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APPLICATION OF ELEMENTS OF COMBINATORICS TO SOME GEOMETRIC PROBLEMS

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Abstract: the article describes geometric problems of combinatorial form and methods of solving them.

Keywords: point, straight line, plane, circle, ellipse, triangle, quality, quality of education.

On the basis of the Law of the Republic of Uzbekistan "On Education", it is used in world practice to educate a well-rounded generation that is physically healthy, spiritually mature, has high intellectual potential, has modern knowledge, thinks independently, and looks to the future with confidence. based on a unique national model of education. This model is based on person-oriented educational technology, which focuses on the needs, interests, talents and abilities of the learner. Thus, the new education system should serve to ensure the formation of a person who is independent, comprehensively developed, embodies high spiritual and moral cultural qualities and professionalism. At this point, the term teacher, coach or mentor immediately comes to mind. So we created the image of the teacher-master in our imagination. We think that the term teacher or teacher is not exactly the person who gave us fundamental or methodical knowledge in a particular branch of science in school or post-school education. A teacher is a person who imparts certain knowledge or skills to any person or individual. Each person in the society has a certain idea, which means that each person has a certain level of geometrical knowledge. Geometry is a world of imagination. Training of competitive personnel by combining the experience of foreign countries with developed educational system of our republic is our priority. If we look at the general secondary education system of our republic, the need for specialized schools under the presidential administration and presidential schools is increasing. It is no secret that the quality of education in specialized schools under the presidential administration and presidential schools is significantly higher than in state-run schools. In specialized schools and presidential schools, the focus is on logical and critical thinking and language skills. The role of geometry in logical and critical thinking is incomparable, but the combinatorics department of mathematics is also known to us in forming students' ability to think critically. Early knowledge of combinatorics has been known for a long time. In the 17th and 17th centuries, the main problems of combinatorics were studied with the help of polynomial theory and probability theory. With the creation of electronic calculators and computers in the 20th century, Combinatorics expanded and began to be applied in technology and economics. Combinatorics is one of the newly developing branches of mathematics. In order to solve a number of practical problems, it is necessary to select its elements with certain properties from the given set and place them in a

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certain order. Description.Among the elements of a finite set, the problems related to the selection of partial sets consisting of elements with a certain property or the arrangement of the elements of the set in a certain order are called combinatorial problems. When solving many practical problems, it is necessary to perform many operations on the elements of sets, such as grouping and placing. The branch of mathematics that deals with these problems is called combinatorics. Let's consider some forms of combinatorial geometric problems below.

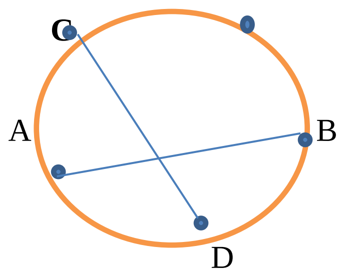
Issue 1.How many different cross sections can be formed by connecting 6 points, no three of which lie on the same straight line?

Note: 2 points must be connected to create a section. We mark the ends of the cross-section with A and B, in which the cross-section AB is formed. If there are 6 points, a maximum of 15 cuts can be made.

Solution: $=C_6^2 \frac{6!}{(6-2)!2!} = \frac{1*2*3*4*5*6}{1*2*3*4*1*2} = 15$

This formula is the same as the number of greetings formula.

Issue 2.How many different shapes can be formed by connecting 5 points on a circle?



Note: If we connect the points A and B, the line AB is formed. Similarly, if we connect the points C and D, the chord CD is formed. Counting these is the same as counting the number of greetings.

Solution: Method 1:$C_5^2 = \frac{5!}{(5-2)!2!} = \frac{1*2*3*4*5}{1*2*3*1*2}$=10

Method 2: =10 $\frac{n(n-1)}{2} = \frac{5(5-1)}{2}$

Issue 3.A circle and an ellipse with their centers at different points intersect at most in how many points?

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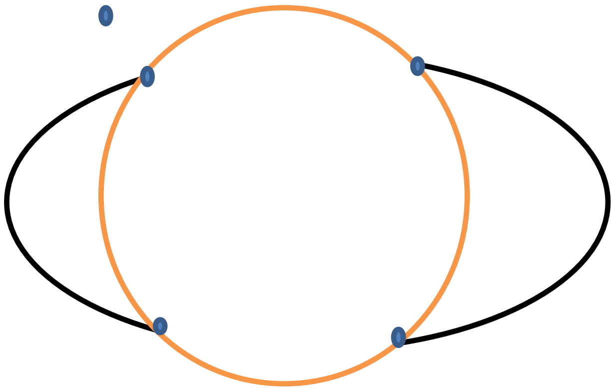


Note: Given an ellipse and a circle, 4 points are formed by their intersection.

Answer:A circle and an ellipse with their centers at different points together intersect in at most 4 points.

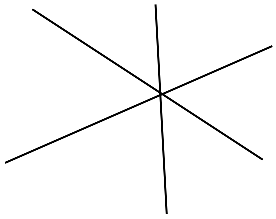
Issue 4. At most in how many points will 4 circles and 3 ellipses intersect at different points?

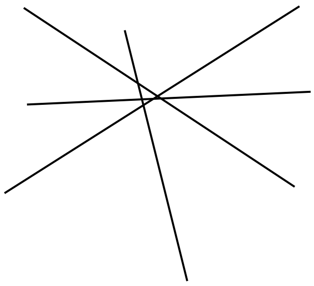
Note: The circle intersects itself at n(n-1) points. An ellipse intersects itself at 2m(m-1) points. The circle and the ellipse intersect in 4 points. So, if one circle and 1 ellipse intersect, 4 points are formed, if n circles and m ellipses intersect, they intersect in mn4 points. The general formula intersects at n(n-1)+2m(m-1)+4nm points.

Solution:n(n-1)+2m(m-1)+4nm=4(4-1)+6(3-1)+48=72

Answer: It intersects at 72 points.

Issue 5. Point A in the diagram is the intersection of 3 straight lines and point B is the intersection of 4 straight lines. Given that none of the 7 straight lines are parallel, find the number of points of intersection of these straight lines?





Note: In fact, at how many points would our 7 straight lines intersect? intersected at the point. But 3 straight lines intersect at one point. So we need to subtract , and add 1 because it intersects at one point. Let's subtract again. What for? Because 4 straight lines intersect at one point. And we add the point of intersection, that is, 1.$C_7^2 C_3^2\ C_4^2$

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Solution:C_7^2-+1-= - +1-+1= 21-3+1-6+1=14.$C_3^2 C_4^2 + 1 \frac{7!}{(7-2)!*2!} \frac{3!}{(3-2)!*2!} \frac{4!}{(4-2)!*2!}$

1.n straight lines intersect in at most ta points.$\frac{n(n-1)}{2}$

2.N straight lines, no three of which have a common point and do not intersect, divide the plane into at most +1 parts.$\frac{n(n+1)}{2}$

3. n circles intersect at most n(n-1) points.
4. n circles divide the plane into at most n(n-1)+2 parts.
5. n straight lines intersect at a point.C_n^2
6. n different triangles intersect in at most points.$C_n^2 * 6$
7. At most n distinct rectangles intersect in a point.$C_n^2 * 8$
8. n distinct circles intersect in at most points$C_n^2 * 2$
9. 2 different ellipses intersect at most points.$C_n^2 * 4$

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