

Sundial

Science theme

Geometry

Science skills

Following procedure

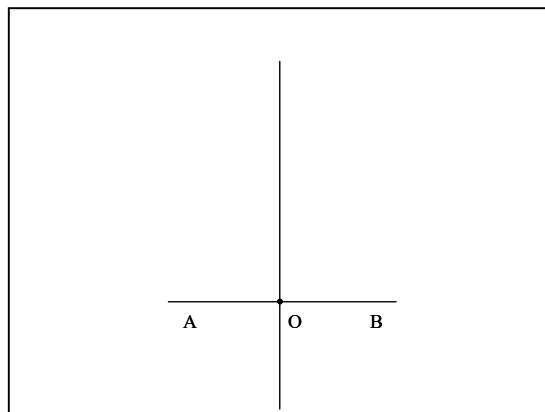
Instrument-making

Materials

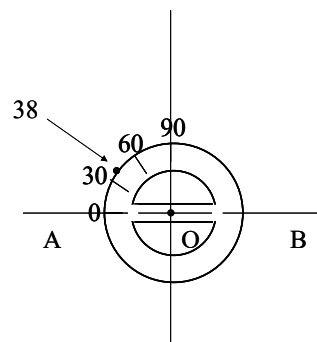
Squared sheet, pencil, square, and protractor

Procedure

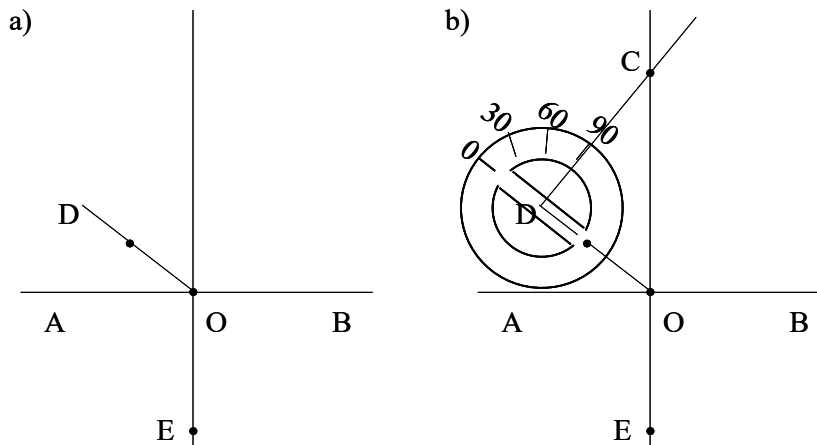
1. Draw a horizontal line AB (10 cm long) and mark on the line a point (point O) which divides the line into two equal parts. Draw a line perpendicular to the line AB and passing through O. At the end of these first operations you should have a drawing like the one below on your sheet.



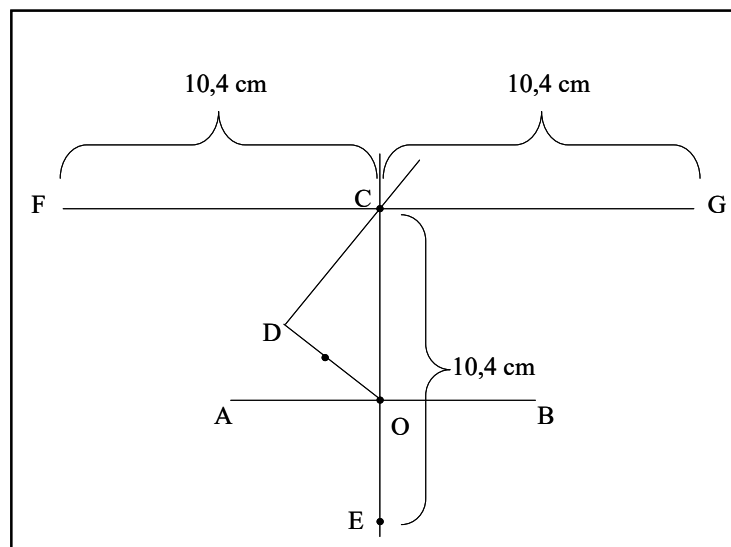
2. Place a protractor as shown below, with the center coinciding with the O point and the 0 (zero) mark falling on the AB line, and mark a point at your latitude degrees. In the figure below we use Palermo latitude.



