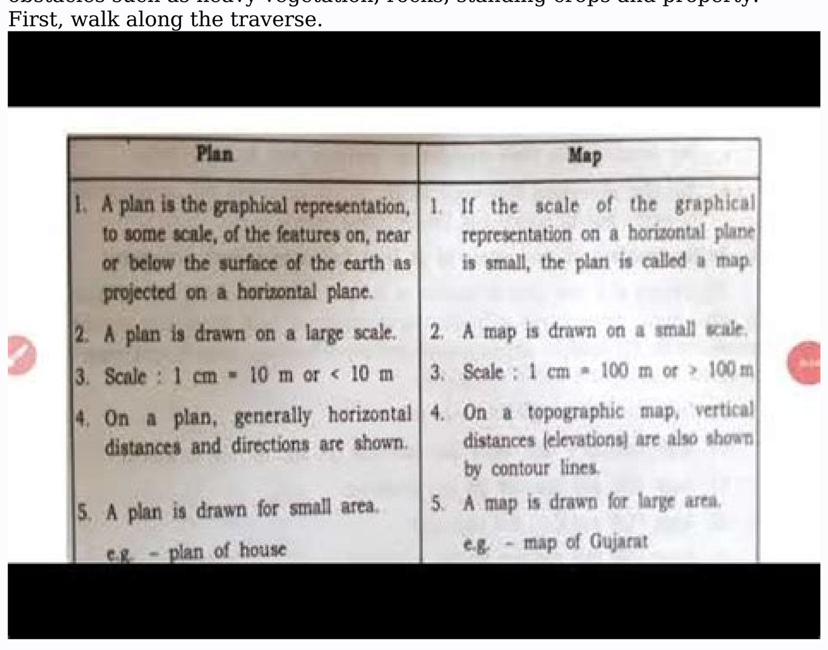
Difference between map and plan in surveying

What is the main difference between a map and a plan. What is map and plan in surveying.

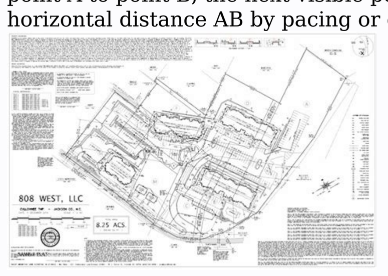
1. A survey of your fish culture site can help you do one of two things: make a map to help you plan your work; or lay out marks on the ground that will guide you as you work. Site 2. Topographical surveys will help you to make plans or maps of an area that show: the main physical features on the ground, such as rivers, lakes, reservoirs, roads, forests or large rocks; or the various features of the fish-farm, such as ponds, dams, dikes, drainage ditches or sources of water; the difference in height between land forms, such as valleys, plains, hills or slopes; or the difference in height between the features of the fish-farm. These differences are called the vertical relief. Map Vertical profile 3. The purpose of the first type of topographical survey is to establish, on a horizontal plane, the position of one or more points in relation to the position of one or more other points. To do this, you will measure horizontal distances and horizontal angles or directions. You will use a method called plan surveying, which will be explained in this chapter. Site 4. The purpose of the second type of topographical survey is to find the elevation (or vertical height) of one or more points above a definite horizontal plane. To do this, you will measure horizontal distances and height differences; you may also need to lay out contour lines. You will use a method called direct levelling, which will be explained in Chapter 8.
Map 5.

You will learn how to make plans and maps based on the results of plan surveying and direct levelling in Chapter 9. Contour map 6.
When you plan a topographical study, the most important rule to remember is that you must work from the whole to the part, keeping in mind all of the work you will need to do as you begin the first steps. Different types of survey require different levels of accuracy, but you should lay down the first points of each survey as accurately as possible. You will adjust all the work you do later to agree with these first points. Primary points Example You need to plan survey a fish-farm site. (a) First, you must make a perimeter survey ABCDEA. Besides these summits and boundaries, add several major points and lines, such as AJ and EO. They run across the interior to create right angles, which will help you in your calculations. This survey gives the primary survey points, which you should determine and plot very accurately. (b) Then, lay out minor lines such as FP and TN. They go between the major lines to divide the area intoblocks. This gives you the secondary survey points, which you may determine less accurately. (c) Finally, survey details in each block using tertiary points, for which less accuracy is also acceptable. Secondary points 7. The way you plan a topographical survey will also depend on its purpose.
