



PRACTICAL METHODS OF EFFICIENCY MATERIALS FOR MAKING "GIRIX" ROUNDS AND METHODOLOGICAL RECOMMENDATIONS TO THEM

Turayev Khumoyiddin Abdugafforovich
Senior lecturer of Termiz State university

Mamatkulov Ilhomjon Chorshanbiyevich
Lecturer of Termiz State university

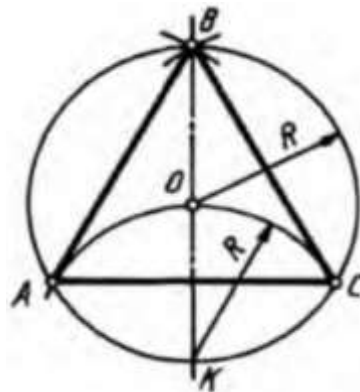
DISCUSSION

It is necessary to make equal parts benches for regular details of drawings, designs of buildings and structures, regular polygon parquet and other ornaments. In this case, divide the circle by the required n-arcs and create adjacent n-angles, forming

a regular n-angle. We also show below that the geometric shapes are formed by dividing the circles into equal parts.

Example 1. Make a triangle with a radius of R and an equilateral triangle in O center (Figure 1).

Figure 1



Dismiss. From any point in the circle, now, from point K, draw a circle with the circle radius R. In this arc, the points A and C intersect at the circle, and these points are intertwined. The resulting AC incision is one side of the triangle that is being searched. To find the rest of this triangle, draw an arc equal to the radius of AC with point A or C. This arc intersects with a circle, forming point V, and then connecting point B with points A and C. The resulting ABC represents the triangle that is being searched. [1]

Example 2. Make a regular rectangle drawn in a circle with radius R (Figure 2).

Dismiss. In order to make the inner circle square, the diameters AB and CD are intertwined by dividing the circle into four equal parts. If the ends of the diameters are joined together, a square ABCD will be created. If the edges of the inner square are required to be horizontal and vertical, then the square framing is as follows (Figure 2).

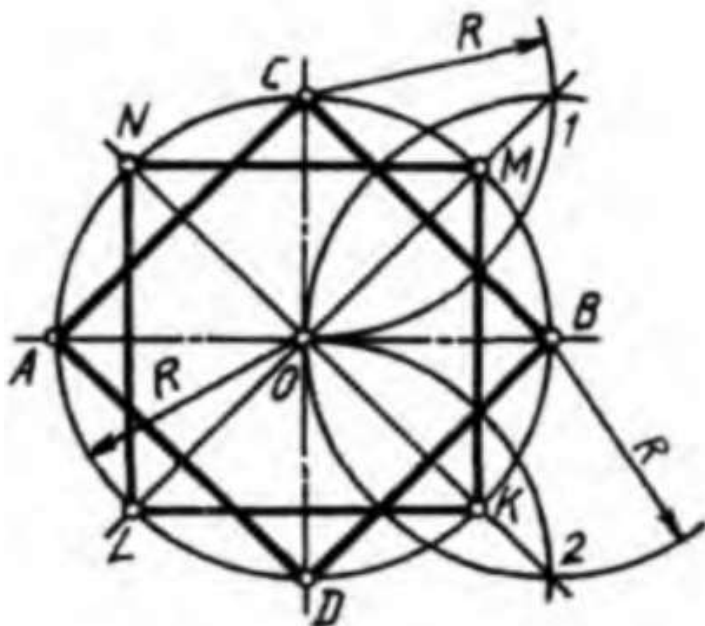


Figure 2

First, the diameters AB and CD are divided into four equal parts, and then the arcs are drawn at the end of the circle, ie, points B, C and D, and the arcs intersect, giving points 7 and 2 respectively. . These points merge with the center O of the circle. The resulting line O1 and O2 intersect with the circle, giving M and K points. Then M and K are drawn straight lines from M and K parallel to AB and diameter. These straight lines intersect with the circle,

giving N and L points of the polygon. Then the MNLK found represents the rectangular square. Scientists have long been concerned about dividing the circle into five parts and other parts. There are several ways to make regular triangles (Figures 3, 4, 5 and 6) in Vitruvius's "Ten Books from Architecture", al-Koshi's "Key of Accounts", as shown in the drawing.[2] We're going to make some of that.

