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7project Development Of Competence Of Future Drawing Teachers Using Geometric Reflection Techniques

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RESUME

In this article, we use the inversion method to solve the "inversion of a point", "the transition from one point to the third circle with two circles," and the "Apollo problem (the fourth circle with three circles)" a graphical method and a method of its use were developed.

Keywords

Designing, competence, geometric reflection, inversion, inversion reflection, feedback loop, inversion circuits, Apollo problem.

Some of the issues that are difficult to make in drawing are the "Fourth Circuit Reference Circle".

In the textbooks and educational literature, this issue is called the "Apollo" problem, and it is theorized that mathematicians can solve it using the Inversia method [2].

The word "inversion" is derived from the Latin word "inversio", which means "to turn upside down" or to "mirror the positions."

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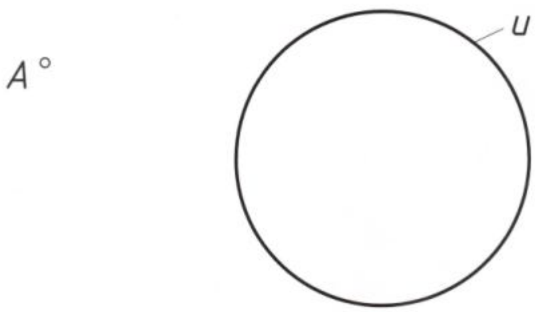
Inversion is one of the most important geometric reflections, and is a way to more easily address issues that are difficult to solve by other methods.

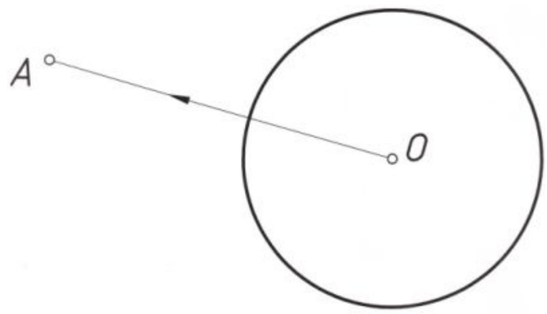
Issue 1. Point inversion reflection. The radius of the inversion (*R36*) is given by the point A in which the inversion loop lies outside it (Graph 1).

Removal:

1. Set the center of u as O and make the inversion of point A outside it. To do this, we move the beam from center A to point A (Graph 2).

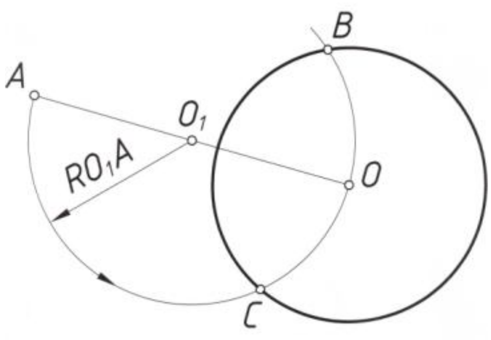


Graph 1.

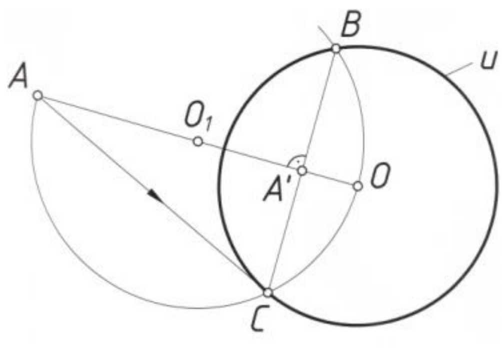


Graph 2.

2. Set the center distance O from point A to center O1 and draw a circle with radius O_1 A. It intersects at points B and C (Graph 3). If we connect point A with any of the points B and C, then it becomes an attempt at point A. The BC vatar OA intersects with the beam, and the inversion of point A gives A1 [BA^1 bOA] (Graph 4).



