USING THE COORDINATE-VECTOR METHOD IN SOLVING PLANAMETRIC PROBLEMS

Bozorov Zokir Yuldosh o'g'li
Teacher, Termiz State Pedagogical Institute
Mustafakulova Jasmina Uktam qizi
Student, Termiz State Pedagogical Institute
Khairullayeva Aziza Kuchkar qizi,
student of Termiz State Pedagogical Institute

Abstract: This article describes the solution of geometric problems using the coordinate system and vector algebra.

Key words: Coordinate system, vectors, planometry, linear operations on vectors, scalar product of vectors, theorem of cosines.

Mathematical concepts, problems and problems studied in high school, and the concepts of coordinates and vectors, which are widely used and widely promoted in practice, are important. Because it can be considered as a relatively simpler way to find the solution of the problem by correctly entering the coordinate system in the given geometric problems or by applying vector algebra to the given problems. In addition, it is the priority task of modern times to teach theory in connection with practice in education.

In our opinion, the properties of vectors in the form of coordinates, vectors
operations on numbers, which lead to operations on the coordinates of vectors

Due to the simplicity of the vector calculation, the coordinate-vector method solves geometric problems
is one of the reliable means of solving. This is the method of coordinates
studying geometric shapes with the analytical method, that is, with the help of calculations
method. It brings geometric problems into algebraic problems. Such issues
and it is easily algorithmized, that is, it leads to a sequence of exact calculations.
The method of coordinates is two branches of mathematics: algebra and geometry
is a meeting between geometric objects and algebraic formulas
establishes a connection. This connection is made through the coordinate system

Currently, this method is used in various fields of science and production
(graphs, tables, diagrams, maps, etc.) are used.

Problem 1: Prove that the midline of a triangle is parallel to the base and equal to half the base.

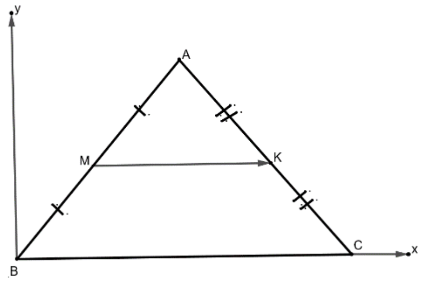
Solution: we introduce the rectangular coordinate system in the following form.
Let the coordinates of point B be B(0;0) and the coordinates of points A and C be A(x_1;y_1) , C(x_2;0).
In that case, since the point M is the midpoint of the section AB of the points M and K, it follows

$M=\frac{(x_1;y_1)+(0;0)}{2}=(\frac{x_1}{2};\frac{y_1}{2})$, $K=\frac{A+C}{2}=\frac{(x_1;y_1)+(x_2;0)}{2}=(\frac{x_1+x_2}{2};\frac{y_1}{2})$ bo'ladi.

Now, in order to prove that MK is parallel to BC and equal to its half, it is necessary to introduce vectors (MK) ⃗ and (BC) ⃗ and show equality (MK) ⃗=k(BC) ⃗.
Coordinates of vectors (MK) ⃗ and (BC) ⃗ (MK) ⃗=K-M=(x_2/2;0)
(BC) ⃗=C-B=(x_2;0) . It follows that (BC) ⃗=2(MK) ⃗.

Problem 2 In a right-angled triangle, the legs are equal to l, m. Find the length of the medians transferred to these legs and the angle between them.

ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 12 Issue: 05 in May-2023
https://www.gejournal.net/index.php/IJSSIR



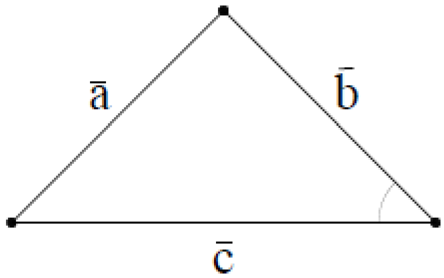
Solution: We find the coordinates of points A, B, C, D_1, D_2 by placing the rectangular coordinate system in the following form. If we consider point A as the origin of coordinates in the selected coordinate plane, points B and C lie on the coordinate axes. From this, A(0;0), B(0;l), C(m;0) will have coordinates. $D_1 = \frac{A+B}{2} = (0;\frac{l}{2})$, $D_2 = \frac{A+C}{2} = (\frac{m}{2};0)$ from which the length of the medians is as follows

$$m_1 = \rho(CD_1) = \sqrt{m^2 - \frac{l^2}{4}}$$

$m_2 = \rho(BD_2) = \sqrt{\frac{m^2}{4} - l^2}$ will be. The angle between these medians is equal to the angle between the vectors (CD_1) ⃗ and (BD_2) ⃗ corresponding to the medians.