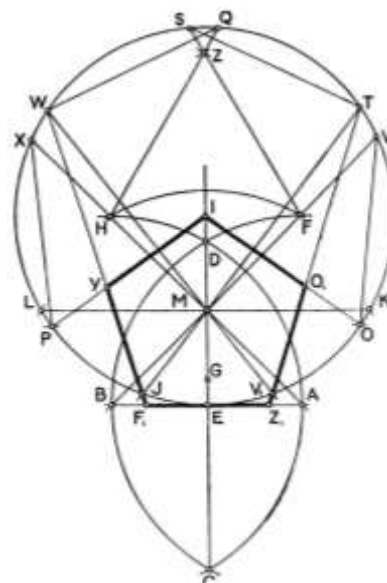
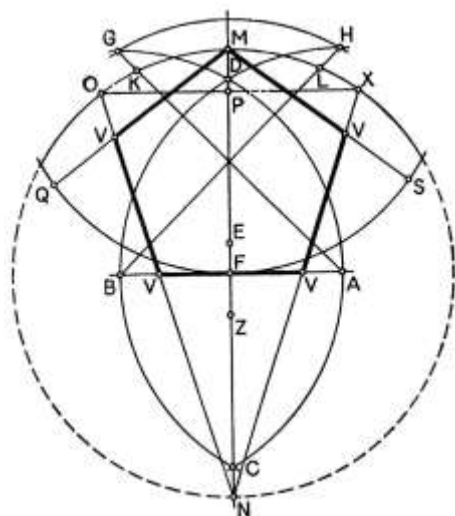




Figure 3

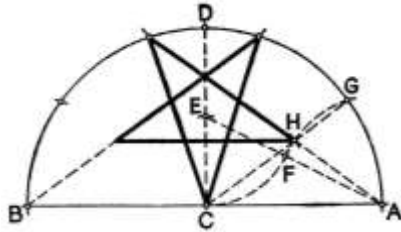


Figure 5

figure 4

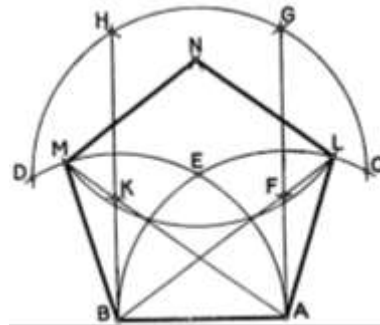


figure 6

Example 3. Make a regular triangle ABCDE on the given AB side (Figure 7 a).

Dismiss. Continue the AB straight line and draw an arc with a radius equal to AB intersections A and B of AB, and subtract AF perpendicular to A from point A to point F. Draw a circle in the center of AB with the radius O of OF, which corresponds with the straight line AB at points K and Z. Now draw the intersection arcs at points D and intersections D with AL radius. These arcs also intersect at points E and C with the first circle arc drawn with a radius of AB. Find the points A, E, D, C, and B along the straight lines and have regular triangles. [3]

Example 4. Make a regular triangle into the circle (Figure 7 b).

Dismiss. Half of the diameters MN and DF, which are perpendicular to the circle, for example, the radius ON (R) is divided into two halves, and its midpoint L is joined by one, now the D tip of the second diameter. From L, draw an arc with $R = DL$. The arc intersects the MN diameter at K, and the point D joins with D, resulting in a D intersection (radius) equal to five divisions. Then, from point D, draw an arc with a radius of D, which intersects the circle at points E and C. From these points, draw the arcs again with radius DK, and form points A and B. The points A, B, C, D and E are then intertwined so that the resulting ABCDE represents the regular triangle in which the polygon is searched. DK equals one side of a regular triangle.

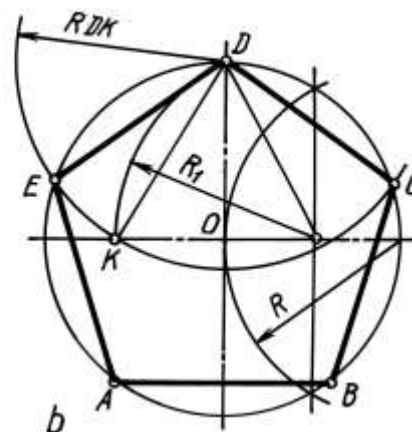
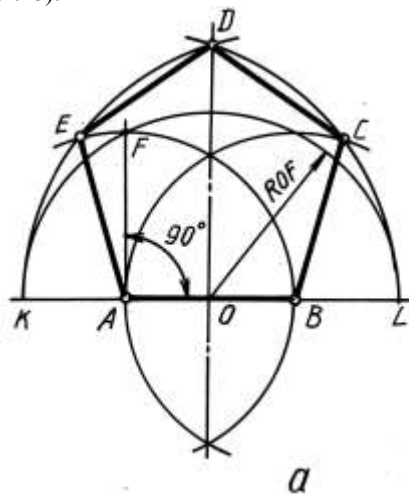


Figure 7

Example 5. Make ABCDEF hexagonal AB side (Figure 8 a).