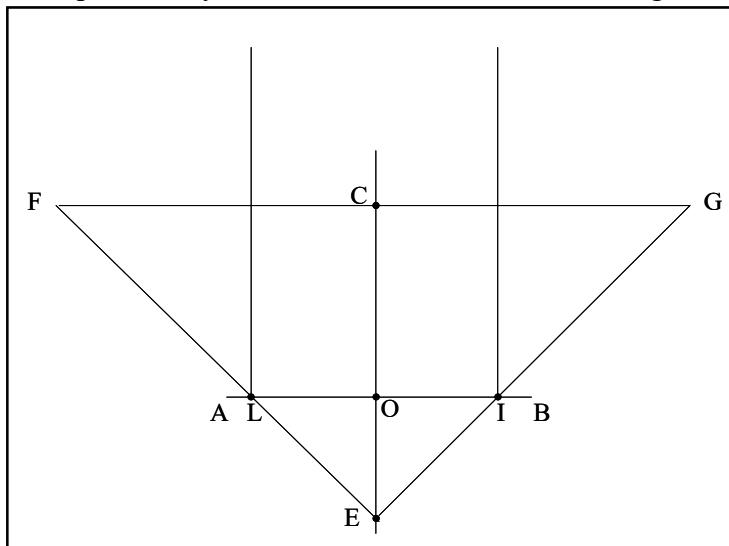
3. Draw a line through O and the point just marked and extend it until it is 4 cm long. We call D the end of this line, as in the drawing on the left below. Also mark on the vertical line, under the point O, a point E such that the line OE also measures 4 cm. Then, with the help of the protractor arranged as in the drawing on the right below, draw a line perpendicular to the OD line. Call C the point of intersection with the vertical line.



4. You measure the distance between points C and E with the square; it should be roughly equal to 10.4 cm. Then draw a horizontal line that passes through C and we call its ends F and G. The distance between F and C must be equal to 10.4 cm, as well as the distance between C and G. See the figure below.

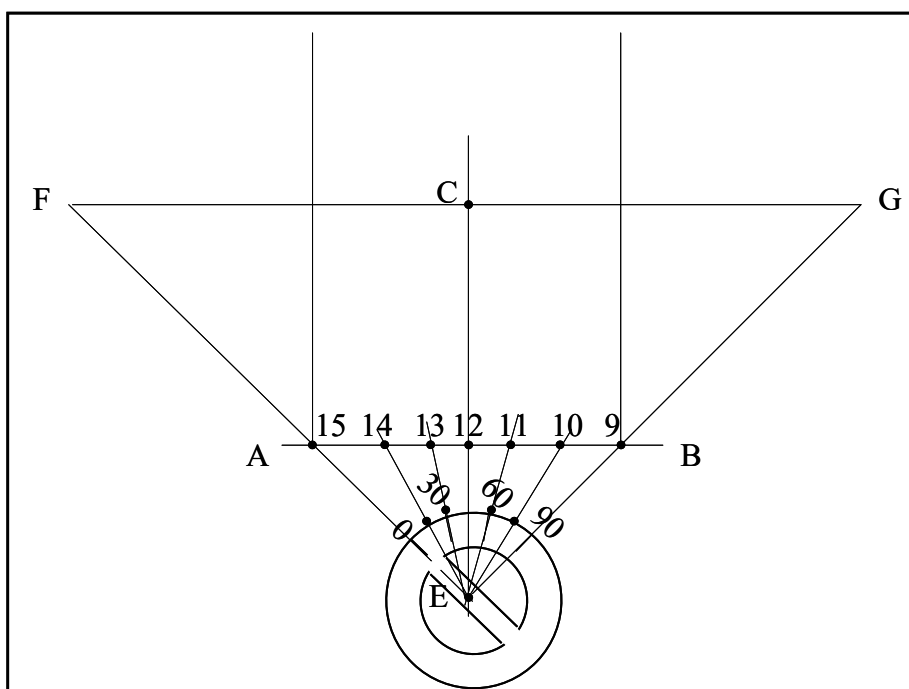


5. Join points F and G with point E with two oblique lines, as in the figure below. If you want, you can also delete the OD and DC lines as we won't need them later. Call L and I the points of intersection of these two oblique lines with the line AB. Draw two vertical lines that pass through L and I. At the end of these operations you should have obtained a drawing like the one shown below.

