breast height (DBH) and its height (H). The estimated amount of carbon is in pounds. Please note that some values are intentionally blank, as trees with the corresponding dimensions are unrealistic.

Diameter at Breast Height (in inches)

	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
5	21	24	27	32	39	47	56	67	80	93	109	125	142	162	183	205	229	255
10	22	26	34	44	57	73	92	114	139	167	197	231	265	304	346	391	439	490
15	23	29	40	56	75	99	128	161	198	239	285	336	387	446	509	576	648	724
20	24	32	47	67	94	126	164	207	257	313	374	441	509	588	672	762	858	960
25	24	35	53	79	112	152	199	254	316	385	462	546	631	729	834	947	1,067	1,194
30	25	38	60	91	130	178	235	301	375	458	550	651	753	870	997	1,132	1,276	1,428
35	—	41	67	102	148	204	271	347	434	531	639	756	875	1,013	1,160	1,318	1,486	1,664
40	—	—	73	114	166	231	307	394	493	604	727	861	997	1,154	1,322	1,503	1,694	1,898
45	—	—	—	126	185	257	342	441	553	677	815	966	1,120	1,296	1,486	1,689	1,904	2,133
50	—	—	—	137	203	283	378	487	611	750	903	1,071	1,242	1,438	1,648	1,873	2,113	2,368
55	—	—	—	149	222	310	415	535	672	825	994	1,179	1,366	1,583	1,815	2,063	2,327	2,608
60	—	—	—	161	239	336	450	581	730	896	1,080	1,281	1,486	1,721	1,974	2,244	2,532	2,837
65	—	—	—	—	258	362	485	627	789	969	1,168	1,386	1,608	1,862	2,136	2,429	2,741	3,071
70	—	—	—	—	—	388	521	674	848	1,042	1,256	1,491	1,730	2,005	2,300	2,615	2,951	3,307
75	—	—	—	—	—	415	557	721	907	1,115	1,345	1,596	1,852	2,146	2,462	2,800	3,159	3,541
80	—	—	—	—	—	—	592	767	966	1,188	1,433	1,701	1,974	2,287	2,624	2,985	3,368	3,775
85	—	—	—	—	—	—	628	814	1,025	1,261	1,521	1,806	2,096	2,430	2,788	3,171	3,578	4,011
90	—	—	—	—	—	—	664	861	1,084	1,333	1,609	1,911	2,218	2,571	2,950	3,355	3,787	4,245
95	—	—	—	—	—	—	—	908	1,143	1,407	1,698	2,017	2,341	2,713	3,113	3,541	3,997	4,480
100	—	—	—	—	—	—	—	954	1,202	1,479	1,786	2,121	2,462	2,854	3,276	3,726	4,206	4,714
105	—	—	—	—	—	—	—	—	1,261	1,552	1,874	2,226	2,584	2,996	3,438	3,911	4,414	4,949
110	—	—	—	—	—	—	—	—	1,321	1,625	1,962	2,332	2,707	3,138	3,601	4,097	4,625	5,184
115	—	—	—	—	—	—	—	—	—	1,698	2,050	2,436	2,829	3,279	3,764	4,282	4,833	5,418
120	—	—	—	—	—	—	—	—	—	1,771	2,139	2,542	2,951	3,422	3,927	4,468	5,043	5,654

These estimates are based on the formula: M_c (mass of carbon in the tree) = $0.5 \times M_w$ (mass of the wood), where $M_w = 0.55 \times V$ (volume of tree) $\times D_w$ (density of wood); $V = 0.0567 + 0.5074 \times (CBH/2) \times H$. It assumes that $D_w = 0.6 \text{ g/cm}^3$, and that water makes up 45 percent of the tree's mass.