Dismiss. To solve this example, we proceed two ways AB introspectively and measure $AK = AB$: 2. From K, A, B and L, we draw lines perpendicular to the line AB. In vertical lines drawn from points A

and B through arcs of radius A and B, and points of F and C in vertical lines, and points E and A in points perpendicular to lines A and B. By combining the points A, F, E, D, C, and V in the straight line, we obtain the regular hexagon ABCDEF.

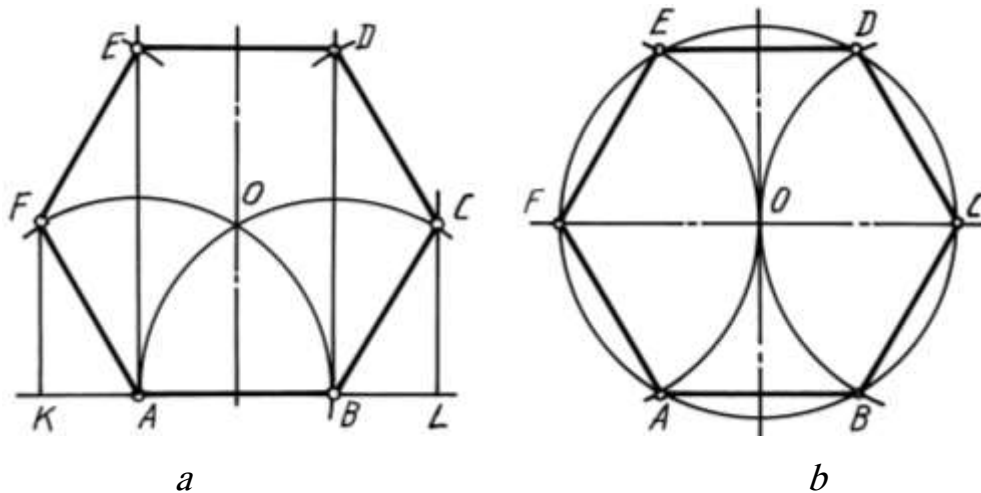


Figure 8

Example 6. Make a regular hexagon from the center O given to the circle R radius (Figure 8 b).

Dismiss. The sides of a regular hexagon inline are the radius of the circle. Circular perpendicular MN and FC diameters are crossed, and each of them, for example, draws arcs from the F and C ends of the FC diameter at $R = FO = CO$, and the arcs intersect at the points A and E and B and D respectively. . When these points are found together, they form a regular hexagon.

Example 7. Make a regular triangle (Fig. 9) inside the circle.

Dismiss. Method 1: Rotate the circumferential AB and CD diameter of the circle, and one of them,

for example, is about half the diameter of the OS. To do this, draw an arc from point C in this circle R. This arc intersects the circle at points 1 and E. The straight line connecting these points cuts the OS radius at point F. The point F divides the OS radius as well as the cross section E I. Half of the cross-section is the length of the incision, which divides the circle EF (F1) by seven. Also, from 1 point the arc with FI radius is drawn. This arc intersects the circle at points 2 and 7. Then draw arcs from points 2 and 7 with the same FI radius, and points 3 and 6 are found, and so on. When the points 1, 2, 3, 4, ... are combined together, a hexagon is formed.