Graph 3.



Graph 4.

3. For the inversion reflection A^1 given inside it, reverse the design performed above, that is, we move from the center A to the point A^1, and lower O

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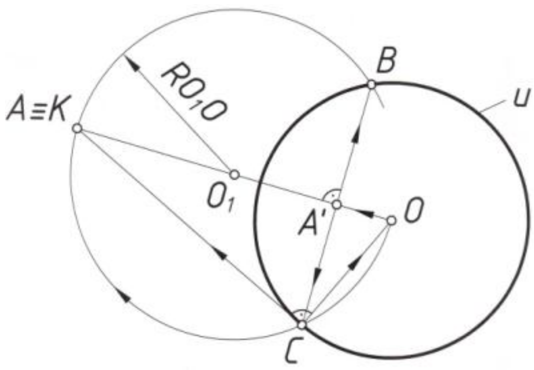
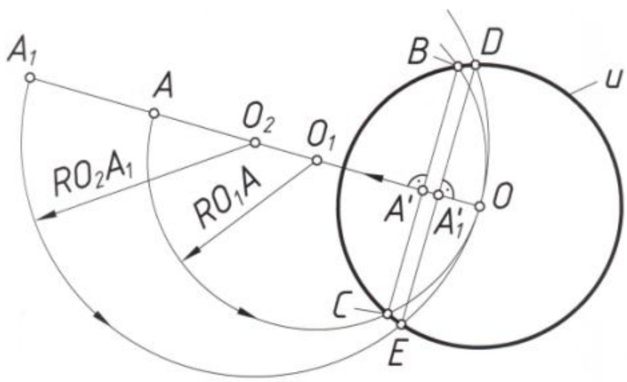
perpendicular to A^1. It intersects u at points B, C [A^1 BbOA^1], and points B or C intersect with the center O. Draw a line perpendicular to the CO line from point C and mark it with the point of intersection of OA^1 beam [KKbOC]. Draw the center of the distance from point K to O center, and draw a circle in radius O_1O. This circle will certainly pass through points B, C and K, and give A^1 the trace inversion of point A^1 [Graph 5].



Graph 5.



Graph 6.

4. Point A is infinitely close to the center of the O beam as the point O is infinitely distant from the center and vice versa, and the point A^1 is infinitely closer to the center of the O beam (Graph 6).

Issue 2 Make a circle with one point and two circles. There are two m, n circles with different radii (R28, R46) and A dot outside them (Graph 7).

Removal:

1. We arbitrarily cross the given point A and use the third circle with two m and n circles, and reflect it inversion (Graph 8).

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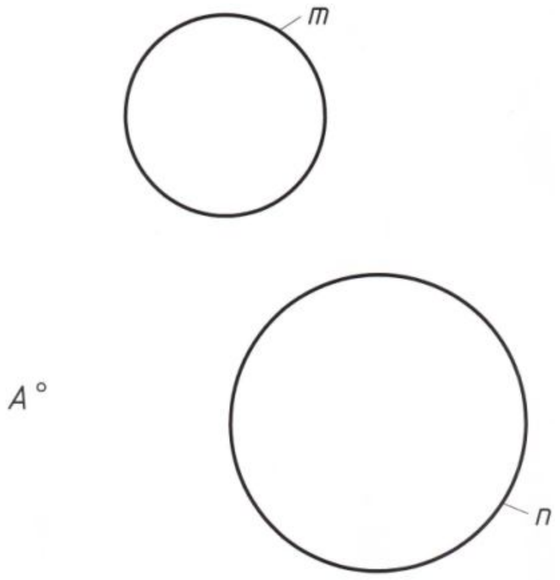
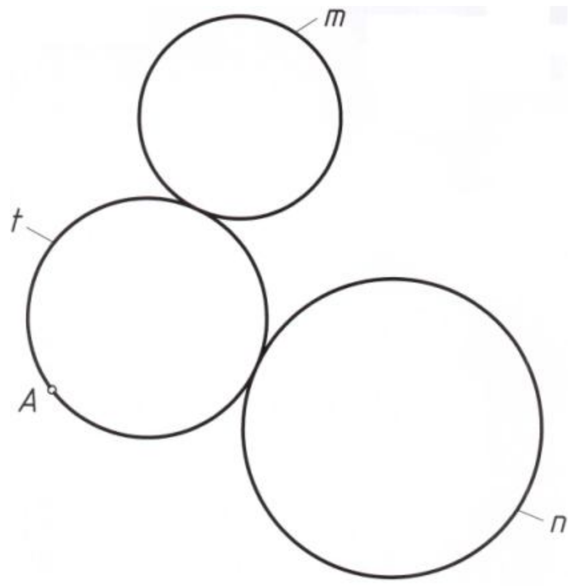