You will use a planning method similar to the one described for soil surveys (see Volume 6, Soil, Section 2.4). First make a preliminary or reconnaissance survey. You can use quick methods without worrying too much about high accuracy. Based on the results of this survey you can plan and carry out more detailed and accurate surveys, such as location surveys and, last of all, construction surveys. 8. The way you plan a topographical survey will depend on the subject you need to survey, such as: a straight line defined by at least two points, such as the centre-lines of supply canals, pond dikes, and reservoir dams; a series of lines related to each other by horizontal angles and horizontal distances, such as the centre-lines of pond dikes in a fish-farm; an area of land such as a site chosen for the construction of a fish-farm (also see step 6 above) Centre-line of a dike Adjacent pond dikes Pond area 9. In open country, you will have no problems in plan surveying with the methods explained in the next sections. Any of the following methods should work well. In country with thick forests, however, you will not be able to use methods for which you need to see several points at the same time. In such areas, you will also need to rely on existing paths and roads much more than usual, and you might even need to clear lines of sight through the vegetation. Clearing land for a survey 10. There are four main methods used in plan surveying. You can fix the position of a point on the horizontal plane: from a single known point, by traversing, a method in which you measure horizontal distances and azimuths along a zigzag line (see Section 7.1); from a single known point, by radiation, a method in which you measure horizontal distances and azimuths, or horizontal angles (see Section 7.2); from a known line, by offset, a method in which you measure horizontal distances and set out perpendiculars (see Section 7.3); from two known points, by triangulation and/or intersection, methods in which you measure horizontal distances and azimuths, or horizontal angles (see Section 7.4). Open traverse Each of these methods will be explained in the next sections. When you are choosing a method, you will also need to consider which methods are suited to the measuring devices you have available. Table 9 will help you select the most suitable plan surveying method, considering your equipment and abilities, the kind of information you need from your survey and the type of terrain you are surveying. Radiation survey TABLE 9 Plan surveying methods Section 7.1 Traverse sections and stations Flat or wooded terrain Longitudinal or cross-section profiles Compass traverse, rapid reconnaissance and details Traverse sections may be of equal lengths, longer than 25 m and are best at 40 to 100 m Careful checks for errors needed 7.2 Radiating, central and lateral stations Small land areas For location of points only All points should be visible and at angles greater than 15ï¿½ 7.3 Details surveys next to a chaining line Chaining line should not be more than 35 m away 7.4 Very large land areas Hilly or open terrains Inaccessible locations Often combined with traversing and needing elaborate preliminary reconnaissance Best with angles of about 60ï¿½ 7.5 Plane-tabling, traversing, radiating, triangulation Reconnaissance and details surveys Open terrain and good weather Irregular lines and areas Mapping is done in the field Rapid method after practice 1. A traverse line or traverse is a series of straight lines connecting traverse stations, which are established points along the route of a survey. A traverse follows a zigzag course, which means it changes direction at each traverse station. 2. Traversing is a very common surveying method in which traverses are run for plan surveying. It is particularly suitable to use in flat or wooded terrain. Closed traverse 3. There are two kinds of traverses: if the traverse forms a closed figure, such as the boundary of a fish-farm site, it is called a closed traverse; if the traverse forms a line with a beginning and an end, such as the centre-line of a water-supply canal, it is called an open traverse. Open traverse 10. When selecting the route a traverse will follow, you should try to: make each straight section of the traverse as long as possible (40-100 m); make the traverse sections as equal in length as possible; avoid very short traverse sections - under 25 m long; choose lines which can be measured easily; choose lines along routes which avoid obstacles such as heavy vegetation, rocks, standing crops and property. 11. You need to survey traverse AF for a future water supply canal.
First, walk along the traverse.

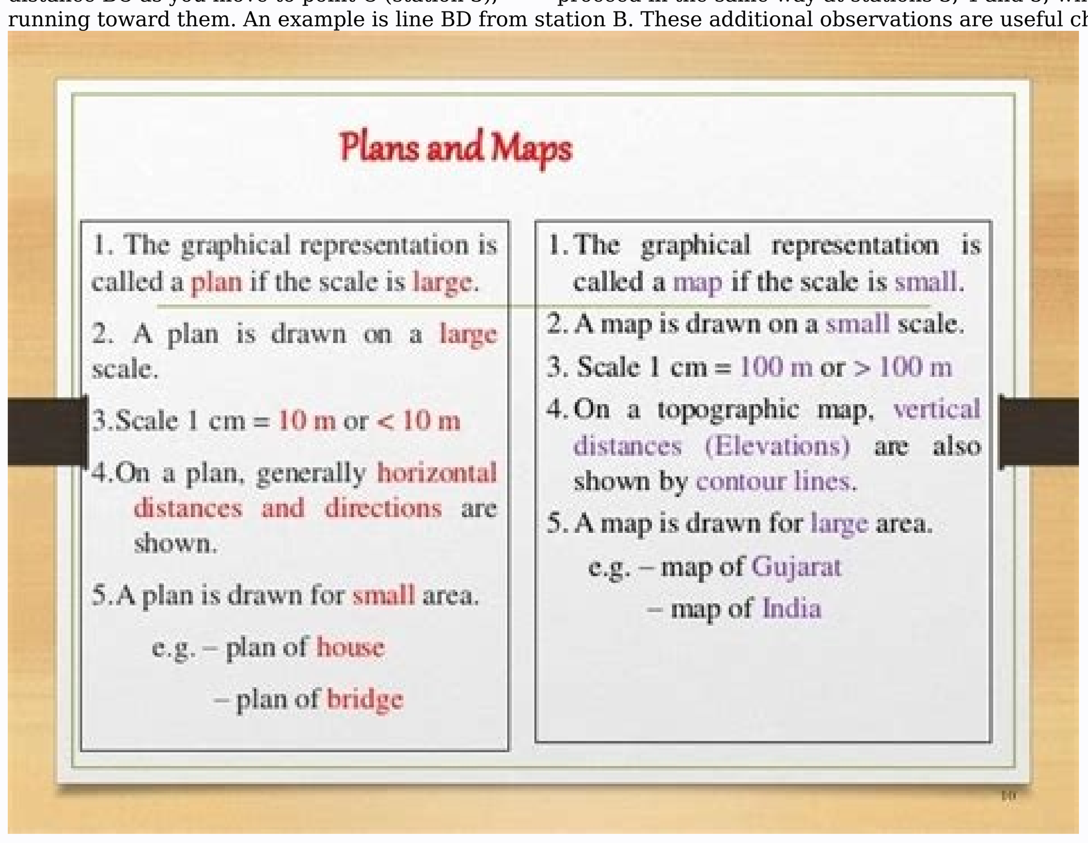


Plan	Map
1. A plan is the graphical representation, to some scale, of the features on, near or below the surface of the earth as projected on a horizontal plane.	1. If the scale of the graphical representation on a horizontal plane is small, the plan is called a map.
