

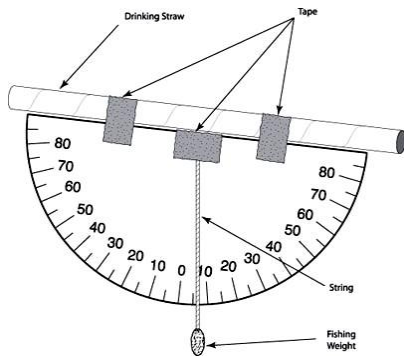
Student Worksheet to determine the height of a tree

1. Measure the distance from the base of the tree on a meter tape out to where you can see the top of the tree. This distance will be used for “b” in the calculation.

Distance b = _____ meters

2. Use a clinometer or protractor to measure the angle from the horizontal to the top of the tree. This is angle “A.”

Angle A _____ degrees



You can make a clinometer from a protractor, string, a weight, and a straw, and use it to measure the angle to the top of the tree

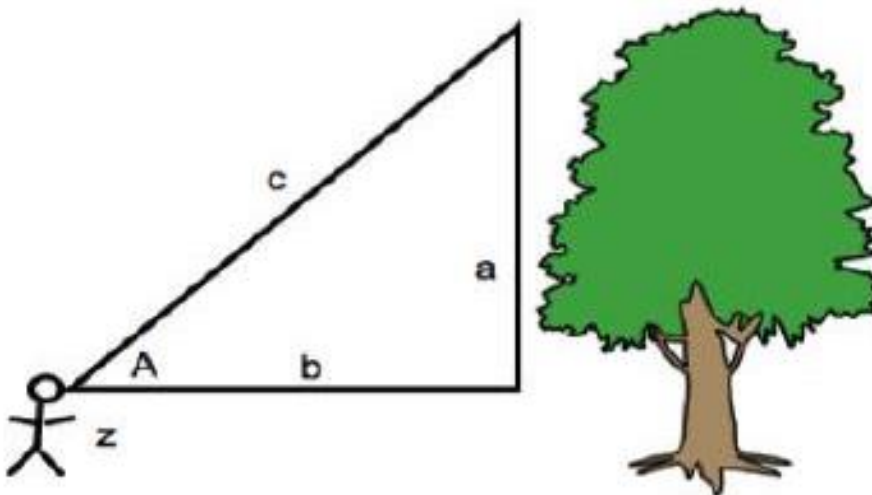
3. Measure the distance from the ground up to observer's eyes

Height of eye z = _____ m

4. Use the tangent of angle "A" to calculate the height “H” of the tree

$$H = (\tan A) \times b + z$$

$$H = \text{_____} \text{ m}$$



Use this table to find a rough estimate of the amount of carbon stored in a tree, based on the tree's circumference at breast height (1.37 m from ground) and its height. The estimated amount of carbon is in kilograms.

Circumference at Breast Height (in meters)

		0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0	2.25	2.5	2.75	3.0	3.25	3.5	3.75	4.0	4.25	4.5
Height (in meters)	2	10	14	19	26	36	48	61	77	95	115	138	162	189	217	248	281	316	353
	4	11	18	28	43	62	86	113	145	181	221	266	315	368	425	486	552	622	696
	6	13	22	38	60	89	124	165	213	267	327	394	467	547	633	725	823	928	1040
	8	14	26	48	77	115	162	217	281	353	433	522	620	726	840	963	1095	1235	1383
	10	15	31	57	94	142	200	269	349	439	539	651	773	905	1048	1202	1366	1541	1727
	12	16	35	67	111	168	238	321	416	525	645	779	925	1084	1256	1440	1638	1848	2070
	14	14	39	76	128	195	276	373	484	610	751	907	1078	1263	1464	1679	1909	2154	2414
	16	18	43	86	145	221	315	425	552	696	857	1035	1231	1443	1672	1917	2180	2460	2757
	18	19	48	95	162	248	353	477	620	782	963	1164	1383	1622	1879	2156	2452	2767	3101
	20	20	52	105	179	274	391	529	688	868	1069	1292	1536	1801	2087	2394	2723	3073	3444
	22	21	56	114	196	301	429	581	756	954	1175	1420	1688	1980	2295	2633	2994	3379	3787
	24	22	60	124	213	327	467	633	823	1040	1281	1549	1841	2159	2503	2872	3266	3686	4131
	26	23	64	133	230	354	505	685	891	1126	1387	1677	1994	2338	2710	3110	3537	3992	4474
	28	24	69	143	247	380	544	737	959	1211	1493	1805	2146	2517	2918	3349	3809	4298	4818
	30	25	73	152	264	407	582	789	1027	1297	1599	1933	2299	2697	3126	3587	4080	4605	5161
	32	26	77	162	281	433	620	840	1095	1383	1705	2062	2452	2876	3334	3826	4351	4911	5505
	34	27	81	172	298	460	658	892	1163	1469	1811	2190	2604	3055	3541	4064	4623	5217	5848
	36	28	86	181	315	486	696	944	1231	1555	1917	2318	2757	3234	3749	4303	4894	5524	6192
	38	29	90	191	332	513	734	996	1298	1641	2023	2446	2910	3413	3957	4541	5166	5830	6535
	40	31	94	200	349	539	773	1048	1366	1727	2129	2575	3062	3592	4165	4780	5437	6137	6879
42	32	98	210	366	566	811	1100	1434	1813	2235	2703	3215	3772	4373	5018	5708	6443	7222	
44	33	103	219	382	592	849	1152	1502	1898	2341	2831	3368	3951	4580	5257	5980	6749	7565	
46	34	107	229	399	619	887	1204	1570	1984	2448	2960	3520	4130	4788	5495	6251	7056	7909	
48	35	111	238	416	645	925	1256	1638	2070	2554	3088	3673	4309	4996	5734	6522	7362	8252	

Note: These estimates are based on the assumptions that V (volume of tree) = $0.0567 + 0.5074 \times (CBH/\pi)^2 \times H$; that D (density of the wood) = 0.6 g/cm^3 ; that water makes up 45% of the tree's mass; that M (mass of the wood) = $0.55 \times V \times D$; and that the mass of carbon in the wood is 0.5% of the mass of the wood.