THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-3

FUNDAMENTALS OF ALGORITHM AND PROGRAMMING IN MATHCAD SOFTWARE.

Quvvatov Behruz Ulug`bek o`g`li

*teacher of the "General Technical Sciences" department of
the International University of Asia
ulughbekovich.bekhruz@mail.ru*

INTRODUCTION.

In order to calculate a set of problems of a complex type and to achieve the result faster, an algorithm is designed for this type of problems, and programs are created based on this algorithm. Programming is central to Mathcad. Although Mathcad can solve many problems without the program, there are some class problems that cannot be solved without the program. That's why the mathcad program gives us such an opportunity. Mathcad allows you to enter any complex program. Mathcadda programming is very clear and easy to understand, in which the program expresses several consecutive formulas. The main programming operators are located in the Programming panel. We can activate this panel from the toolbars section of the view menu.

FUNDAMENTALS OF ALGORITHM AND PROGRAMMING IN MATHCAD SOFTWARE.

Before creating a program for a problem in Mathcad, it is necessary to create an algorithm for this problem. When creating an algorithm for an arbitrary problem, we have to choose one of 3 different algorithmic approaches. These are:

1. Linear algorithm
2. A branching algorithm
3. Iterative algorithm

to work on the basis of the same three approaches when creating a program . To build a program in Mathcad, you need to enter its lines. This is done in the following procedure:

1. Enter the name of the program expression.
2. Enter the assignment operator (:=).
3. Clicking the Add Program Line button from the programming panel.
4. Enter the necessary operators in the input field that appears, remove the redundant input field.

$$dastur :=$$

Picture 1 .

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-3

Quyida oddiy ifodani hisoblash dasturini ko'rib o'tamiz.

$$y = a \cdot x^3 + e^b \cdot \cos(x)$$

$$x := 3$$

$$y(x) := \begin{vmatrix} a \leftarrow 3 \\ b \leftarrow 4 \\ a \cdot x^3 + e^b \cdot \cos(x) \end{vmatrix}$$

$$y(x) = 26.948$$

Figure 2.

To open the desired input line, move the blue corner cursor to the end of the line and press the Add Program Line button while holding down the space bar. If it is necessary to open the input line before the line, it is necessary to bring the blue corner cursor to the beginning of the line and press the Add Program Line button while pressing the space key . In some cases, for example, when adding a line between two nested cycles, this method becomes unavailable.

necessary to use another method . This method is done as follows:

1. The inside of the cycle is divided into black.

Click the Cut button from the standard toolbar.

3.Add Progrm Line (add a line to the program) programming panel button is clicked.

4. The cursor is placed at the place where the line is entered, and the Paste button is clicked from the standard toolbar.

5. The input field that appears is filled. This method provides convenience in entering a line in all cases.

Sending values locally in a program

Assigning values to ⇓constants and variables in the program is done using the assignment operator ( ) . This operator is combined with the Local Definition button in the programming panel tool (Local Definition). During program creation, in most cases, this symbol can also be executed by pressing the { symbol from the keyboard .

The value of a local variable cannot be used outside the program. If it is necessary to use it outside , it is necessary to place the cursor in a space after the last statement of the program, and then write the variable.

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY
VOLUME-4, ISSUE-3

If you need to output a single value of a variable, you should write the name of this variable. If you want to output a vector or array, you need to enter its name.

The if conditional operator.

The if conditional statement takes effect in two steps. The condition written to the right of the first if operator is checked. If it is true, the expression to the left of it is executed, otherwise, it goes to the next line of the program.

procedures below .

1. In the program to be compiled, the cursor is placed at the place where the conditional operator is entered.

2. The if operator button is pressed from the programming panel. An operator template with two inputs appears in the program.

3. A condition is entered in the right input field. Logical operators can be used for this. For this, using the (Boolean) logical operator panel provides some convenience.

4.If statement is entered on the left hand side of the expression to be executed when the condition is true.

If multiple expressions are executed in the execution of the condition, then it is necessary to have multiple input fields. To do this, place the cursor in the input field to the left of the if statement, and then press the Add Program Line button on the programming panel as many lines as needed. It should be noted that the appearance of the conditional operator changes . A vertical newline appears below the insertion point, not to the left, and to the right of the if operator. If the condition is false , the transition is to the next line of the program.