2. A plan is drawn on a large scale.	2. A map is drawn on a small scale.
3. Scale : 1 cm = 10 m or < 10 m	3. Scale : 1 cm = 100 m or > 100 m
4. On a plan, generally horizontal distances and directions are shown.	4. On a topographic map, vertical distances (elevations) are also shown by contour lines.
5. A plan is drawn for small area. e.g. – plan of house	5. A map is drawn for large area. e.g. – map of Gujarat

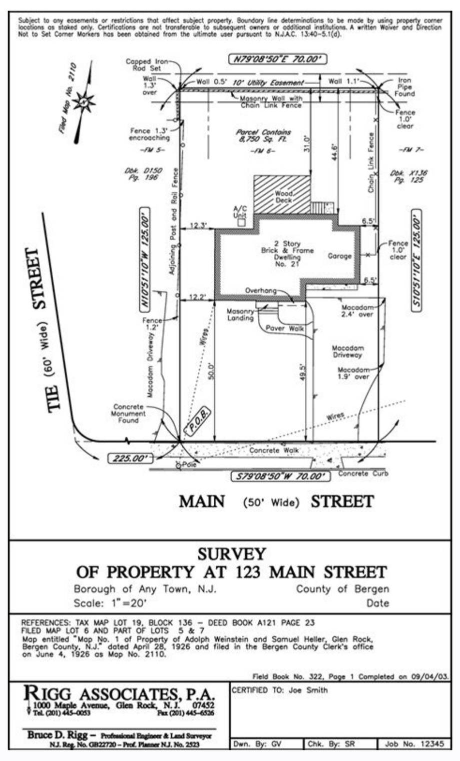
Mark its course by placing high stakes about every 50 m. If necessary, place additional stakes at important traverse stations, such as where the traverse changes direction, where hills or other changes in elevation reduce visibility between traverse stations, or where there are particular landscape features such as a road, a river, or rocks. Mark the main points 12. If necessary, clear any tall vegetation from the path of the traverse, so that you will be able to see each marked point from the one before it. Clear the path and mark details 13. Start traversing at the first point A. Remove the ranging pole and stand at point A. With the magnetic compass, measure the azimuth* of the line joining point A to point B, the next visible point. Point A becomes station 1. The direction you measure from there to point B, or station 2, is called a foresight* (FS) because you are measuring forward. Note down this value in a table (see step 17). FS=AB 14. Replace the ranging pole at station 1 (point A) and move to station 2, while measuring the horizontal distance AB by pacing or chaining. Note this distance down in the table (see step 17). Distance AB 15. At station 2 (point B), remove the ranging pole and stand over the point holding the compass.



Look back at station 1 and measure the azimuth of line BA, which is called a backsight (BS). Then look forward at the next point C, or station 3, and measure the azimuth of line BC, a foresight (FS). Measure distance BC while moving forward along the traverse. Note these values down in the table (see step 17). BS = BA Note: the difference between the foresight and backsight should be 180ï¿½. A difference of only 1 or 2 degrees between the FS and BS is acceptable and may be corrected later (see step 19). If the error is greater, you should make the measurement again before moving on to the next station. FS = BC 16. Repeat this procedure, measuring horizontal distances from station to station and measuring two azimuths (a BS and a FS) for each point. However, from the last station at the end of an open traverse, you will only have a BS measurement, just as you had only an FS from station 1. Note: if the land slopes and you need to use a more accurate method, you can use a special method to measure or calculate horizontal distances (see Sections 2.6 and 4.0). Distance BC 17.