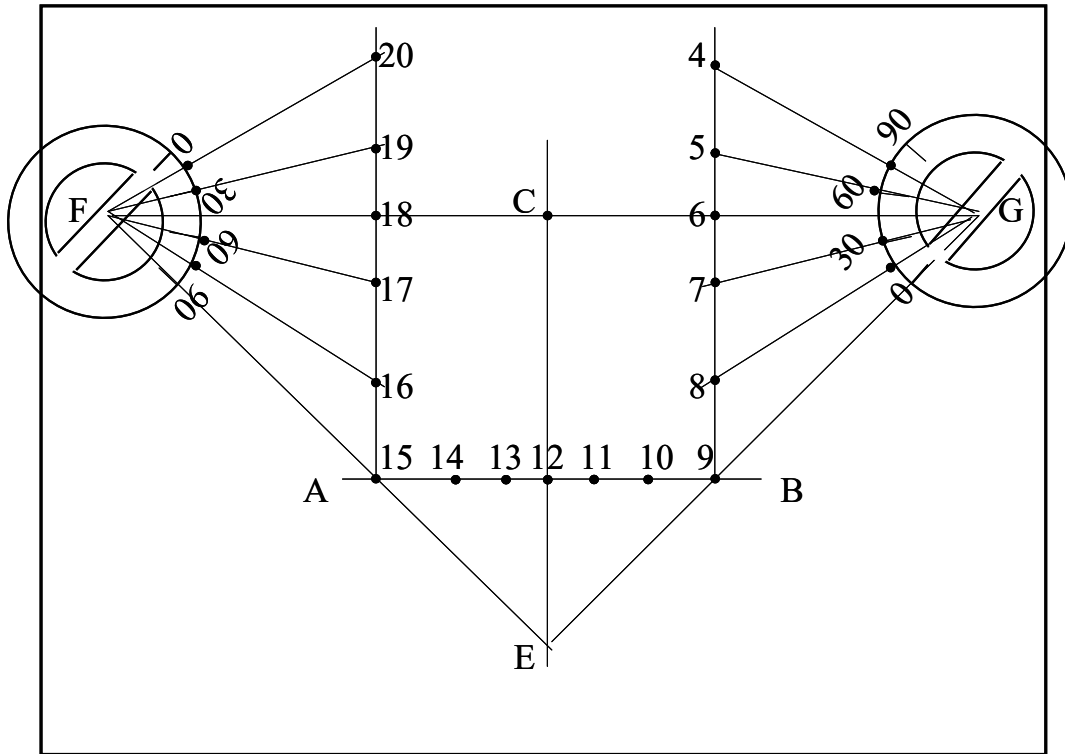


6. Now you are read to insert time. Instead of L you write 15 and instead of I you write 9. Instead O you write 12.

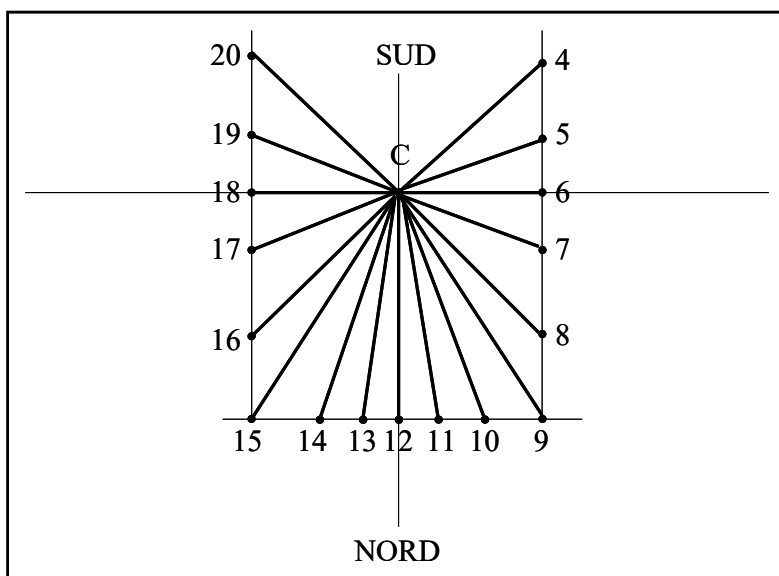
Position the protractor with the center at point E and the notches at 0 degrees and 90 degrees on the EF and EG lines respectively, as shown in the figure below. Mark with the pencil the points corresponding to the notches numbered 15, 30, 60 and 75. Then join point E with all these points you have just marked and extend the lines until you reach the horizontal line AB each time. You will have thus obtained on the line AB another 4 points, which we call 14, 13, 11 and 10.