There are three ways to write a condition in Mathcad:

• using the if conditional operator of programming ;

• using boolean operators;

• using the if function.

Figure 3 below shows three ways to write a condition.

Ushbu funksiyani hisoblang:

$$y = \begin{cases} \ln(\sqrt{a}), & a < 3 \\ 2, & 3 \le a \le 5 \\ (a+1)^2 - a, & a > 5 \end{cases}$$

1 – Dasturlash bo'yicha

$a := 8$

$y := \Big|$ if $a < 3$
$\quad \Big| b \leftarrow \sqrt{a}$
$\quad \Big| \ln(b)$
$\quad 2$ if $3 \le a \le 5$
$\quad$ otherwise
$\quad \Big| c \leftarrow a + 1$
$\quad \Big| c^2 - a$

Javobi
$y = 73$

2.Bul operatori bo'yicha

$y1 := \left[\ln(\sqrt{a})(a < 3) + 2.(3 \le a \le 5) + \left[(a + 1)^2 - a \right](a > 5) \right]$

$y1 = 73$

3.if funktsiyasi bo'yicha

$y2 := \text{if}\left[a < 3, \ln(\sqrt{a}), \text{if}\left[3 \le a \le 5, 2, (a + 1)^2 - a \right] \right]$

$y2 = 73$

Figure 3. Calculation of the conditional function in three ways .

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY
VOLUME-4, ISSUE-3

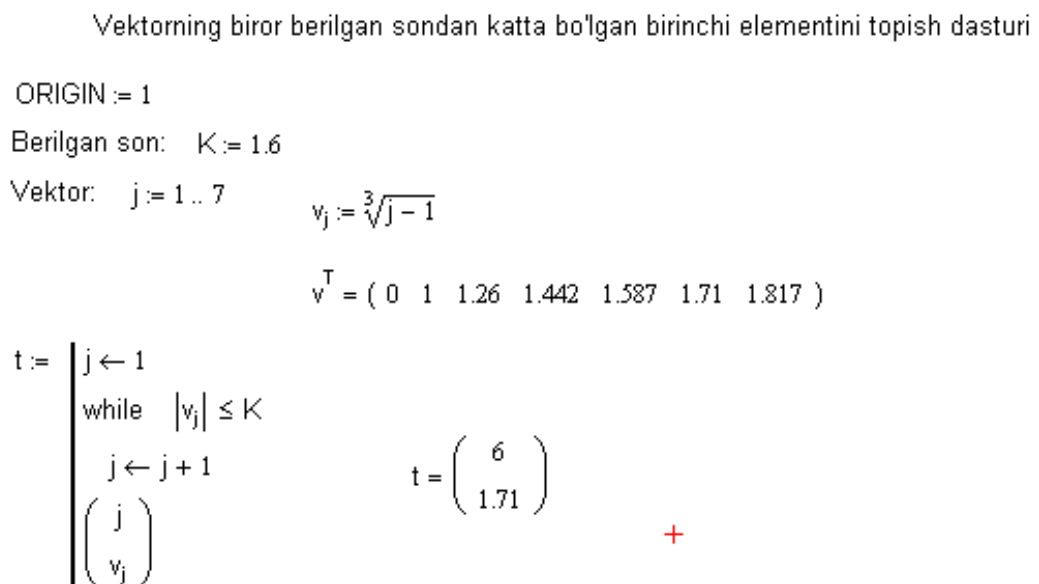**Loop operator.**

Mathcad has two loop operators: FOR and WHILE.

• If the number of repetitions in the loop is known in advance, then the FOR operator is used.

• If the loop is to be repeated within the fulfillment of a certain condition, then the WHILE statement is used.

WHILE statement

The while loop statement executes the iteration if a condition is true in cases where the number of iterations is not specified in advance. The given condition is first checked, and then the operators contained in it are executed depending on the fulfillment of the condition.

While loop operator, the following sequence should be performed :
1. The cursor is placed in the space where the program should be entered.