You should carefully note down all the measurements you have made in a field book. You can use a table like the one shown in the example or you can make a rough sketch of the open traverse on square-ruled millimetric paper, noting down your measurements next to the correct stations in it. Example Measurements observed for the beginning of compass traverse AX made of 12 stations: Stations Distance (m) Azimuths (degrees) Calculated difference FS/BS (degrees) From To Individual Cumulative FS BS 1 2 53.6 53.6 82 261 179 2 3 47.3 100.9 120 301 181 3 4 65.2 166.1 66 248 182 4 5 56.8 222.9 51 229 178 5 6 61.1 284.0 91 270 179 ... ... 18. You must always check on such a compass traverse, particularly if you do not know the exact position of its starting and ending stations beforehand from studying previous surveys or existing maps. To check on your compass traverse, do the following: Observed traverse AX if the starting and ending traverse stations A and X are unknown, check on your first traverse by making a second compass traverse in the opposite direction, from X to A; Observed traverse XA if these two stations A and X are known, draw the traverse on paper as you have measured it. To do this, use a protractor for the angles (see Section 3.3) and an adequate scale for distances (see Section 9.1). Using the known station A, compare the position of the last station X with its known position X'. If this comparison shows a large error (the closing error XX'), you will need to adjust the observed traverse AX. To do this, see the next step. Observed traverse AX 19. To adjust the observed traverse AX for the closing error XX', it is easiest to use the graphic method, as follows: on paper, draw a straight horizontal line AX equalling the total measured length of the observed traverse, drawn at an adequate scale; at X, draw XX' perpendicular to AX and in proportion, in length to the closing error, using the same scale as above; join A to X' with a straight line; on AX, find lengths AB, BC, CD, DE, and EX in proportion to the field measurements, using the same scale as above; Find the intermediate points BCD and E at points B, C, D, and E, draw lines BB', CC', DD' and EE' perpendicular to AX; Draw perpendiculars BB', CC', DD' and EE' measure the lengths of lines BB', CC', DD' and EE', which show by how much you need to adjust each traverse station; Measure the perpendiculars adjust your drawing of the traverse by: joining the observed position X of the last traverse station to its known position X'; Draw XX' drawing short lines parallel to XX' through stations B, C, D and E; Draw the other segments parallel to XX' marking on these lines the calculated adjustments BB', CC', DD' and EE', using the same scale as above; Measure the distance BB', CC', DD' and EE' joining points A, B', C', D', E' and X' to find the adjusted traverse. Join the points of the adjusted traverse 20. You can lay out a closed traverse ABCDEA in exactly the same way as an open traverse, except that you will connect the last point to the initial point A. 21. To survey an irregular enclosed area of land ABCDEA (such as a site for a fish-farm) by compass traversing, proceed as follows: walk over the area and locate traverse stations A, B, C, D and E; mark them with ranging poles or stakes; if necessary, clear away any vegetation so that you can see stations A and B, B and C, C and D, etc. from each other; remove the ranging pole from point A (station 1) and stand at this station. Find azimuth AB- a foresight- from the centre of this station with the compass. Replace the ranging pole exactly at station 1; measure distance AB with a measuring line; at point B (station 2), measure azimuth BA - a backsight and azimuth BC - a foresight; measure distance BC as you move to point C (station 3); proceed in the same way at stations 3, 4 and 5; when you reach point A again (station 1), measure azimuth AE - a backsight. Note: during the traverse, you may be able to see one or more additional stations from the station where you are standing. If you do, measure the azimuths of the lines running toward them. An example is line BD from station B. These additional observations are useful checks on your work. 22.



In a field book, carefully note down all your measurements. You can use a table similar to the one suggested for the open traverse (see step 17). You should also make a sketch of the traverse, on a separate square-ruled page, and write in the measurements. At the same time, check to see that the foresights and backsights differ by 180ï¿½. Example You have surveyed site ABCDEA with a closed traverse and your field notes are as follows: Stations Distance (m) Azimuths (degrees) Calculated difference FS/BS (degrees) From To FS BS 1 2 90.8 136 315 179 2 3 53.5 78 259 179 3 4 68.7 347 168 179 4 5 44.6 292 110 182 5 1 63.7 241 63 178 23. You have learned that in any closed polygon* of N sides, the sum of all the interior angles should be equal to (N - 2) x 180ï¿½ (see Section 3.0). This rule will help you to check your azimuth measurements after you calculate the interior angle for each station (see Section 3.2, steps 10 and 11). Example Using the observations given in the previous example, calculate the sum of the interior angles of polygon ABCDEA as follows: Station Azimuth differences (degrees) Interior angle (degrees) 1 AB -AE = 136- 63 73 2 (BA - BC = 315 - 78 = 237) 1231 3 CD - CB = 347 - 259 88 4 DE - DC = 292 - 168 124 5 EA - ED = 241 - 110 131 Sum of interior angles 539 1 Since the magnetic north falls inside the angle, you must calculate it as 360ï¿½ - (the azimuth difference) or 360ï¿½ - 237ï¿½ = 123ï¿½, According to the general rule, the sum of the five interior angles should be equal to (5-2) x 180ï¿½ = 3 x 180ï¿½ = 540ï¿½, which closely agrees with the above result. Check: Sum of angles = (5 - 2) x 180ï¿½ = 540ï¿½ 24.



Starting from station 1 (A), draw the observations of your compass traverse on square-ruled paper. Use a protractor to measure the azimuths (see Section 3.3), and an adequate scale for the measured distances (see Section 9.1). If there is a closing error, adjust your drawing by using the graphic method described for an open traverse (see step 19, above). Example For the above example, the closing error is FA. Adjust it as follows: using the correct scale, draw a horizontal line AF whose length equals the total measured length of the observed traverse; Draw AF to scale at F, draw FA' perpendicular to AF, using the same scale as above. The length of FA' should be in proportion to the closing error; Draw FA' perpendicular to AF join A to A' with a straight line; Draw AA' on AF, draw lengths AB, BC, CD, DE and EF in proportion to the field measurements, using the same scale as above; Find points BCD and E at points B, C, D, and E draw lines BB', CC', DD' and EE', which show how much you must adjust each traverse station; Draw and measure the perpendiculars adjust your drawing of the traverse by: joining the observed position F of the last station to its known position A; Draw FA drawing short lines parallel to FA through the other stations B, C, D, and E; Draw the other segments parallel to FA marking on these lines the calculated adjustments BB', CC', DD' and EE', using the same scale as above; Measure the appropriate lengths joining points A, B', C', D', E' and A to determine the adjusted traverse. Join the points of the adjusted traverse 1. When you plan a survey by radiation, you will choose one convenient observation station, from which you will be able to see all the points you need to locate. This method is excellent for surveying small areas, where you need to locate only points for mapping. 2. When you make a radiating survey of a polygonal* site, you connect the observation station to all the summits of this area by a radiating series of sighting lines. In this way, a number of triangles are formed. You will measure one horizontal angle and the length of two sides for each triangle. Choosing the observation station 3. You should be able to reach the observation station easily. This station should also be a located so that: you can see all the summits of the area you need to survey; you can measure the lines joining it to these summits; you can measure the angles formed by these lines. 4. When choosing the observation station, you should be particularly careful to avoid any points from which very small radiating angles (less than 15 degrees) might result. 5. The observation station 0 can be in a central position, inside the polygon to be surveyed. In this case, you will measure as many triangles as there are sides of the polygon. Number of triangles = number of polygon sides N = 5 6. The observation station 0 can also be in a lateral position (off to the side). In this case, 0 will be one of the summits of the polygon*. The number of triangles you need to measure will be the number of sides to the polygon, minus 2. Number of triangles = number of sides minus 2 N = 5 - 2 = 3 10. Walk over the area you need to survey and choose a convenient central observation station 0. Clearly mark all summits of the polygon.
