Land surveyor formulas pdf

1. One of the main goals of a topographic survey may be to identify the land area where you want to build a fish farm. Existing topographical maps may need to calculate the area of the watershed or the future reservoir (see Water, Volume 4 in this series). Note: When surveying land, land should be treated as horizontal surfaces, not as the actual area of the earth's surface. You always measure horizontal distances. 2. You will often need to know the areas of cross profiles to calculate the amount of earthworks you need to do. Horizontal Area Cross Area 3. You can identify areas either directly from field measurements or indirectly, according to a plan or map. In the first case, you'll find all the measurements of distances and angles you need by shooting, and you'll calculate the areas from them. In the second case, you will first draw a plan or map (see chapter 9). Then you get the sizes you need from the scale and determine the area on that basis. There are a few simple ways to measure areas. Some of these are graphic methods where you compare a plan or map of an area that needs to be measured with a drawn pattern of known unit sizes. Other geometric methods where you use simple mathematical formulas to calculate areas of regular geometric shapes, such as triangles, trapeze, or areas, are limited to an irregular curve. Note: The trapeze is a four-way range with two parallel sides. The simple methods will be detailed in the following sections. They are also summarized in Table 13. Triangle Trapezium 1 Trapezium 2 Irregular areas TABLE 13 Simple methods of measuring the area 10.2 Stripes Graphic method gives an approximate estimate of 10.3 square grid Graphic method gives good very good estimates of 10.4 division in regular geometric shapes, such as, triangles, trapeze geometric method gives good very good scores 10.5 Trapezoidal rule geometric method gives good very good scores suitable for curved border 1. Get a sheet of transparent paper, such as tracking paper or lightweight square millimeter paper. Its size will depend on the size of the area displayed, which must be measured. 2. On this paper, draw a series of stripes, drawing a series of parallel lines with a regular fixed interval. Select this W strip width to represent a certain number of meters. To do this, you can monitor the scale of the plan or map. Example Scale 1: 2,000; W 1 cm and 20 m. Scale 1: 50,000; The width of the W strip is 1 cm and 500 m. Note: the smaller the width of the band, the more accurate will be the estimate of the area of the ground. 3. Place a sheet of transparent paper over the plan or map of the area you need to measure and it's secure with pins or transparent tape. Scale: 1: 2,000 4. For each lane measure measure AB's distance in centimeters along the central line between the boundaries of the area shown on the map. 5. Calculate the amount of these distances in centimeters. Then, according to the scale you use, multiply to find the equivalent distance in the field, in meters. Sample scale 1:2000 and 1 cm and 20 m. The amount of distances 16 cm. Equivalent terrestrial distance: 16 x 20 m and 320 m. 6. Multiply this amount of real distances (metres) by the equivalent width of the W band (in meters) to get an approximate estimate of the total area per square meter. The amount of equivalent distances is 320 m. The width of the strip (1 cm) is equivalent to 20 m. Land area: 320 m x 20 m, 6,400 m2 or 0.64 hectares Note: 10,000 m2 and 1 hectare (ha) 7. Repeat this procedure at least once to check your calculations. The total area is 320 m x 20 m and 6400 m2 1. Get a piece of transparent square paper, or draw a square grid on transparent paper tracing yourself. To do this, trace the grid from squares of 2 mm x 2 mm inside the 10cm x 10cm square using the example given on the page. Note: if you use smaller unit squares on the grid, your land area estimate will be more accurate; But the minimum size you have to use is 1mm x 1mm and 1 mm2. 2. Place this transparent grid over the drawing area you need to measure and attach it to the picture securely with your thumbs or tape. If the grid is smaller than this area, start at one end of the drawing. Clear the outline of the grid, then move on to the next section and continue this way throughout the area. 3. Calculate the number of full squares included in the area that needs to be measured. To avoid mistakes, mark each square that you consider a pencil, making a small point. Note: to the center of the area, you may be able to count large squares made, such as 10 x 10 and 100 small squares. It'll make your job easier. 4. Look at the squares on the edge of the picture. If the drawing is more than half a square, count and mark it as a full square. Ignore everything else. Half or more squares 5. Add these two amounts (steps 3 and 4) to get the total T full squares. 