2. Click the While Loop button from the programming panel.

3. A condition (logical expression) is entered from the right side of the While operator.

4. Expressions that need to be cycled are entered below the While operator. If you need to calculate several expressions in a loop, first place the cursor at the input point, then Add Program

Line (Insert a line into the program) or "]" (closing middle bracket) key should be pressed as many times as the number of lines included in the loop. Then the input fields are filled with the required expressions and the excess input field is removed. Figure 4 below shows an example of determining the first large value of a vector from a given value.

Vektorning biror berilgan sondan katta bo'lgan birinchi elementini topish dasturi

$ORIGIN := 1$

Berilgan son: $K := 1.6$

Vektor: $j := 1 .. 7$ $v_j := \sqrt[3]{j - 1}$

$$v^T = (0 \quad 1 \quad 1.26 \quad 1.442 \quad 1.587 \quad 1.71 \quad 1.817)$$

$$t := \begin{vmatrix} j \leftarrow 1 \\ \text{while} \quad |v_j| \leq K \\ \quad j \leftarrow j + 1 \\ \begin{pmatrix} j \\ v_j \end{pmatrix} \end{vmatrix} \qquad t = \begin{pmatrix} 6 \\ 1.71 \end{pmatrix}$$

Figure 4. Using the While loop operator in programming .

The FOR operator

the for loop operator when the number of iterations is known in advance . It determines the repetition of the for statement, the variable that precedes it. To write a **for** loop statement, you need to perform the following sequence:
1. The cursor is placed in the space where the program should be entered.

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-3

2. Click the For Loop button from the programming panel.

3. The name of the variable is entered from the right side of the for operator, followed by the range of the variable. A loop variable can be an array of numbers or a vector.

For example, in the figure, the variable values are represented as a comma-separated vector.

4.   Below the for statement, the expressions that should be cycled are entered. If you need to evaluate several expressions in the loop, first place the cursor at the input point, then press Add Program Line or "]" (closing middle bracket) as many times as the loop contains. will need to be pressed. Then the input fields are filled with the required expressions and the excess input field is removed. The example given in Figure 5 below shows how to determine the first large value of a vector from a given value.

5.

Figure 5. Using the For loop operator in programming.

List of used literature:

1.   Babaev, S., Olimov, N., Imomova, S., & Kuvvatov, B. (2024, March). Construction of natural L spline in W2, σ (2, 1) space. In *AIP Conference Proceedings* (Vol. 3004, No. 1). AIP Publishing.

2.   Behruz Ulugbek og, Q. (2023). TECHNOLOGY AND MEDICINE: A DYNAMIC PARTNERSHIP. *International Multidisciplinary Journal for Research & Development*, *10*(11).

3.   Behruz Ulug'bek o'g, Q. (2023). USE OF ARTIFICIAL NERVOUS SYSTEMS IN MODELING. *Multidisciplinary Journal of Science and Technology*, *3*(5), 269-273.

4.   Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. KLASSIK GAUSS KVADRATURALARI. *Инновационные исследования в науке*, *3*(2), 94-103.

5.   Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. SIMPSON FORMULASI. *Models and methods in modern science*, *3*(2), 223-228.

6.   Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. ROMBERG INTEGRALLASH FORMULASI. *Центральноазиатский журнал образования и инноваций*, *3*(2 Part 2), 107-112.

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-3

7.   Quvvatov, B. (2024, February). TORTBURCHAK ELEMENT USTIDA GAUSS– LEJANDR FORMULASI. In *Международная конференция академических наук* (Vol. 3, No. 2, pp. 101-108).

8.   Behruz Ulug'bek o'g, Q. li.(2023). Mobil ilovalar yaratish va ularni bajarish jarayoni. *International journal of scientific researchers*, 2(2).

9.   Quvvatov, B. (2024, February). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. REKURSIV TRAPETSIYALAR QOIDASI. In *Международная конференция академических наук* (Vol. 3, No. 2, pp. 41-51).

10.   Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. ORTOGONAL KOPHADLAR. *Инновационные исследования в науке*, 3(2), 47-59.

11.   Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. GAUSS KVADRATUR FORMULALARI. *Models and methods in modern science*, 3(2), 114-125.

12.   Quvvatov, B. (2024). GLOBAL IN VIRTUAL LEARNING MOBILE APP CREATION INFORMATION SYSTEMS AND TECHNOLOGIES. *Science and innovation in the education system*, 3(1), 95-104.

