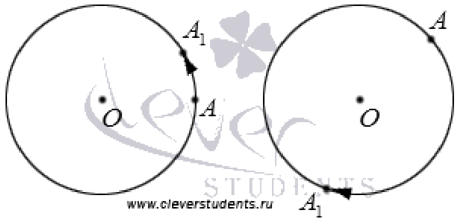
Y. Grygorus
Research supervisor: I.G. Lenchuk,
Candidate of technical sciences, Professor
Zhytomyr Ivan Franko State University
Language tutor: A.V. Kuznyetsova,
Candidate of Philology, Associate professor



ROTATION AROUND THE ORIGIN BY A SPECIFIED ANGLE

Mankind deals with the use of rotation (or rotation) constantly, most often this phenomenon can be observed in nature, for example, the movement of the sun and planets, the rotation of a wheel about its axis, the movement of molecules and so on. In mathematics the word "rotation" like the word "movement" has two meanings. Firstly, motion is used to indicate a continuous movement process, and secondly, and more often, in mathematics motion is used to indicate an isometric transformation with start and end positions. Accordingly, the word "rotation" can also be applied both to a continuous process and to an isometric transformation. In the latter case the term "turn" is most often used [1].

Let's introduce the notion of turning points around the point. First, we should define the center of rotation: *the point about which the rotation occurs is called the center of rotation. As a result of rotation of point A relative to the centre of rotation O point A_1 isobtained (which in the case of a certain number of full rotations can be the same as A); at that point A_1 lies on the circle centred at O with radius OA. That is, as a result of rotation around the center of rotation O, point A comes to point A_1 which lies on the circle centred at O with radius OA.* It is considered that point O while turning round itself comes to itself.

Fig. 1 illustrates rotation of point A around the point O, shifting of point A to point A_1 is shown with arrows.

From the definition of turning point it is clear that there are infinitely many variants of rotation of point A around point O. Indeed, any point on the circle with centre at O, radius OA can be viewed as point A_1, resulting from rotation of point A. Therefore, in order to distinguish one turn from another, the concept of the angle of rotation can be introduced [1].

The concept of a turning point can be easily expanded to rotate any shape around a point on an angle (it is this turn that both the point about which the rotation is carried out, and the figure which is rotated, lie in the same subspace).

Under the rotation of a figure we understand the rotation of all point of this shape around a given point at a given angle. If at turning figure F is displayed on itself, we can say that this figure has a rotating symmetry.

Figure F has a rotating symmetry of order n relative to centre O, if at the turn around the corner of angle $\frac{360^\circ}{n}$ this figure is displayed on itself. Point O is called the centre of symmetry of n-th order of figure F. If the angle of rotation equals to a straight angle, that is when a rotary symmetry of the second order is observed, such a turn is a central symmetry [3].

The rotation centred at O about the angle α ($0^\circ \leq \alpha \leq 180^\circ$) in a given direction is called the display of a plane on itself, in which point O appears about itself and any other point A appears at point A_1 so that:

- distance |OA| and |OA_1| level;
- angle AOA_1 has a value α and is deferred from half line OA in a given direction.

Point *O* is then called the *centre of rotation*, and angle α is called *the angle of rotation*[2].

Therefore, mathematically, rotation is the motion of a rigid body, which, unlike transference, maintains one or more fixed points.

LITERATURE

1. Боровик В.Н., Зайченко І.В., Мурач М.М., Яковець В.П. Геометричні перетворення площини. – Суми: Університетська книга, 2003. – 504 с.
2. Тесленко І.Ф. Геометричні побудови – К.: Радянська школа, 1956. – 140 с.
3. Перепёлкин Д.И., Курс элементарной геометри. – М.: Государственное издательство технико-теоретической литературы, 1949. – 348 с.