$$\varphi = \frac{\overrightarrow{CD_1}\overrightarrow{BD_2}}{|\overrightarrow{CD_1}||\overrightarrow{BD_2}|} = -\frac{\frac{m^2}{2} + \frac{l^2}{2}}{\sqrt{\frac{m^2}{4} - l^2}\sqrt{m^2 - \frac{l^2}{4}}}$$

Issue 3. Find the third side of an arbitrary triangle by two sides and the angle between them.
Solution: this problem is known as the theorem of cosines in our school math course. We will try to prove this theorem using the vector method. We place vectors a ⃗, b ⃗, c ⃗ on the sides of the triangle in Fig. 3.



According to the vector subtraction rule, the following equality $\vec{c} - \vec{b} = \vec{a}$ is appropriate. If we square both sides of this equation, the equation $c^2 + b^2 - 2\vec{c}\vec{b} = a^2$ is formed. According to the rule of scalar multiplication of vectors, if we take $\vec{c} \cdot \vec{b} = |\vec{c}| \cdot |\vec{b}| \cdot \cos(\vec{c}^\wedge\vec{b})$, $\varphi = \vec{c}^\wedge\vec{b}$, the following equality is formed . $c^2 + b^2 - 2cb\cos\varphi = a^2$

Problem 4 Check whether the points A$(x_1;y_1)$, B$(x_2;y_2)$, C$(x_3;y_3)$ lie on a straight line.
Solution: There are different ways to check that given points lie on a straight line. Below we will check whether these points lie on a straight line using the method of vectors. Suppose these points lie on a straight line, then the vectors corresponding to these points are collinear. That is, $\overrightarrow{AB}||\overrightarrow{BC}$, then these vectors can be expressed in the following form. $\overrightarrow{AB} = \lambda\overrightarrow{BC}$.. If we express this equality in coordinates $(x_2 - x_1; y_2 - y_1) = \lambda(x_3 - x_2; y_3 - y_2)$ we will have the following equality. If we find λ from this equation and equate it, we get the equation $\frac{x_2-x_1}{x_3-x_2} = \frac{y_2-y_1}{y_3-y_2}$ The condition is created that these 3 points lie on a straight line.

ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 12 Issue: 05 in May-2023
https://www.gejournal.net/index.php/IJSSIR

Using the coordinate-vector method is very effective in solving geometric problems. In this case, on the one hand, the main aspects related to coordinate and vector methods (alternative choice of coordinate system, creation of the necessary vector relationship to solve the given problem) are used in the teaching process.
can be an effective weapon in the hands of students. Of course, in this process, along with solving the given problem, the student strengthens his knowledge of the concept of coordinate system and vector algebra.

Used literature:

1. Gusev.V.A., Litvenko V.N., Mordkovich A.G. Praktikum po resheniyu
mathematicheskikh zadach. M, Prosvisheniye 1986.
2. Gusev.V.A., Kolyagin Yu.M., Lukakinin G.L., Vector and school course
geometry. M, Prosvisheniye 1986.
3.M.Murodova, Aminova M. Cultural diversity and information and communication impacts on language learning. Republic of Uzbekistan Ministry of Emergency Situations academy Different approaches to learning foreign languages: problems and solutions. Materials of scientific-practical conference. Tashkent-2022.
4. N.D. Dodajonov, M.Sh. Joraeva. Geometry. Part 1, Tashkent. "Teacher", 1996. (tutorial).

ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 12 Issue: 05 in May-2023
https://www.gejournal.net/index.php/IJSSIR