Sneaky Range Finder: Measure the Unreachable

If you know the length of one side and one angle of a Right-Angle Triangle you can find the length of another side, like the height of a tree!

Stand 10 feet or 50 feet from your target object. Holding the Sneaky Range Finder steady with the bottom level with the ground, view the top of the target through the pointer straw. The Sneaky Range Finder's gauge then displays the angle of elevation (a) and the height (A) of the object. (Remember to add your own height minus 5 inches (B) to (A) for the total height.)

Bottom

0.9 1.7 2.7 3.6 4.6 5.8 7.0 8.3 10 12 14 17 21 27 37 57 114
4.3 8.8 13 18 23 29 35 42 50 60 71 87 107 137 186 283 571
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90

DISTANCE:
10 FEET
50 FEET
ANGLE

Cut out the pointer and the Range Finder, then cut out the black window in the pointer.

Since every angle has its own unique tangent, if the bottom of an object is not exactly 10 or 50 feet away you can still find its height. First use the Sneaky Range Finder to determine the angle of elevation of the target object's top, then find that angle's tangent number in the table below. Multiply the distance to the object by the tangent number found to calculate the object's height!
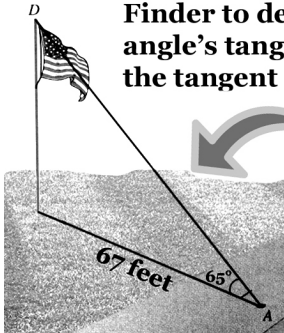
For example, if the elevation angle to the top of a flagpole is measured by the Sneaky Range Finder to be 65-degrees, and that pole is 67 feet away, multiply 67 times 2.14 (the tangent of 65-degrees from the table below) to determine the pole is 143 feet tall (plus your height minus 5 inches)
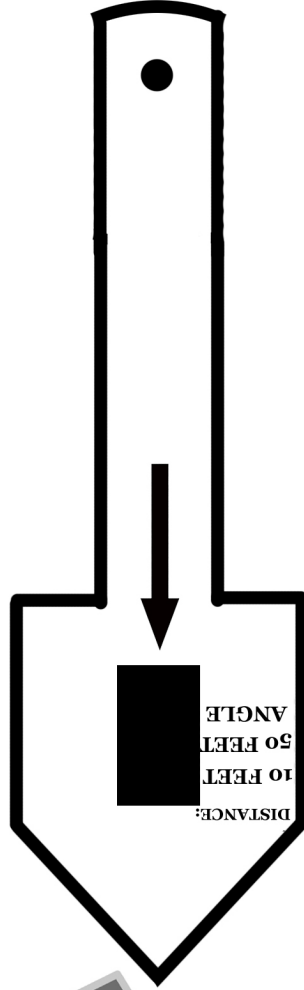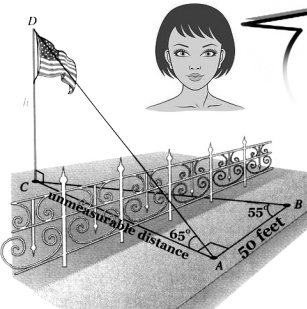
67 feet   65°

Sneaky Trick - If you cannot directly measure the distance to the object whose height you want to determine (see diagram below):
(1) Find the object's angle of elevation and corresponding tangent.
(2) Turn 90-degrees right and walk exactly 50-feet to (B).
(3) Holding it horizontally, look through the Sneaky Range Finder and determine the angle between the object's base and your original starting point (A). Multiply the tangent of that angle by 50 feet to determine the distance from your original starting point to the object being measured.
(4) Multiply that length by the tangent you determined in step (1).

