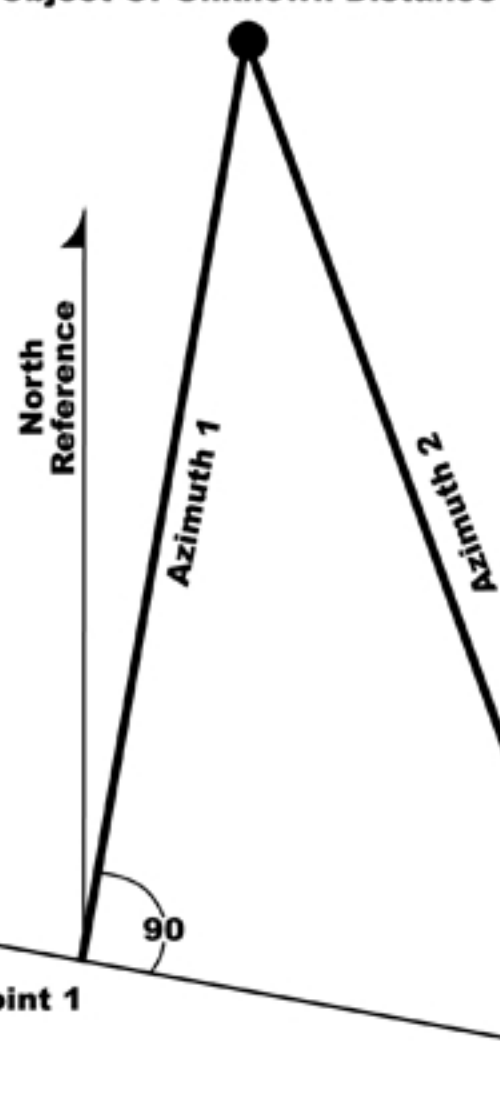


Table of tan(angle)

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

Object Of Unknown Distance



- 1) Shoot an azimuth from Point 1 to the object of unknown distance.
- 2) Turn 90 degrees from this azimuth and move to a second location (Point 2) that is a known distance from your first point (pace count 50 meters for example).
- 3) From Point 2 shoot another azimuth to the object of unknown distance.
- 4) Find the difference in degrees from these two azimuths (For example if your first azimuth was 10 degrees and your second azimuth was 340 degrees, then the difference is 30 degrees).
- 5) Subtract this difference from 90 (in the example above you would come up with 90-30=60)
- 6) Look on your tangent tables and find the tangent for the value (in the example, the value from the tangent tables for 60 is 1.732)
- 7) Multiply the distance you moved from Point 1 to Point 2 (50 meters) by the tangent of 1.732.
- 8) 50 x 1.732 = 86.6 meters (distance from Point 1 to the object of unknown distance).

EQUATION:

$$d = (\text{Tan } (90 - (A - B))) \times \text{Ref}$$

d = Distance (to be calculated)
Tan = Tangent value of the resultant angle
A = Greater value of the two measured bearing angles
B = Lower value of the two measured bearing angles
Ref = Measured reference distance between Point 1 & Point 2

Height Measurement Using Inclinometer

If angle is less than 45 degrees:

- 1) Convert angle to percent of grade (see below).
- 2) Multiply distance from object by percent of grade, and then divide this by 100.
- 3) Add eye (compass) level height to this value.

Converting to percent of grade:

When an angle is less than 45 degrees you must convert angle to percent of grade. To do this multiply the angle tan value by 100. Example: if the angle is 35 degrees then the tan value is .7002, so $.7002 \times 100 = 70.02$ (or rounded off to 70) percent grade.

Once you have percent of grade, to find height use this equation: Multiply the distance to the object by the percent of grade, and then divide this number by 100.

For example: you are standing 30 feet away from a tree and your eye level is 5 ½ feet. You measure an angle to the top of the tree as being 35 degrees. You convert this angle to percent of grade (70). So, $30 \times 70 / 100 = 21$. Add your eye level height back to this and the tree is 26.5 feet tall.

If angle is more than 45 degrees:

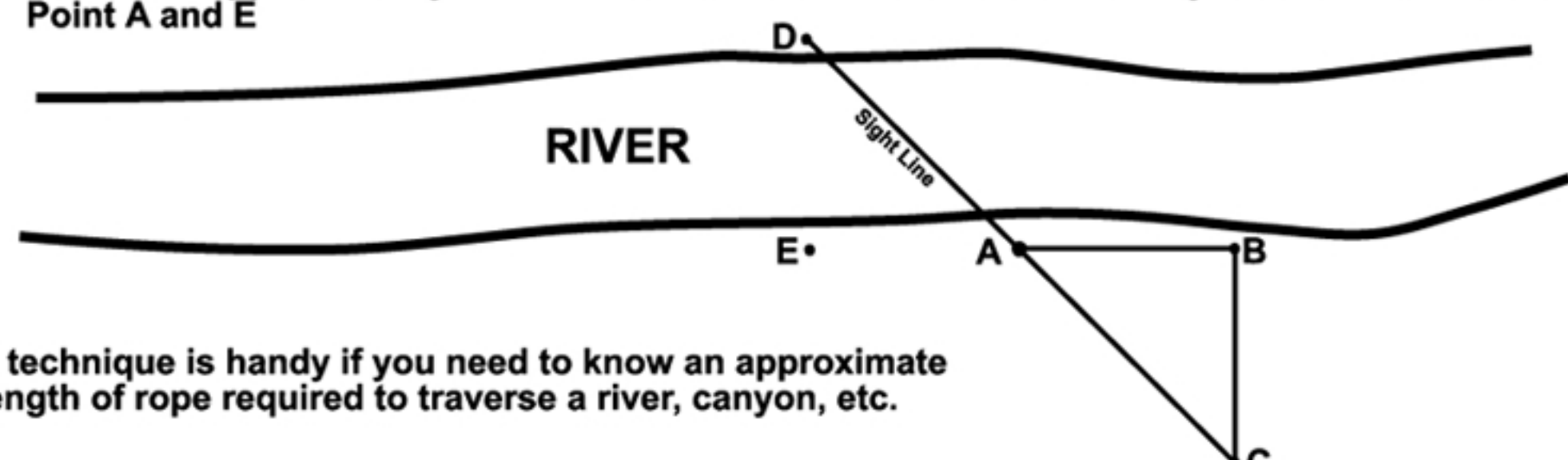
If an angle is more than 45 degrees you can skip converting to percent of grade and use the tan value direct.

- 1) Find Tan Value of angle.
- 2) Multiply Tan value by distance away from object being measured.
- 3) Add eye (compass) level height to this value.

For example if you are standing 30 feet away from a tree and your eye level is 5 ½ feet. You measure an angle to the top of the tree as being 52 degrees. The tan value of 52 is 1.2799 (round it off to 1.28). So, $(30 \times 1.28) + 5.5 = 43.9$ feet tall.

Using Basic Trigonometry To Determine Approximate Distance Across A River:

- 1) Mark a starting point along a straight stretch of the river as Point A.
- 2) Start at Point A and walk 5 paces (can be another number) along the side of the river to point B.
- 3) Turn 90 degrees and walk the same amount of paces to Point C.
- 4) Sight from Point C to Point A and find a distant point (D) on the other side of the river.
- 5) Return to Point A and count your paces until you are directly across from the point you sighted as D (this will be Point E).
- 6) The river is approximately the same distance in width as the distance you counted between Point A and E



This technique is handy if you need to know an approximate length of rope required to traverse a river, canyon, etc.