Clear any high vegetation along the future radiating lines of sight. 11. With your magnetic compass, take a position over the central station 0. Measure the azimuths of the six radiating lines OA, OB, OC, OD, OE and OF.
12. Measure the horizontal distance over each of these lines. 13. Carefully note down all these measurements in your field-book. You can use the first three columns of the table given in the example. Then make a sketch of the area, with the lines and angles and their measurements, on square-ruled paper. 14. Calculate the value of the angles between successive points (see 4th column of the table and Section 3.2).
Check this by adding all the values: if you find 360ï¿½ or a figure close to that, the calculation is correct. Example Table for field observations from a radiating survey. Angles (degrees) Sum of the interior angles: 1Since magnetic north falls inside angle AOB, it is calculated as 360ï¿½ minus the difference of the azimuths.
1. In plan surveying, an offset is a straight line which is laid out perpendicularly to a line you are chaining. 2. Offsets are mainly used to survey details of the terrain (such as wells, rocks or trees) which are located close to a chaining line. Generally, offsets are less than 35 m long. 3. While chaining line AB, you see two points of interest on either side of it, X and Y, whose exact positions you want to record. 4. From these points, drop XC and YD perpendicular to line AB (see Section 3.6). Lines XC and YD are offsets. Drop perpendiculars from the points of interest 5. Measure horizontal distances AC and CD on line AB. Measure horizontal distances CX and DY along the offsets. 6. From these measurements you can plot the exact positions of points X and Y on paper, if line AB is known. Measure the distance to plot the points 1. If you use the triangulation method, you will form consecutive triangles, starting from two known points which you can see from each other. The straight line joining these two points is called the base line. Example A and B are two points whose positions you know.
Therefore, you can easily survey the baseline AB to find the measurements of the horizontal distance and magnetic azimuth. AB is 123 m long and azimuth AB = 150ï¿½. 2. To determine the position of a new point C by triangulation, this new point is joined to the known base line by two new lines, forming a triangle.
You can then find the position of the new point: either by measuring the distances of the lines running from the base line to the point; or by measuring the azimuths of the two new straight lines running from the points A and B to point C. Measure distances AC and BC or... Example It you need to determine the position of C, lay out lines AC and BC from base line AB. Then you can: either measure horizontal distances AC = 166 m and BC = 156 m to find intersection point C; or measure Az AC = 87ï¿½ and Az BC = 43ï¿½ to find C at the intersection point of two lines drawn with these azimuths. ... measure the azimuths of lines AC and BC 3. To find the positions of other new points, use the same procedure. As you find the positions of new points, use the most convenient existing line as the new base line and form new triangles as you work. Use BC as the base line for new triangle BCD Example If you need to determine the position of D, layout triangle BCD and use BC as the base line.
Similarly, to determine points E, F and G, use base lines CD, DE and EF successively. Continue making triangles until you have surveyed the whole site 4. On terrain with many obstacles such as hills, marshes or high vegetation, where traversing would be difficult (see Section 7.1), you can use the triangulation method successfully. 5. When you are traversing, and cannot measure a line directly, you can use the triangulation method instead. 6. Triangulation makes locating points on opposite sides of a stream or a lake very easy. A good site for a triangulation survey 7. The simplest way to use the triangulation method in the field is with a plane-table(see Section 7.5). You will learn how to survey by triangulation, using a plane-table, in Section 9.2. 8. When using the triangulation method, avoid very large angles (over 165ï¿½) and very small angles (under 15ï¿½). The method works best with angles of about 60ï¿½. A plane-table is useful in triangulation 1. A plane-table is a horizontal drawing-board mounted on top of a vertical support. You use it with a sighting device, a spirit level and a magnetic compass. Simple plane-table 2. You can make a very simple plane-table for reconnaissance surveys from a wooden board and a strong pole. 3. Get a 50 x 60 cm board of soft wood, about 2 cm thick. With sandpaper, polish one of its surfaces well until it is very smooth. Draw two diagonal lines lightly across this surface to find the centre of the board.
4.
Get a straight wooden pole about 5 cm in diameter and 1 m long. Shape one end into a point. This will be firmly driven into the ground at the observation point when you use the plane-table.