Graph 7.



Graph 8.

2. To do this, we define point A as the center of the inversion circle u and O, and the centers of m, n are O_1 and O_2 (Graph 9). Then we pass the beam from center O to m and centers O_1 and O_2. The light transmitted by OO_1 interrupts the m in 1.2 nuts. The light emitted by OO_2 interrupts n at 3.4 points. Now, let's go back to the above design, that is, for the inversion of m and n circles, look at the method of "point injection" in Graphs 1 and 4 and invert the points of m, n, and n. For example: inversion of nutrients produced by the cut of m by OO1 light. That is, the center of the distance from the center O to the point 2, is the center of O_3 and we draw a circle in radius $O_3 2$. This intersects the circle at points B, C, and gives BC vatar OO_1 the intersection of the beam and the 21 inversion of the point 2 [$B2^1bOO_1$]. The inversions of the remaining 1,3,4 points can be found in the same way, and the inversion of n circles gives m^1 and n^1 (Graph 10).

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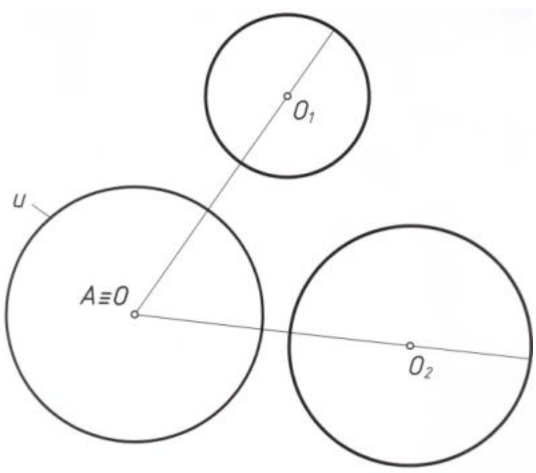
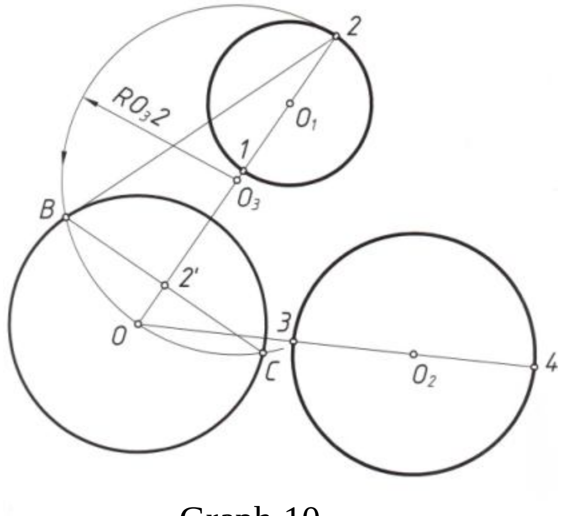
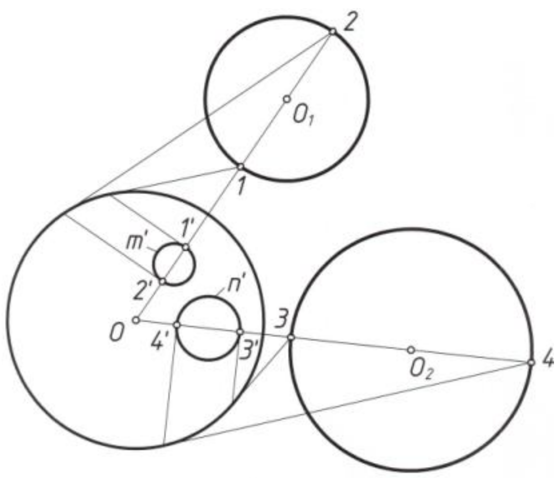