Repeat a similar operation by placing the protractor first in point F and then in point G, as shown in the drawing below. At the end of these operations we will have obtained on the left the points indicated with the numbers 16, 17, 18, 19 and 20, while on the right the points indicated with the numbers 8, 7, 6, 5 and 4.

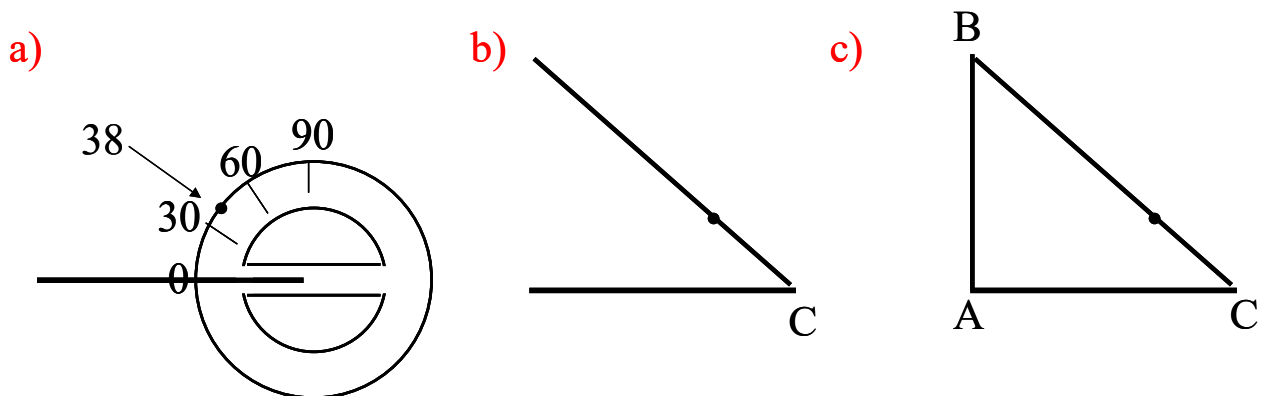


8. To finish the drawing on the sheet, just join all the numbered points with point C. If you want, you can delete all the other lines. You should have a drawing like this pictured below. The thick lines are called hour lines and the numbers in them represent the hours we're going to read. In the drawing the writings NORTH and SOUTH have also been marked, because you will have to position the sheet, on a horizontal plane, with the writing NORD facing the NORTH pole. Use a compass to do this.



9. At the end you have to build the gnomon, that is the object that will cast the shadow on the hour lines and will allow us to know what time it is.

To build a gnomon, we take a thick cardboard and cut out a triangle (with sides of about 4 cm). It is important that an angle is equal to 38 degrees; help yourself once again with the protractor, you can follow its construction with the three steps represented in the figure below.



Finally, place the gnomon on the sheet vertically, fixing it well to the sheet with tape, so that the AC side is above the 12 o'clock hour line and its vertex C coincides with the point C that we had previously marked on the sheet.

The sundial is ready. To know what time it is, just look at which hour line the shadow of the gnomon falls.

Just remember that if summer time is in effect, the sundial will mark one hour less than that of the other watches. For example, if your wristwatch is showing 5pm, the shadow of the gnomon will fall on the hour line at 4pm. If there is no daylight saving time, the time indicated by our sundial will coincide with that of the others. watches.