5. Preferably using a brass screw, fix the board, smooth side up, by its centre-point to the top of the pole. 6. You can make a simple sighting device from an ordinary ruler about 50 cm long by driving two thin nails vertically into it along the centre-line for sighting. Make a sighting device 7. You will also need a simple magnetic compass to use with the plane-table. If you have a spirit level, use it to set up the top board horizontally. Or simply lay a rounded object such as a small ball, a glass marble or a pencil on the board's top surface.
When the object remains still, the board is horizontal. Make sure the board is horizontal 8.
To survey more precisely, you will need a more complicated plane-table than the one just described. This plane-table will be mounted on a tripod (a three-legged support) so that: you can alter the spread of the tripod's legs to adjust to rough terrain, you can accurately place the drawing board in a horizontal position; you can easily orient and rotate the drawing board. 9. You can build a tripod with legs made out of single pieces of wood, or with adjustable legs. A tripod with adjustable legs is more difficult to make, but it is better since you can set up the plane-table more easily on sloping ground by changing the length of the legs.
An improved plane-table 10. A plane-table with a normal tripod is adequate for surveying horizontal areas and areas with small slope gradients, which you must often survey in aquaculture. To make this type of plane-table, you will need the following materials1: one board of soft wood, about 40 x 55 cm and 2 cm thick three pieces of wood, about 2.5 x 4.5 cm, and 1.4 m long; three blocks of wood, about 2.5 x 4.5 cm, and 7 cm long; two circular pieces of wood, 15 cm in diameter and 2.5 cm thick; several nails or wood screws, both 3.5 to 4 cm long and 6 to 6.5 cm long; four bolts, 6 mm in diameter and about 6 cm long; four washers and four wing nuts for the bolts. 1Adapted from Using Water Resources, Maryland, USA, VITA Publications, 1977, pp. 137-140. 11. Get a piece of 40 x 55 cm plywood 2 cm thick to use for the drawing board. If the plywood you have is thinner than 2 cm, make two battens (wooden supports) from two pieces of wood 30 x 8 cm and 2 cm thick. Attach these battens parallel to the 40 cm sides of your board, a few centimetres in from each side. The wood you use for the board should be soft enough to allow drawing pins and ordinary pins to go in easily. You should smooth the top of the board with sandpaper if the surface is irregular.
If the board is thin, strengthen it with battens Sand the surface smooth 12. Make the three legs from the 1.4 m pieces of wood. Shape each into a point at one end. On the other end- face of each leg, mark a centre-line parallel to the 2.5 cm sides. Continue this line 5 cm down either side of the leg. At these two points, mark a centred perpendicular line 2.5 cm long; connect the end-points of this 2.5 cm line up the sides of the leg and over the top. Cut out this block you have marked, which will measure 2.5 x 2.5 x 5 cm, and discard it. Round off the edges of the two remaining "prongs" of wood which face toward the 2.5 cm side of the leg, using a knife and sandpaper, for example. 13. On these prongs, drill a 6 mm hole at a point 1.3 cm from the top of the leg. Cut out the blocks Shape the ends into points Round the tops and drill two holes 14.
Make the rotating connection between the drawing board and the legs with the two circular pieces and the three small blocks of wood. Drill a 6 mm hole in the centre of one of the 15 cm wooden circles. Put a 6 mm bolt through the hole making sure the head of the bolt is even with the top surface of the circle. Put the bolt through the centre of the disc 15. Find the centre of the lower surface of the drawing board by drawing two diagonals across it from opposite corners. Hold the wooden circle on this side of the board, with the head of the bolt touching the centre mark. Nail or screw the wooden circle in place. Nail the disc to the board so that the bolt sticks up 16. Take the second 15 cm circle and mark the points where you will attach the legs. To do this, first draw two perpendicular lines across the circle. They should intersect at the exact centre of the circle. Call them diameters a and b. With a protractor, using line b as the 0 to 180ï¿½ line, draw two more lines from the centre of the circle to the edge at 45ï¿½ and 135ï¿½. Call them radiuses c and d. They should divide one half of the circle into four equal, wedge-shaped sections. Then drill a 6 mm hole in the centre of the circle. 17. Drill a 6 mm hole on the centre line of the 4.5 x 7 cm face of each 7 cm wooden block, 1.3 cm in from one end. Nail or screw these three 7 cm wooden blocks to the surface of the second wooden circle, so that they join around the centre-hole in a Y-shape. To do this, align the centre-lines of the blocks' 2.5 x 7 cm faces over the lines a, c and d that you drew in step 16. The ends with the holes should be towards the edge of the circle. Drill a hole in each block Attach the blocks to the disc, following the lines you have drawn 18. Place this wooden circle, with the blocks facing you, against the circle already fixed to the underside of the board.
Pass the bolt in the first circle through the centre-hole of the second circle. Add a washer and a wing nut to it and tighten them securely. Mount the disc on the board 19. Align the holes in the three legs with the holes in the three blocks of wood on the underside of the board, and attach the legs with bolts, washers and wing nuts to the blocks. Your plane-table is now ready to use. 20. You will also need a small spirit level, a magnetic compass, a sighting device called an alidade. You have already learned a one kind of alidade (see Section 3.1), but this one will be slightly different.
21.