Graph 9.

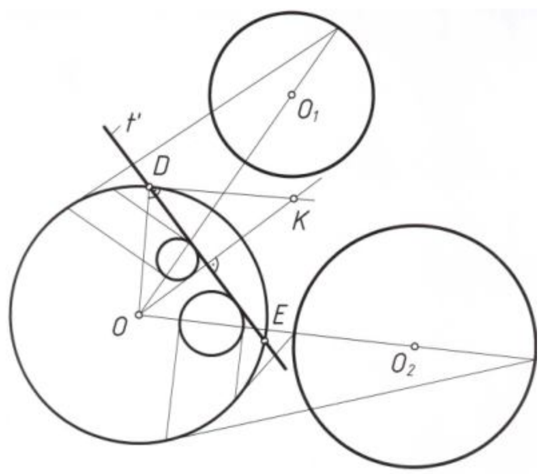


Graph 10.

3. Using the inversion of points 1,2 and 3.4, we made 1^1, 2^1, 3^1, 4^1 points and inversions m^1 and n^1, respectively (Graph 11). Inversion Circles Let us draw the line straight through the lines of m1 and n1, and this line gives the search for the inversion t of the arbitrary interval t^1 in Figure 8 and intersects t^1 at D, E. We draw a line perpendicular from center O to t^1 and merge D with center D and draw a line straight from D to perpendicular to O line. This line crosses the straight line, which is perpendicular to the center T1 and gives the point K [DKbOD], [OKbDE, t^1] (Graph 12).



Graph 11.



Graph 12.

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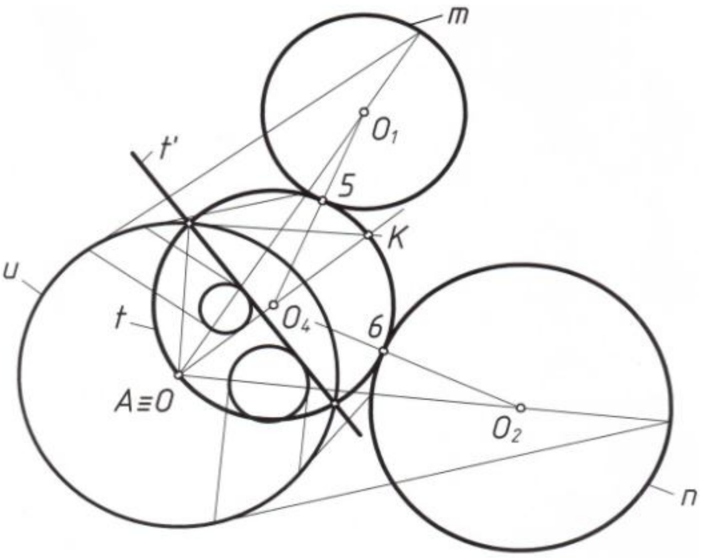
4. Set the center distance from the point K to the center O, and make the beam passing from O_4 to O_1 and O_2. This beam intersects m at 5 points on the O_4O_1 light, and n at 6 points on the O_4O_2 light, and these points are the starting points for m and n. We draw a circle from O_4 to O_4O with a circle D, E, K, and 5.6, respectively, and give the third circle a point, passing through the point A and m, n (Figure 13). Also, in Figures 14, 15, and 16, the intersection of a given point A and inverted circuits m and n are the internal and intersections of the inverse inversion circuits m^1 and n^1 as a result of passing the straight line in different situations. are shown.



