

500 years after the birth of Pedro Nunes

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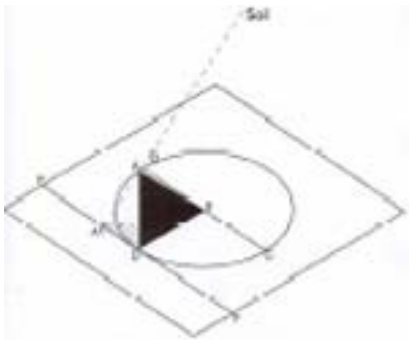
The Shadow Instrument

The shadow instrument was designed by Pedro Nunes to measure the angle of the Sun using the shadow thrown by the side of a triangle projected onto a straight line.

Material

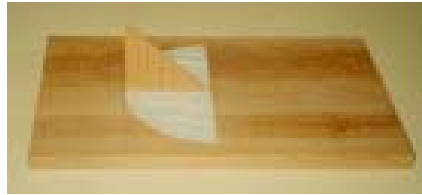
- A wooden rectangle 25 x 35 cm;
- A wood or iron rectangular triangle with 10 cm long sides;
- A compass, set square, protractor, ruler, rubber, pen, pencil and paper.

Method



- Draw two diagonal lines on the wooden rectangle and call their meeting point E;
- Draw a circumference with a 10cm radius and E as its centre.
- Draw the diameter [BC] parallel to the shorter side of the rectangle.
- Draw the tangent line FD;
- Use the protractor to graduate the arcs BD and CD from 0° to 90° (from B to D and from C to D)
- Cut out a groove along the radius [ADE] and insert the triangle so that it sits perpendicular to the base.

Your shadow instrument is ready!



Consider

- Try to explain the equal triangles $[AA_1D]$ and A_1ED ;
- Which arc is the angle of the Sun equal to? Give reasons for your answer.

To measure the height of the Sun

- Place the triangle in a horizontal position;
- Turn it until the A_1D shadow of the side $[AD]$ is in line with the tangent FD ;
- Look at the A_1E shadow of the hypotenuse $[AE]$;
- Write down the point where the A_1E shadow intersects the arc of the circumference.
- Read the scale at this point.
- What is the reading for the angle of the Sun?