With the plane-table described above, you should use an alidade about 40 cm long. Get a straight strip of wood 40 cm long, 5 cm wide and 0.5 to 1 cm thick. Find the centre-line, then measure 5 cm from each end and draw a line from the edge of the alidade to the centre-line. Cut out the section you have marked off. 22. Get a clean, empty metal tin and remove its top and bottom. Cut this tube vertically and flatten it out to make a sheet of metal. 23. From this sheet, cut out two pieces 5 cm x 12 cm each. Mark the centre-line lightly on each, using a nail to scratch the line. 24. On one of these pieces, cut an 8 cm slit along the center line, starting about 1 cm in from the 5 cm edge. 25. On the second piece, cut out a 3 cm x 8 cm window, as shown in the drawing. 26 . On the piece with the window, make a small hole at each end of the window "frame", along the centre-line. Thread a thin line (such as wire or nylon fishing line) through these two holes and knot the ends at the back. This line should now exactly follow the centre-line of the window. 27. On each metal piece, use a nail to draw a fairly deep line perpendicular to the centre-line, at a point 2 cm from the end without a slit or window. Then make three small holes parallel to this line and between the line and the end of the piece, using a hammer and nail. Sharply bend this end of the metal along the deep line, until it forms a right angle with the rest of the piece. 28. Attach the metal pieces to the ends of the wooden strip you prepared in step 21. Hold them in place with a small screw in each of the holes you have made in the metal. Make sure that: the vertical sides of the metal pieces are at right angles to the straight edge; and the centre-lines of each end piece (marked by the slit and the wire) line up with the centre-line of the wooden strip. You will use the alidade set flat on the plane-table. You will sight through the slit at the wire. You will draw the line along the centre-line of the wooden strip. 29. You can use the plane-table in two different ways, depending on the type of survey you are making: in reconnaissance surveys, to make maps and plans quickly in the field; in later surveys, to fill in details after you have determined the primary points. The plane-table can also be used for measuring horizontal angles. 30. Before you plan survey with the plane-table, you will need to: fix a piece of drawing paper on the top of the board; set the plane-table up over the station point; level the drawing board, or make it horizontal; orient the drawing board to face the line you want to survey. You will learn more about each of these procedures later (see steps 34-47). 31. When you are ready to start surveying with your plane-table, you will then: sight with the alidade at a point you have chosen (a foresight); draw this line of sight on the drawing board with a well-sharpened pencil that has a hard lead; measure the horizontal distance from the station to the point; transfer this distance to the line you have drawn, using an appropriate scale; if necessary, move to another station, and take a backsight along the line you have drawn; repeat the above procedure for all the lines you need to survey,. You will learn more about each of these procedures later (see Chapter 9). 32. Compared with other methods of plan surveying, plane-tabling is better in some ways because: it is the only method with which you can make a plan or map in the field; you need to find fewer points, as you draw the map while you survey; you can plot irregular lines and areas fairly easily and accurately; you can work quickly, once you learn how to use the method; you do not have to measure angles, so that you avoid several possible sources of error; you plot everything in the field, and so avoid missing any features you need to measure; you can easily check on the location of points you have plotted. 33. Several disadvantages to plane-tabling are that: the plane-table and its extra equipment are heavy and fairly awkward to carry; learning how to use the plane-table correctly takes some time; you can only use the method in fairly open country, where you can see most of the points you are surveying; you cannot use the method in bad weather conditions, such as heavy rains or high winds. 34. You should try to find the best quality drawing paper possible to use with the plane-table. Since the paper will be exposed to outdoor conditions, you should prepare it to make it more resistant to changes in the humidity of the air. With a wet cloth, lightly dampen the paper and dry it several times before you use it. This is called seasoning the paper. Note: be careful not to make the paper too wet when you season it. 35. Cut the sheet of drawing paper to a size 20 cm larger than the dimensions of your drawing board. 36. Cut the four corners of the paper off diagonally. To do this, measure 20 cm from each corner along its two sides, and mark the points. Join these points by diagonal lines, and cut along these lines. 37. For the last time, slightly dampen the back of the drawing sheet, then place it over the board. Stretch it well (taking care not to tear it) and secure the edges under the board with drawing pins. This will keep the paper from moving and prevent the wind from getting underneath it. 38. If you plan to work in the field for several days with the same piece of drawing paper, you should protect it by covering it with a sheet of smooth, heavy paper. As you work in the field, you can tear off pieces of this cover sheet to expose the drawing paper as you need it. 39. You should keep the plane-table in a waterproof canvas bag when you carry it in the field. 40. If you decide to start the survey from a selected station, first set up the plane-table over this station. Note: you may need to set up the plane-table so that a point drawn on it is exactly over a corresponding ground point.
You can use a V-shaped metal arm and a plumb-line, which you can easily make yourself.
Otherwise, you can use calipers and a plumb-line. The metal arm or calipers should be placed with one tip touching the point on the plane-table and the other tip on the underside of the table. Hang the plumb-line from the point indicated on the underside of the table, and move the table until the plumb-line is directly over the ground point.