Graph 13.

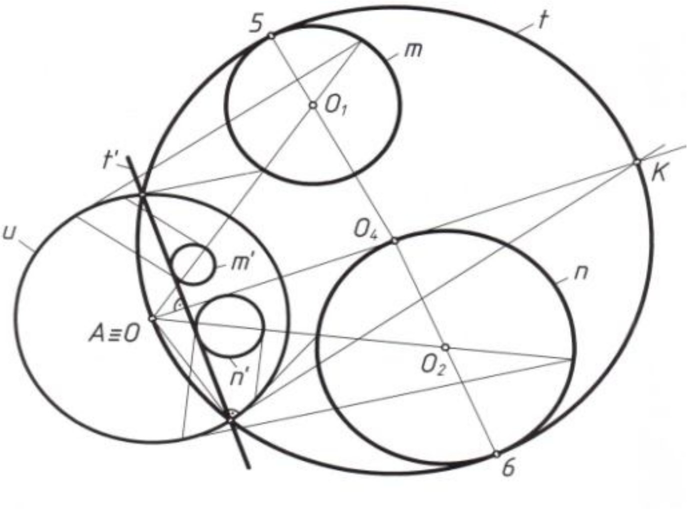
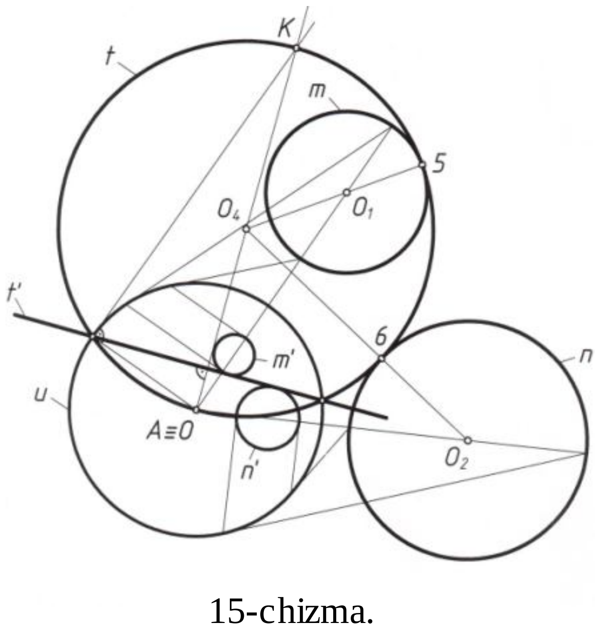
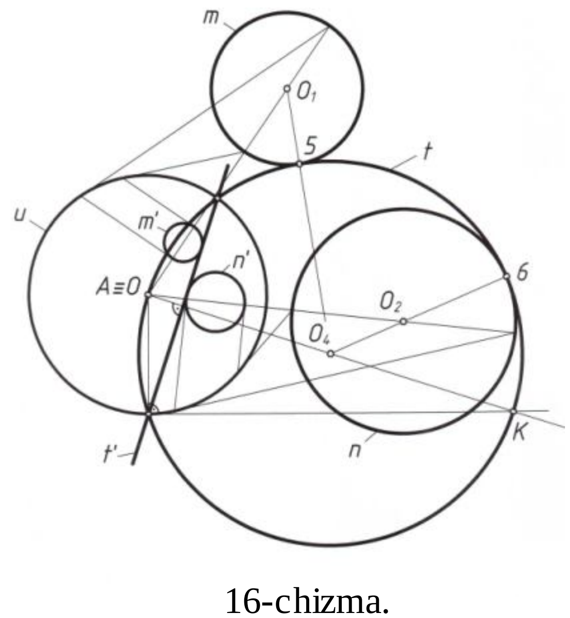


Figure 14.