13.   Quvvatov, B. (2024). WEB FRONT-END AND BACK-END TECHNOLOGIES IN PROGRAMMING. *Theoretical aspects in the formation of pedagogical sciences*, 3(1), 208-215.

14.   Quvvatov, B. (2024). FINDING SOLUTIONS OF SPECIAL MODELS BY INTEGRATING INTEGRAL EQUATIONS AND MODELS. *Current approaches and new research in modern sciences*, 3(1), 122-130.

15.   Quvvatov, B. (2024). CONSTRUCTION OF SPECIAL MODELS THROUGH DIFFERENTIAL EQUATIONS AND PRACTICAL SOLUTIONS. *Solution of social problems in management and economy*, 3(1), 108-115.

16.   Quvvatov, B. (2024). CONSTRUCTION OF SPECIAL MODELS THROUGH DIFFERENTIAL EQUATIONS AND PRACTICAL SOLUTIONS. *Solution of social problems in management and economy*, 3(1), 108-115.

17.   Karimov, F. (2022). ANIQ INTEGRALNI TAQRIBIY HISOBLASH. *ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu. uz)*, 14(14).

18.   Latipova, S. (2024). YUQORI SINF GEOMETRIYA MAVZUSINI O'QITISHDA YANGI PEDAGOGIK TEXNOLOGIYALAR VA METODLAR. SINKVEYN METODI, VENN DIAGRAMMASI METODLARI HAQIDA. *Theoretical aspects in the formation of pedagogical sciences*, 3(3), 165-173.

19.   Latipova, S. (2024, February). SAVOL-JAVOB METODI, BURCHAKLAR METODI, DEBAT (BAHS) METODLARI YORDAMIDA GEOMETRIYANI O'RGANISH. In *Международная конференция академических наук* (Vol. 3, No. 2, pp. 25-33).

20.   Latipova, S., & Sharipova, M. (2024). KESIK PIRAMIDA MAVZUSIDA FOYDALANILADIGAN YANGI PEDAGOGIK TEXNOLOGIYALAR. 6X6X6 METODI, BBB (BILARDIM, BILMOQCHIMAN, BILIB OLDIM) METODLARI HAQIDA. *Current approaches and new research in modern sciences*, 3(2), 40-48.

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY
VOLUME-4, ISSUE-3

21. Latipova, S. (2024). 10-11 SINFLARDA STEREOMETRIYA OQITISHNING ILMIY VA NAZARIY ASOSLARI. *Академические исследования в современной науке*, *3*(6), 27-35.

22. Latipova, S. (2024). HILFER HOSILASI VA UNI HISOBLASH USULLARI. *Центральноазиатский журнал образования и инноваций*, *3*(2), 122-130.

23. Latipova, S. (2024). HILFER MA'NOSIDA KASR TARTIBLI TENGLAMALAR UCHUN KOSHI MASALASI. *Development and innovations in science*, *3*(2), 58-70.

24. Latipova, S. (2024). KESIK PIRAMIDA TUSHUNCHASI. KESIK PIRAMIDANING YON SIRTINI TOPISH FORMULALARI. *Models and methods in modern science*, *3*(2), 58-71.

25. Shahnoza, L. (2023, March). KASR TARTIBLI TENGLAMALARDA MANBA VA BOSHLANG'ICH FUNKSIYANI ANIQLASH BO'YICHA TESKARI MASALALAR. In *" Conference on Universal Science Research 2023"* (Vol. 1, No. 3, pp. 8-10).

26. qizi Latipova, S. S. (2024). CAPUTO MA'NOSIDAGI KASR TARTIBLI TENGLAMALARDA MANBA FUNKSIYANI ANIQLASH BO 'YICHA TO 'G 'RI MASALALAR. *GOLDEN BRAIN*, *2*(1), 375-382.

27. Latipova, S. S. (2023). SOLVING THE INVERSE PROBLEM OF FINDING THE SOURCE FUNCTION IN FRACTIONAL ORDER EQUATIONS. *Modern Scientific Research International Scientific Journal*, *1*(10), 13-23.

28. Latipova, S. (2024). GEOMETRIYADA EKSTREMAL MASALALAR. В DEVELOPMENT OF PEDAGOGICAL TECHNOLOGIES IN MODERN SCIENCES (Т. 3, Выпуск 3, сс. 163–172).