41. Spread the tripod legs well apart, and plant them firmly in the ground. The drawing board should be waist-high, so that you may bend over it without resting against it. 42. Rotate the table top so that the paper is in a position that allows you to draw the whole area you need to survey on it. 43. Choose the scale you will use (see Section 9.1), making sure it will allow you to plot even the most distant point on the paper. You can first walk quickly over the terrain you will survey to check the distances by pacing so you can decide on the right scale to use (see Section 2.2). Level the table-top in both directions 44. Level the board with the spirit level, making it as horizontal as possible. To do this, first place the spirit level along one side of the board, parallel to two legs of the tripod and adjust the table to a horizontal position. Then place the level along the side perpendicular to that pointing toward the third leg of the tripod and adjust again. Repeat this process until the board is horizontal. 45. You can orient the plane-table either by using a magnetic compass or by backsighting. Usually, the board is first oriented roughly by compass, and then more precisely by backsighting. 46. If you use a magnetic compass (see Section 3.2), rotate the compass until the direction of the needle lines up with the direction of south-north, or the 180ï¿½ to 360ï¿½ direction. Draw a line on the drawing paper showing this direction. Draw another line in the same direction on another part of the paper. Mark the north direction on these lines with an arrow and the letter N.
Note: remember to keep away from any materials which could have an effect on the magnetic needle of the compass (see Section 3.2, step 17). 47. If at a surveying station you know the direction of a line which you have already plotted on the board, you can use that line to orient the plane-table by taking a backsight. It is the most precise way of orienting the plane- table and you should use it whenever possible. Example From station A, you have already plotted line ab. Set up the plane-table at station B. Place the centre-line of the alidade along line ba on the board. Rotate the board until the line of sight on the alidade lines up with line BA on the ground.
The table is now oriented. You can proceed to survey and plot new points.
Station B Plane-tabling methods for reconnaissance surveys 48.
During reconnaissance surveys, you can use plane-tabling to quickly map out areas and open traverses. The survey will proceed by one of the methods described earlier in this chapter or a combination of them. This method may be: 49.
When you have finished the reconnaissance survey and accurately mapped the main stations, you can further use plane-tabling to locate details such as rocks, buildings, a well or a group of trees. 50. To do this, set up the plane-table at each of the main stations in turn, and draw sighting lines to each of these features. 51.
You can locate each detail on the drawing board by finding the intersection point of at least three sighting lines. You will not have to take any more measurements. ABCD main stations Example During a reconnaissance survey you have accurately mapped the fish-farm site ABCDA using your plane-table. You want to add the exact positions of a rock outcrop X and a group of buildings Y. Proceed as follows: set up the plane-table over point A, orienting it by backsighting known lines AB and AD; draw lines AX and AY; move the plane-table to point B, orienting by lines BA and BC and draw line BX; move to point C and draw lines CX and CY; move to point D and draw line DY; determine the position of X at the intersection of AX, BX and CX; determine the position of Y at the intersection of CY, DY and AY. Site ABCDA Sight from point A Sight from point B Sight from point C Sight from point D The intersections determine points X and Y 52. You can measure horizontal angles fairly accurately by drawing sighting lines on a plane-table and measuring this angle with a protractor (see Section 3.3). Draw ab Example You need to measure angle BAC formed by straight lines AB and AC, which have been well-marked in the field. Begin by setting up the plane-table at station A. Place the alidade so that it passes through point a, and sight at point B, and draw line ab. Draw ac
With the alidade passing through point a, sight at point C and draw line ac. Measure angle bac with a protractor. Measure bac The map is a topographical representation of many features such as positioning, places, and sectors, whereas the plan is a three-dimensional representation of a region, territory, structure, or building that involves a variety of detailed information.Here are some of the main differences between map and plan to help you understand how both differ: All of the information displayed on maps is visible on-site.The map depicts an examination of the entire area. It is provided information on critical locations.The map offers a wealth of information, it is just highlighting the most essential aspects of the area.A map is a top-down picture of a territory larger than a few structures.The total size of the construction may or may not be shown on a map.It will indicate the structure’s border as well as the surrounding infrastructure such as roads, bridges, sewers, electricity towers/lines, DP points, and so on.A map is involved with the position of certain items and covers a large region.Maps are recorded in municipal offices, but plans are filed as part of the property record at the courts.A plan is a specialized map.It also incorporates illustrations and secret data.A plan is often for a single structure or a group of structures with a maximum of three or four structures.It defines the precise proportions of all necessary information, the position of structural pieces, and any additional legends that the user needs.It delivers comprehensive information in the form of symbols about small areas.Details are provided in the form of symbols in the plan; hence it may display both length and width.A survey plan is placed on the map indicating the improvements proposed for the area and the intended borders of subdivided portions.A map is a visual representation of a geographic region and itmay also be described as a symbolic representation demonstrating links between space components such as objects, regions, and themes whereas a plan is a collection of two-dimensional diagrams or drawings that are used to describe a location or an item or to transmit building or manufacturing instructions.Let’s discuss the difference between a map and a plan:MapPlanThe plan is termed a map if the size of the graphical depiction on a horizontal plane is modest.A plan is a graphical representation of characteristics on, behind, or beneath the earth’s surface placed on a horizontal plane.A map on a tiny scale is generated.A large-scale plan is created.Scale: 1 cm Equals 100 m or more.Scale: 1 centimetre Equals 10 m or 10 m.Contour lines on a topographic map also represent vertical distances (altitudes).Unlike Map, Horizontal lengths and directions are frequently shown on a plan.A wide-area map is created.A plan for a tiny region is created.For example, Area Map.For example, a home plan or a bridge layout.Also read: Contour Interval | Reconnaissance Survey | Levelling | Chain Surveying | Plane Table SurveyingAfter reading this article you learned a lot about the differences between a map and a plan.A map and a plan are used to examine the location of a proposed project and to evaluate the positive or negative influence on the project.Similarly, a map will be a valuable source for geographically determining a plan’s border co-ordinates and other features.