For example: You measure the original angle to the flagpole top to be 65 degrees. Then, after pacing off 50 feet to (B), you measure the angle between points (A) and (C) to be 55 degrees, multiply 50 feet by 1.426 (the tangent of 55 degrees) and find the distance from (A) to (C) is 71 feet! Now, multiply 71 Feet times 2.14 (the tangent of the original 65 degrees) and find the flagpole is 152 feet tall plus your height minus 5 inches! If you are, for example, 5 feet 5 inches tall, add 5 feet to the 152 feet to find the total height of the flagpole is 157 feet!

unmeasurable distance   65°   55°   50 feet   B

Tangent Table

Angle	tan(a)	Angle	tan(a)	Angle	tan(a)	Angle	tan(a)
0.0	0.00	25.0	.4663	46.0	1.0355	71.0	2.9042
1.0	.0175	26.0	.4877	47.0	1.0724	72.0	3.0777
2.0	.0349	27.0	.5095	48.0	1.1106	73.0	3.2709
3.0	.0524	28.0	.5317	49.0	1.1504	74.0	3.4874
4.0	.0699	29.0	.5543	50.0	1.1918	75.0	3.7321
5.0	.0875	30.0	.5773	51.0	1.2349	76.0	4.0108
6.0	.1051	31.0	.6009	52.0	1.2799	77.0	4.3315
7.0	.1228	32.0	.6249	53.0	1.3270	78.0	4.7046
8.0	.1405	33.0	.6494	54.0	1.3764	79.0	5.1446
9.0	.1584	34.0	.6745	55.0	1.4281	80.0	5.6713
10.0	.1763	35.0	.7002	56.0	1.4826	81.0	6.3138
11.0	.1944	36.0	.7265	57.0	1.5399	82.0	7.1154
12.0	.2126	37.0	.7535	58.0	1.6003	83.0	8.1443
13.0	.2309	38.0	.7813	59.0	1.6643	84.0	9.5144
14.0	.2493	39.0	.8098	60.0	1.7321	85.0	11.430
15.0	.2679	40.0	.8391	61.0	1.8040	86.0	14.301
16.0	.2867	41.0	.8693	62.0	1.8907	87.0	19.081
17.0	.3057	42.0	.9004	63.0	1.9626	88.0	28.636
18.0	.3249	43.0	.9325	64.0	2.0503	89.0	57.290
19.0	.3443	44.0	.9657	65.0	2.1445	90.0	infinite
20.0	.3640	45.0	1.000	66.0	2.2460		
21.0	.3839			67.0	2.3559		
22.0	.4040			68.0	2.4751		
23.0	.4245			69.0	2.6051		
24.0	.4452			70.0	2.7475		

SNEAKY RANGE FINDER INSTRUCTIONS

MAKE IT!
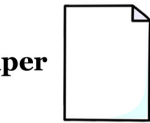
What you need:

1 sheet of thick paper

1 2-inch length of plastic straw
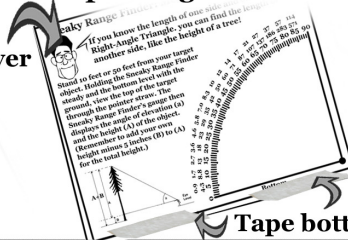
1 paper fastener

transparent tape

scissors

Print the Sneaky Range Finder and pointer on a sheet of thick paper and cut out the parts.
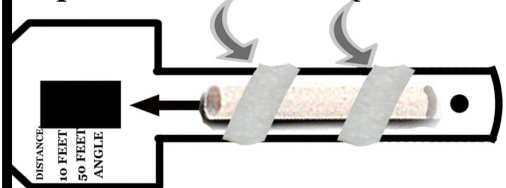
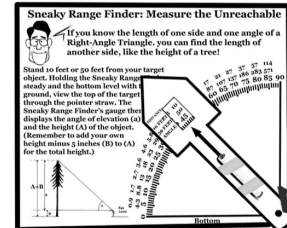**Then fold the Range Finder in half and tape it together.**

Fold over

Tape bottom

Tape the straw onto the pointer.