29. Latipova, S. (2024). EKSTREMUMNING ZARURIY SHARTI. В SOLUTION OF SOCIAL PROBLEMS IN MANAGEMENT AND ECONOMY (Т. 3, Выпуск 2, сс. 79–90).

30. Latipova, S. (2024). FUNKSIYANING KESMADAGI ENG KATTA VA ENG KICHIK QIYMATI. В CURRENT APPROACHES AND NEW RESEARCH IN MODERN SCIENCES (Т. 3, Выпуск 2, сс. 120–129).

31. Latipova, S. (2024). EKSTREMUMLARNING YUQORI TARTIBLI HOSILA YORDAMIDA TEKSHIRILISHI. IKKINCHI TARTIBLI HOSILA YORDAMIDA EKSTREMUMGA TEKSHIRISH. В SCIENCE AND INNOVATION IN THE EDUCATION SYSTEM (Т. 3, Выпуск 3, сс. 122–133).

32. Latipova, S. (2024). BIR NECHA O'ZGARUVCHILI FUNKSIYANING EKSTREMUMLARI. В THEORETICAL ASPECTS IN THE FORMATION OF PEDAGOGICAL SCIENCES (Т. 3, Выпуск 4, сс. 14–24).

33. Latipova, S. (2024). SHARTLI EKSTREMUM. В МЕЖДУРОДНАЯ КОНФЕРЕНЦИЯ АКАДЕМИЧЕСКИХ НАУК (Т. 3, Выпуск 2, сс. 61–70).

34. Latipova, S. (2024). KASR TARTIBLI HOSILALARGA BO'LGAN ILK QARASHLAR. В CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (Т. 3, Выпуск 2, сс. 46–51).

35. Latipova, S. (2024). TURLI EKSTREMAL MASALALAR. BAZI QADIMIY EKSTREMAL MASALALAR. В CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (Т. 3, Выпуск 2, сс. 52–57).

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY
VOLUME-4, ISSUE-3

36.   Latipova, S. (2024). FUNKSIYA GRAFIGINI YASASHDA EKSTREMUMNING QO'LLANILISHI. В CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (Т. 3, Выпуск 2, сс. 58–65).

37.   Latipova, S. (2024). BIRINCHI TARTIBLI HOSILA YORDAMIDA FUNKSIYANING EKSTREMUMGA TEKSHIRISH, FUNKSIYANING EKSTREMUMLARI. В CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (Т. 3, Выпуск 2, сс. 66–72).

38.   Sharipova, M., & Latipova, S. (2024). TAKRORIY GRUPPALASHLAR. *Development of pedagogical technologies in modern sciences*, *3*(3), 134-142.

39.   Murodov, O. T. R. (2023). Zamonaviy ta'limda axborot texnologiyalari va ularni qo 'llash usul va vositalari. *Educational Research in Universal Sciences*, *2*(11), 481-486.

40.   Муродов, О. Т. (2023). РАЗРАБОТКА АВТОМАТИЗИРОВАННОЙ СИСТЕМЫ УПРАВЛЕНИЯ ТЕМПЕРАТУРЫ И ВЛАЖНОСТИ В ПРОИЗВОДСТВЕННЫХ КОМНАТ. *GOLDEN BRAIN*, *1*(26), 91-95.

41.   Murodov, O. T. R. (2023). INFORMATIKA DARSLARINI TASHKIL ETISHDA INNOVATSION USULLARDAN FOYDALANISH. *GOLDEN BRAIN*, *1*(32), 194-201.

42.   Murodov, O. T. R. (2023). INFORMATIKA FANINI O 'QITISHDA YANGI INNOVATSION USULLARDAN FOYDALANISH METODIKASI. *GOLDEN BRAIN*, *1*(34), 130-139.

43.   Turakulovich, M. O. (2023). DEVELOPMENT AND INSTALLATION OF AN AUTOMATIC TEMPERATURE CONTROL SYSTEM IN ROOMS. *International Multidisciplinary Journal for Research & Development*, *10*(12).

44.   MURODOV, O. T. (2023). INNOVATIVE INFORMATION TECHNOLOGIES AND NEW METHODS AND TOOLS FOR THEIR APPLICATION IN TODAY'S EDUCATION. *International Multidisciplinary Journal for Research & Development*, *10*(12).