6. Add the amounts again at least once to check them. Using the drawing distance scale, calculate the equivalent unit area for your grid. This is the equivalent area of one of its small squares. Example Scale 1:2000 or 1 cm - 20 m or 1 mm - 2 m. The size of the grid is 2 mm x 2 mm Equivalent unit of mesh area - 4 m x 4 m - 16 m2 8. Multiply the equivalent unit area by the total T full square to get a fairly good estimate of the measured area. Example Total T 256 Total Unit Area - 16 m2 Total Area - x 16 m2 and 4096 m2 Note: When working with large-scale plans such as cross-sections, you can improve accuracy score by changing step 5, above. To do this, look at all the squares on the edge of the picture that intersect the drawing line. Then look like a decimal part of the entire square that needs to be included in the total (the decimal part is a part of the square, expressed as decimal, for example, 0.5, 0.1 and 0.9). Example of Square A - 0.5; B 0,1; C 0,9. 10.4 How to subssse the area into the usual geometric shapes 1. When you need to measure areas directly in the field, divide a piece of land into ordinary geometric shapes such as triangles, rectangles or trapeze. Then take all the necessary measurements and calculate the areas by mathematical formulas (see annex 1). If a plan or map area is available, you can draw these geometric shapes on it, and find their dimensions using the scale of the cut. 2. In the first guide to this series Water for Freshwater Fish Culture, FAO Training Series (4), Section 2.0, you learned how to calculate the area of the pond using this method. In the next stages, you'll learn how to apply it in more challenging environments. 3. You can easily calculate the area of any triangle when you know the dimensions: all three sides a, b and c Area s (s - a) (s - b) (s - c), where s (a b) ÷ 2; Example If 35 m; b No 29 m; And from 45.5 m. Then from (35 m and 29 m and 45.5 m) ÷ 2 - 54.75 m Area 2 - 54.75 m (54.75 m - 35 m) 5 4.75 m x 19.75 m x 25.75 m x 9.25 m and 257,555 m4 Area - 257,555 m4) - 507 m2 on both sides (b, c) and the BAC angle between them (the so-called included angle) receiving the BAC sin from table 14. Example If b 29 m; From 45.5 m; and the corner of BAC 50. Then sin BAC No. 0.7660 (Table 14) Area (29 m x 45.5 m x 0.7660) ÷ 2 1,010,737 ÷ 2 505.3685 m2 TABLE 14 Sinus Values Angles 4. Subsried a piece of land into triangles. For a four-way area, you can do this in two ways. You can join two opposite corners with a straight BD line. Measure the length of the BD to find the length of the three sides of each of the two triangles, and then calculate their area (see step 3, above). The sum of the two triangular areas is the total area. You can continue by radiating from Central Station 0. Measure the consecutive angles of AOB, BOC, COD and DOA. Then measure the distances of OA, OB, OC and OD from 0 to each corner of the site and calculate the area of each triangle (see step 3, above). The sum of the four triangular areas is the total area. Two triangles 5. On a land with more than four sides, you can turn its area into triangles: radiating from central station 0 (see step 4, above); or by radiating from a side station such as A. Radiation from the central radiation station from the central station Radiation from the side station 6. Check If you find an area using two opposite angles, use the first procedure. If you continue to radiate, use a second one. Repeat measuring the total area with the other two ABC and ACD triangles formed by the AC straight line. Also, repeat the measurements of angles and lengths from either the same station or the other. 7. When the shape of the land is polygonal, it is usually necessary to subline the total area to be measured by a series of ordinary geometric shapes (1-7 in example) from the common baseline AD. 8. When choosing a baseline, remember that it should be easily accessible along its entire length; Provide good sights for most of the tops of the landfill; Be lined along the longest side of the land to keep the offset as short as possible; join the two peaks of the test site. Area No (base height x) ÷ 2 9. Calculate the area of each triangle with a right angle using the formula: Area (base height x) ÷ 2 10. Calculate the area of each trapeze using the formula: Square x (base 1 - base 2) ÷ 2, where: Base 1 parallel base 2; Height is a perpendicular distance from base 1 to base 2. Area - Height x (base 1 - base 2) ÷ 2 11. Mix all these partial areas to find the total area of land. You should use the table to enter the all basic measurements for both the right triangles (one base) and the trapezoids (two bases), as shown by the example. Example Along the base line of AD, a measure from point A of cumulative distances to points H, I, J, K, K, L and D, as follows: Baseline (in m) From these measurements, get partial distances for each section AH, HI, IJ, JK, KL and LD as follows: Baseline (in m) Measure compensates HG, IB, ... LE from the baseline to each top of the test site: HG 11.80 m; LB 5.20 m; ... LE 9.65 m Enter this data in the next table and get partial sections of each lot 1, 2, 3, 4, 5, 6 and 7; the amount is the total area. 1TR - triangle with a right angle; TP trapezoids 12. When the shape of the earth is more complex than the ones you just learned to measure, you will have to use more than one baseline, and subtivise the area into triangles, and trapeze different shapes. Normally there will be an existing straight angle for you to work with, and you will have to calculate the trapezoid area by taking additional measurements that will determine their height along the perpendicular lines. The example of the ABCDEFGHIA Land Tract along the river is divided into five lots 1-5, representing three triangles (1,2,5) and two trapezes (3 with BE parallel CD, and 4 with EI parallel to FH). The land boundary forms a closed landfill, As shown in the video. 