15-chizma.



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Issue 4 The question of "Apollo" (the fourth circle with three circles). Three m, n, l circles with different radius (R16, R33, R48) and without intersection (Graph 17). Using the inversion method of the fourth loop in three circles, namely, l.

Removal:

1. In this case, as shown in Figure 8 above, we can optionally rotate the fourth circle using the given m, n, l and reflect it inversion (Graph 18).

2. Assume the smallest radius of circle in the given m, n, l circles, and mark that point as the inversion center O, and draw a line from the center O (inversion circle), and use the "one point and two circles" above the third circle.

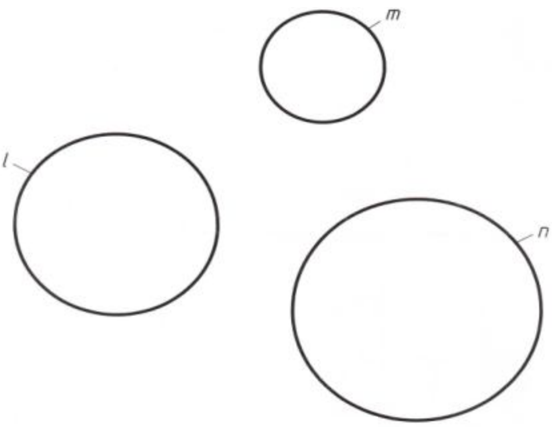

Figure 17.

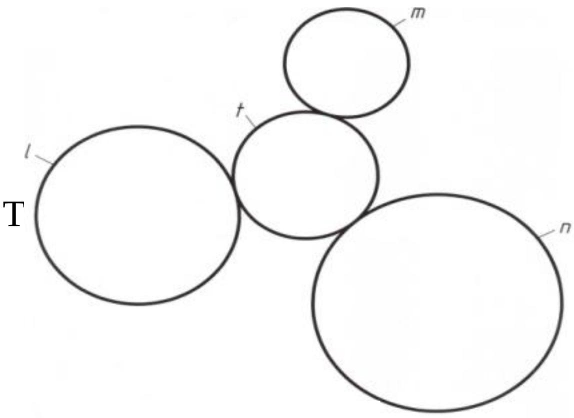

Figure 18.

That is, divide the circle radius m by n, l, and draw the circle at the remaining radius. Let them denote the circles n1 and l_1 and their centers as O_1 and O_2 (Graph 19). then we pass the light from center O to n1 and l1 through the centers O_1 and O_2. Light OO1 cuts n1 in 1.2 nuts. The light emitted by OO_2 cuts l_1 at 3.4 points. Now, let's go back to the above design, that is, for the inversion of n_1 and l_1, we look at the molds in

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Figures 7-13 above and invert the points n_1 and l_1. For example: when we cut l_1 with the light transmitted by OO_2, we will invert the 3.4 nutrients produced. That is, the center of the distance from the center O to 4 points is the center of O_3 and we draw a circle in radius O_34. It intersects the circle at points B, C, and BC vatar OO_2 intersects the beam and gives the search for the inverse of 4 points 4^1 $[B4^1bOO_2]$. The remaining 1,2,3, inversion points are also found in the same way: the inversions of n_1, l_1, and n_1^1 and l_1^1 are in the same direction (Graph 20).