45.   Muradov, O. (2024, January). APPLICATION OF BASIC PRINCIPLES AND RULES OF INNOVATIVE PEDAGOGICAL TECHNOLOGIES TO EDUCATIONAL PROCESSES. In *Международная конференция академических наук* (Vol. 3, No. 1, pp. 46-55).

46.   Muradov, O. (2024). BASIC PRINCIPLES AND RULES OF INNOVATIVE PEDAGOGICAL TECHNOLOGIES IN THE EDUCATIONAL PROCESS. *Models and methods in modern science*, *3*(1), 84-93.

47.   Muradov, O. (2024). APPLIED TO THE CURRENT TRAINING PROCESS REQUIREMENTS. *Инновационные исследования в науке*, *3*(1), 54-63.

48.   Muradov, O. (2024). DEVELOPMENT OF AN AUTOMATED PARAMETER CONTROL SYSTEM ROOMS AND WORKSHOPS BASED ON CLOUD TECHNOLOGIES. *Академические исследования в современной науке*, *3*(2), 16-27.

49.   Murodov, O. (2024). DEVELOPMENT AND INSTALLATION OF AN AUTOMATIC TEMPERATURE CONTROL SYSTEM IN ROOMS. В SOLUTION OF SOCIAL PROBLEMS IN MANAGEMENT AND ECONOMY (Т. 3, Выпуск 2, сс. 91–94).

50.   Муродов, О. (2024). РАЗРАБОТКА АВТОМАТИЧЕСКОЙ СИСТЕМЫ УПРАВЛЕНИЯ ТЕМПЕРАТУРЫ И ВЛАЖНОСТИ В ПОМЕЩЕНИЯХ. В CURRENT APPROACHES AND NEW RESEARCH IN MODERN SCIENCES (Т. 3,

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-3

51.   Murodov, O. (2024). TA'LIM TEXNOLOGIYALARINING ILMIY-NAZARIY ASOSLARI. В SCIENCE AND INNOVATION IN THE EDUCATION SYSTEM (Т. 3, Выпуск 3, cc. 155–160).

52.   Murodov, O. (2024). INNOVATSION YONDASHUV ASOSIDA INFORMATIKA VA AXBOROT TEXNOLOGIYALARI FANINI O'QITISH JARAYONINI TAKOMILLASHTIRISH. В THEORETICAL ASPECTS IN THE FORMATION OF PEDAGOGICAL SCIENCES (Т. 3, Выпуск 4, cc. 77–81).

53.   Murodov, O. (2024). INNOVATIVE INFORMATION TECHNOLOGIES AND NEW METHODS AND TOOLS FOR THEIR APPLICATION IN TODAY'S EDUCATION. В CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (Т. 3, Выпуск 2, cc. 83–92).

54.   Komilov, O. S., & Sayfulloev, S. S. (2024). HORIZONTAL AND VERTICAL LOOPS GEOTHERMAL HEATING SYSTEM. *Educational Research in Universal Sciences*, *3*(2), 384-391.

55.   Sayfulloev, S. S. (2023). HEAT-TECHNICAL CHARACTERISTICS OF HEAT PUMP DEVICE FOR HEAT SUPPLY SYSTEMS. *GOLDEN BRAIN*, *1*(34), 91-101.

56.   Komilov, O. S., Sayfulloev, S. S., & Rustamova, F. R. (2022). CALCULATION OF THE THERMODYNAMIC CYCLE OF A VAPOR COMPRESSION HEAT PUMP INSTALLATION WITH A SUBCOOLER FOR HEATING AND HOT WATER SUPPLY. *Центральноазиатский журнал образования и инноваций*, *1*(1), 43-47.

57.   Sayfulloev, S. S. (2023). HEAT-TECHNICAL CHARACTERISTICS OF HEAT PUMP DEVICE FOR HEAT SUPPLY SYSTEMS. *GOLDEN BRAIN*, *1*(34), 91-101.

58.   Komilov, O. S., Sayfulloev, S. S., & Urinov, S. (2021). Analysis Of Energy of Heat Pump Heating System with The Environment. *Texas Journal of Multidisciplinary Studies*, *3*, 230-233.