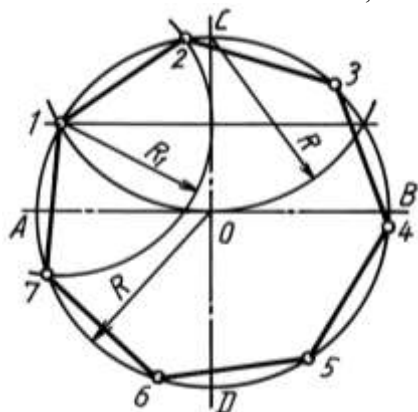


Figure 9

Method 2 We pass diameters that are perpendicular to each other. We keep the diameter on both sides, and divide the vertical AL diameter by seven equal parts (Figure 10). Draw a circle arc from point L in the radius of AL until the intersection of the horizontal diameter at points P and T. Draw straight lines connecting points 2, 4 and 6 in vertical diameter with points T and P. The straight lines cross the circle at points V, C, D, E, F and K. These points

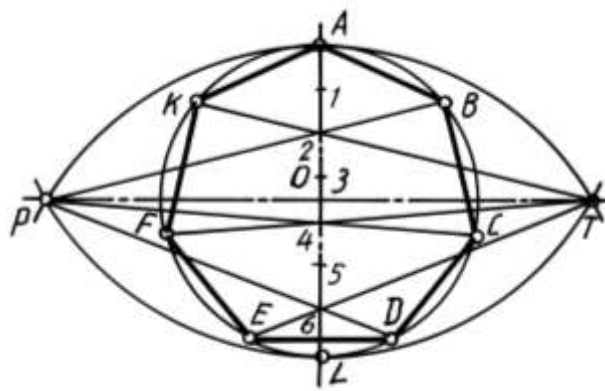


Figure 10

are the ends of the seven corners. Sequencing these points found in the circle, we will find the seven angles ABCDEFK in the same direction. [4]

Example 8. Make a regular rectangle with the inner circle drawn (Figure 11).

Dismiss. After passing the intersecting AE and CK diameter of the circle, the arcs from the points A, C, and E are drawn by R. These arcs correspond to each other and form the points M and N respectively.



The center of the circle is the straight lines through the points N and M, and the right lines cross the center of the circle and cut them at points B and F and

D and L. The resulting points are then intertwined. The result is a rectangular ABCDEFKL octagon.

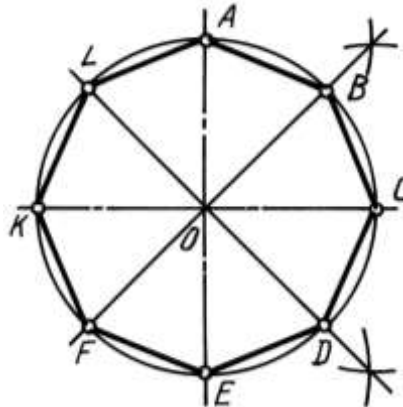


Figure 11

Example 9. Make twelve regular angles drawn inside the circle.

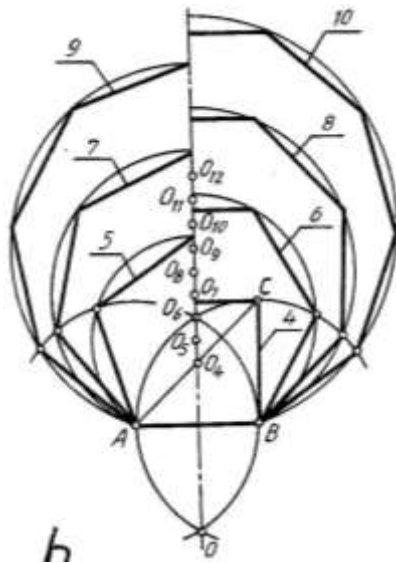


Figure 12

Dismiss. Circular AB and CD diameters are perpendicular to the circle. At the ends of these diameters A, B, C and A are crossed arcs with the same radius. These arcs cross the circle at points 2, 6, 5, 9, 3, 11, 8, and 12, respectively. If these points 1 (A), 2, 3, 4 (C), 5, ... are intertwined, then the regular twelve angles you seek will form. In addition to the methods described above, dividing a circle by three, six, eight, or twelve can be done with a ruler and a triangle. Figure 12 shows how to make various

regular polygons by cutting AB. The arcs drawn from points A and B in the radius of AB intersect at points O and O6, and when they are connected, the symmetry axis of the circle for making all polygons is made. To make a square, draw a point perpendicular to AB from point B to the point C, which intersects the arc. AC intersects with the diagonal symmetry axis and forms the center of the square circle O4. When the O4O6 cross is cut in half, the center of the regular triangle is O5. If you draw a circle from O5 to



A, intersect with AB radius arc. In the same way a hexagon circle is drawn from O₆ and so on. The distance from O₆ to O₅O₆ is measured to determine the center of the remaining circles. Then the centers O₇, O₈, ... are designated.

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