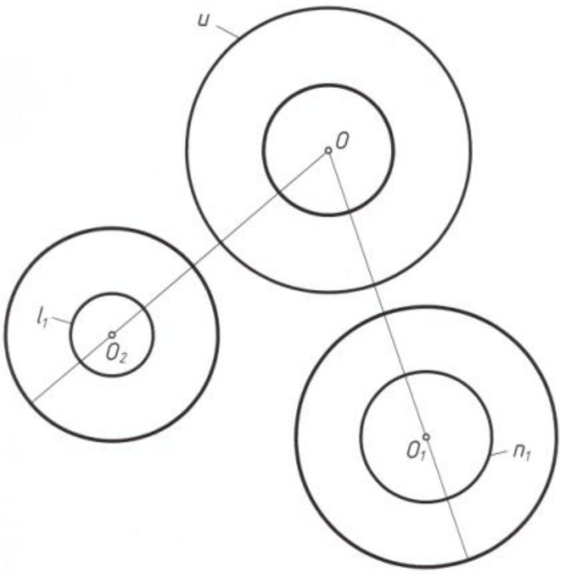

Figure 19.

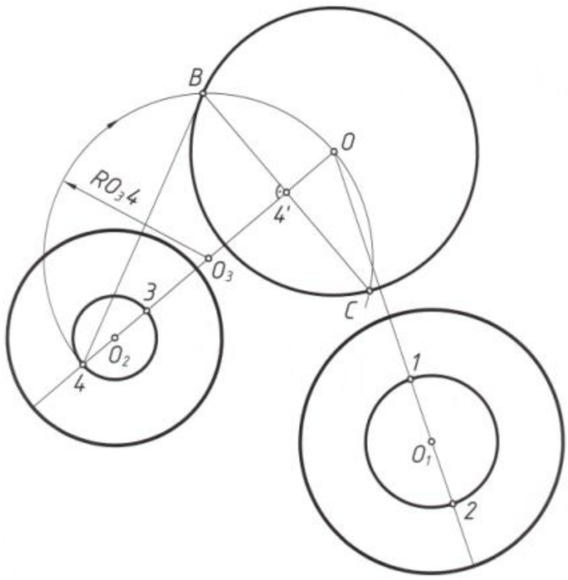

Figure 19.

3. Using the inversion of points 1.2 and 3.4, we made 11, 21, 31, 41 points and inversions n_1 and l_1 n_1^1 and l_1^1 (Graph 21). Inversion Circles Let us use the correct line for n_1^1 and l_1^1, and this right line is centered on O and gives the inverse t_1 of the third circle in n_1 and l1. t_1^1 intersects at E, F points. We draw a line perpendicular to the center O from T_1^1 and merge F with O center and draw a straight line from F point perpendicular to the OF line. This line crosses the straight line perpendicular to t_1^1 from center O and gives K point [FKbOF], [OKbEF, t_1^1] (Figure 22).

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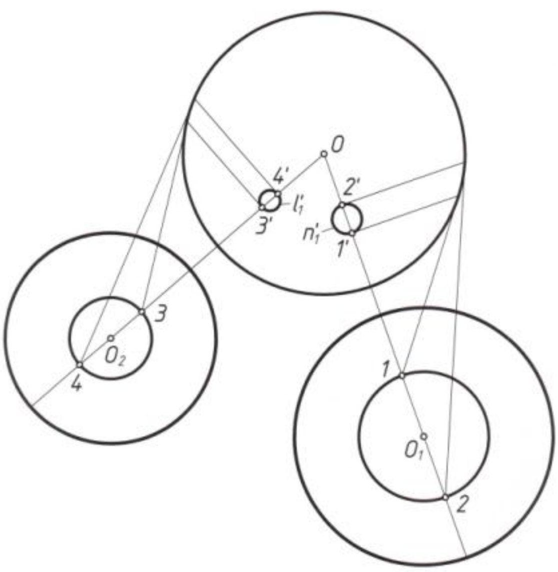


Figure 21.