Then push the paper fastener thru the pointer's hole and thru the hole at the corner of the Range Finder.

Attach pointer to Range Finder here!

USE IT!

Using the Sneaky Range Finder

Hold the Range Finder a few inches from your eye and parallel with the ground. Use your other hand to aim the pointer at the top of the target object as you look through the straw.

Hold bottom level with the ground!
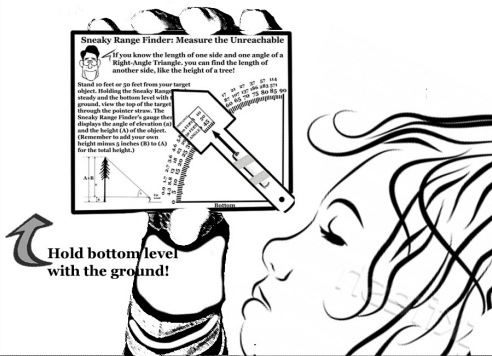
Calculate the vertical height from 10- or 50-feet away from the target.

For example: If your pointer shows a 60-degree angle to the top of the target and you are 50-feet from the target, the Range Finder scale shows the target is 87-feet high (plus your viewing height) :

87 feet + 5 feet viewing height = 92 total feet high!

Calculating Height with a Tangent Table

If you are not exactly 10- feet or 50-feet from an object, you can still determine the height of the object. Just multiply the distance to the target by the tangent of its angle measurement (found in the table to the right):

Example:
Object distance = 67 feet
Angle of elevation = 65 degrees
Tangent of 65 degrees = 2.14
Multiply 67 x 2.14 = 143.68 feet
Add viewing height (we use 5 feet)
143.68 + 5
Total height = approximately 149 feet high!

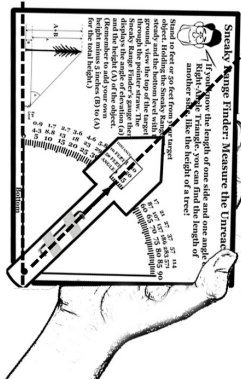## GOING FURTHER!

Using the Range Finder Horizontally

Point A   **Point B**

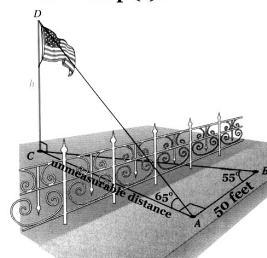A < How far is it from (A) to (B)? > B

Stand at Point A facing B and then walk 10 (or 50) feet right from Point A.

Holding the Range Finder level with the ground in your upturned palm, line up the 0 (zero) degrees line on the Range Finder with Point A and then aim the pointer at Point B.
The distance from (A) to (B) is the distance you walked times the tangent of the measured angle.

Sneaky Trick - If you cannot directly measure the distance to the object whose height you want to determine:

(1) Find the object's(A) angle of elevation and corresponding tangent.
(2) Turn 90-degrees right or left and walk exactly 50-feet.
(3) Holding it horizontally, look through the Sneaky Range Finder and determine the angle between the object(A) and your original starting point(B). Multiply the tangent of that angle by 50 feet to determine the distance from your original starting point to the object being measured.
(4) Multiply that length by the tangent you determined in step (1).

Tangent Table

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13.0	.2309	38.0	.7813	59.0	1.6643	84.0	9.5144
14.0	.2493	39.0	.8098	60.0	1.7321	85.0	11.430
15.0	.2679	40.0	.8391	61.0	1.8040	86.0	14.301
16.0	.2867	41.0	.8693	62.0	1.8907	87.0	19.081
17.0	.3057	42.0	.9004	63.0	1.9626	88.0	28.636
18.0	.3249	43.0	.9325	64.0	2.0503	89.0	57.290
19.0	.3443	44.0	.9657	65.0	2.1445	90.0	infinite
20.0	.3640	45.0	1.000	66.0	2.2460		
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