13. Calculate the areas of triangles 1, 2 and 5 using the lengths of their three sides and the following formulas: s (a q b) ÷ 2 s-a (s-a) (s-b) (s-c) Example Take measurements of the sides of triangles as needed. Apply the formula area: s-a)(s-b) (s-c) in the following table: 258773.25 340258.66 68305.16 Total Triangle Area 667337.07 14. Calculate the trapezoid areas 3 and 4, determining their height and base length, and using the following formula: area and height x (base 1 and base 2) ÷ 2 Example Measure the heights and bases of trapezoids, as needed. Apply the formula in the following table: Total trapezoid area 787400 15. Add the total area of triangles (step 12) to the total trapezoid area (step 14) to obtain the total area of the land. Example Total area of triangles - 667337 m2 Total area of trapezoids - 787,400 m2 Total land area - 1454 737 m2 or 145.47 hectares 16. Another way to make calculations easier is to measure according to the plan the height of each triangle along perpendicularly lined from one corner of the summit to the opposite side (the so-called base). Then, to calculate each area of the triangle as: the area (height x base) ÷ 2 enter all the data in one table as explained in step 11, above. Example From the plan, measure the heights of BJ, BK and LG for triangles 1.2 and 5, respectively. Enter all the data in the following table: 1 600 860 - 430 258000 2 810 840 - 420 340200 3 560 980 600 790 2400 2400 2400 2400 2400 2 4 460 840 660 750 345000 5 206 660 - 330 67980 Total land area 1453580 Total land area is 145.36 hectares, which is slightly different from the previous estimate (see. Step 15). This was caused by scaling errors in measurements from the plan, which in this case are small enough (0.11 hectares or 0.07 percent) to be valid. 1. In Volume 4 of this series, Water for Freshwater Fish Culture (see section 2.0), you learned how to calculate the area of the pond that has one curved side. A similar procedure can be used to determine the area of land limited by the normal curve in an attempt to balance partial plots. 2. If part of the land is limited on one side of an irregular curve, such as a road or a river, you can find its area using a trapezoidal rule, as explained in this section. 3. Set a straight AB line of the side of the land and works as close as possible to the curved border. To identify the irregular ABCDA area, continue as follows. 4. Measure the ab distance and substrate it at several regular intervals, each, for example, 22.5 m. Separate each of the intervals on AB with a range of poles. Note: The shorter these intervals, the more accurate the area will be. 5. In of these marked points, set the perpendicular line of AB's accession to the curved boundary. Measure each of these shifts. 6. Calculate the ABCDA area using the following formula: Area x -- interval x (ho th 2hi) ÷ 2, where: ho is the length of the first bias, AD; hn is the length of the last offset, BC; and hello is the sum length of all intermediate offsets. Example Interval 112.5 m ÷ 5 x 22.5 m-ho - 20m and x 10m hello - 27m, 6m - 14m, 32m - 79m ABCDA Area - 22.5m x (20m) 10m and 158m) ÷ 2m (22.5m x 188m) ÷ 2m and 2115m2 Note: remember you should still calculate the area AXYBA and add it to the ABCDA area in the ABCDA 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and add it to the ABCDA area in the ABCDA 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and add it to the ABCDA area in the ABCDA area 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and add it to the ABCDA area in the ABCDA area 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and add it to the ABCDA area in the ABCDA area 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and add it to the ABCDA area in the ABCDA area 2 and 2115 m2 Note: remember that you still have to calculate the area AXYBA and to get the total area of DAXYBCD. 7. If you can lay out the AB line so that it relates to both ends of the curved border, your calculations will be much easier. In this case, ho and HN are both zero, and the formula becomes: where hi the sum length of all intermediate offsets. Example Interval 158m ÷ 6 and 26.3m hi 25m 6.3m x 101m and 2,656.3m2 Note: remember that you still have to calculate the area of the AXYBA and add it to the curved section area to get the total area. land surveyor formulas pdf. land surveyor calculation formulas