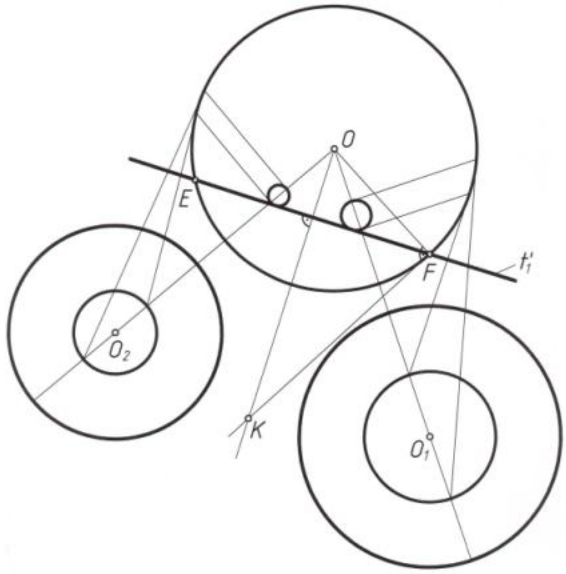


Figure 22.

4. Set the center distance from the point K to the center O, and make the beam passing from O_4 to O_1 and O_2. This light cuts n_1 at 5 points on the O_4O_1 light, l_1 at 6 points on the O_4O_2 light, and, of course, cuts the n circle at 7 points on the O_4O_1 light, and cuts the circle at 8 points on the O_4O_2 light. m intersects the O_4O beam at 9 points. 5.6 points are the starting points for n1 and l1. The points of 7,8,9 are the turning points of circles n, l, m. We draw a circle from O_4 to O_4O with a circle E, F, K, and 5.6, giving O the center of the circle and the third circle of the n_1 and l_1 intervals (Graph 23). We draw a circle from the O_4 n, l, m points to 7.8,9, which gives the fourth cycle of the intersection of m, n, l, in Figure 18 (Graph 24).

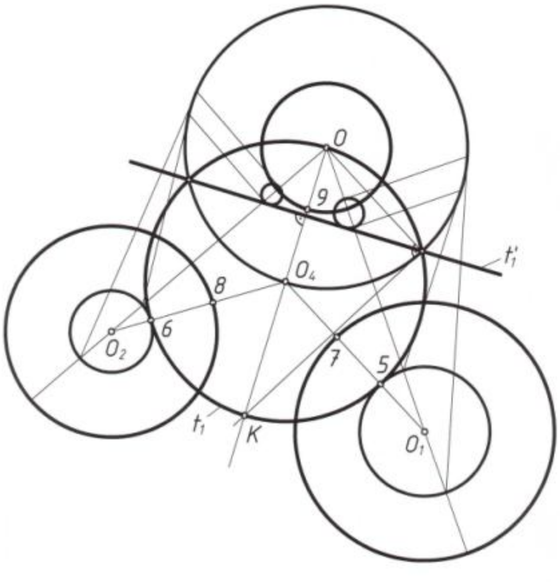
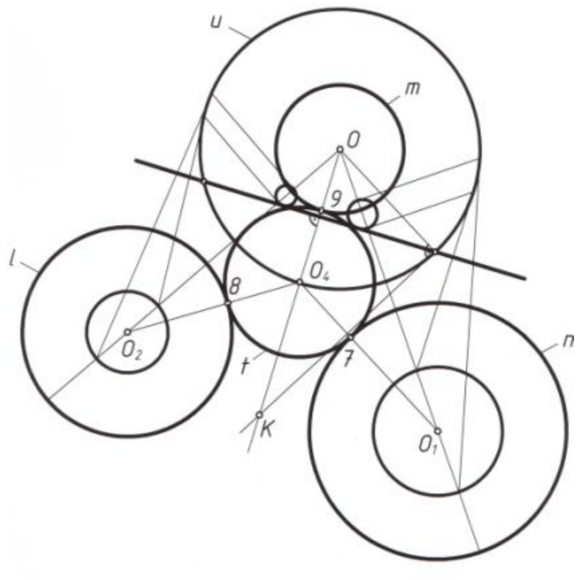


Figure 23.



Graph 24.

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List of used literature

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