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Essential Elements of Mathematics

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This book is intended for undergraduate and graduate students of math, computer science and physics as well as professor –teachers who need practice in improving their reading and comprehension in English. It has been our first experience that even learners of English can read, understand, and speak on their specialty in this language. Therefore, mathematical concepts, math terms in each section is on increasing reading, writing, speaking skills. These materials have been selected for the students of above-mentioned departments and also for professor - teachers who are going to teach due to the specialty .

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KIRISH

Ushbu qo'llanma matematika sohasidagi bakalavriat va magistratura talabalari hamda mutaxassislik fanlarni ingliz tilida olib borishni rejalashtirayotgan professor-o'qituvchilar uchun mo'ljallangan.

Har bir bo'limda matematik tushunchalalar ham o'zbek ham ingliz tilida berilgan va so'ngra mavzuga doir kalit so'zlar jadvali keltirilgan. Birinchi bo'limda haqiqiy sonlar va ular ustida arifmetik amallar, haqiqiy sonlarning xossalari, natural, miqdor va tartib sonlarning ingliz tilida o'qilishi, nomlanishilari berilgan. Shuningdek, oddiy kasrlar, aralash sonlar, o'nli kasrlar va haqiqiy sonning absolyut qiymati kabi tushunchalar keltirilgan. Matematik tushuncha va terminlardan so'ng ularni mustahkamlash uchun mashqlar berilgan.

Qo'llanmada matematik belgilar, daraja va ildiz, to'plamlar va ular ustida amallar hamda elementar funksiyalarning belgilanishi va o'qilishi bayon qilingan. Shunigdek, bir nechta ilovalar ham keltirilgan.

Ma'lumki, matematik terminlar, formulalar va boshqa matematik belgilashlarni ingliz tilida o'qish va bayon qilish ko'plab talabalar uchun qiyinchilik tug'diradi. Shu sababli qo'llanma orqali o'rganuvchilarga ko'mak berish nazarda tutilgan.

Qo'llanmaning asosiy maqsadi talabalar va yosh o'qituvchilarni matematika mutaxassisligi bo'yicha ingliz tilida yozilgan matematik tushunchalarni o'qishga, tushunishga va ularni qo'llashga o'rgatishdan iborat.

Mazkur qo'llanma matematika sohasidagi mutaxassislik fanlarini ingliz tilida o'qitishga qaratilgan dastlabki qadam deyish mumkin va u matematika yo'nalishidagi mutaxassislik fanlarini ingliz tilida o'qitishda muhim manbaa bo'lib xizmat qiladi.

INTRODUCTION

This manual is designed for undergraduate students of mathematics, computer science and physics as well as professor-teachers who are going to teach their specialty in English. It consists of 7 chapters and appendices.

In each section of the manual includes mathematical concepts in Uzbek and English, and a table of key words.

The first section consists of the real numbers; there are arithmetical operations on the real numbers, properties of the real numbers, reading of natural, quantity and ordinal numbers and their names in English. In addition, simple fractions, mixed numbers, decimal fractions and real numbers, the definitions to the absolute value of the real numbers are also given in it. There are also several activities for revision after those.

Therefore, this book gives mathematical signs, power, root and their operations such as signs of basic functions and reading of them. There are also a few appendixes.

It is known that is difficult to read and express math terms, power, formulas and other math signs for students in the English language. For that reason, this manual is helpful to be easily understand by learners.

The main purpose of the manual is to teach students, young teachers according to their specialty on mathematical concepts and their reading, understanding and the usage in English.

This manual is aimed at teaching of the science in English, it can be said the initial step for learners as well as an important source for the expertise.

Contents

1. THE REAL NUMBER SYSTEM
1.1 THE REAL NUMBER

Haqiqiy sonlar.

- Quyidagi 1,2,3, 4,…
sonlar **natural sonlar deb ataladi**.

- Quyidagi …-5, -4, -3, -2 ,-1, 0, 1, 2, 3, 4, 5, … ko'rinishdagi sonlar **butun sonlardir**.

- $\frac{p}{q}$ (bu yerda p butun son, q natural son) ko'rinishda ifodalash mumkin bo'lgan sonlar **ratsional sonlar** deyiladi.

Bundan tashqari, ratsional son

- chekli o'nli kasr ko'rinishida, $\frac{1}{4} = 0.25$;

- yoki cheksiz davriy o'nli kasr $\frac{10}{3} = 3.(3)$
ko'rinishida ifodalanadi.

- Chekli bo'lmagan o'nli kasrlar va davriy bo'lmagan o'nli kasrlar **irratsional sonlar** deyiladi.

Irratsional sonni p va q larning hech bir qiymatida $\frac{p}{q}$ ko'rinishda ifodalab bo'lmaydi.
π, e, $\sqrt{3}$ sonlar irratsional sonlarga eng sodda misoldir.

- Ratsional sonlar va irratsional sonlar **haqiqiy sonlar** deyiladi.

Noldan katta bo'lgan son **musbat son** deyiladi.

Noldan kichik bo'lgan son **manfiy son** deyiladi.

The Real Numbers.

- **Natural numbers** are called the following numbers: 1,2,3, 4,…

- **Integers** are the following numbers: …-5, -4, -3, -2,-1, 0, 1, 2, 3, 4, 5, …

- The numbers, that can be represented as a fraction $\frac{p}{q}$ (where p is integer, q is natural) are called **rational numbers.**

In addition, a rational number can be also represented:

- either as terminating decimal, $\frac{1}{4} = 0.25$;

- or as a repeating decimal $\frac{10}{3} = 3.(3)$

- **Irrational numbers** are the numbers that can be represented as a non-repeating and non-terminating decimals.

An **irrational number** cannot be represented as a fraction $\frac{p}{q}$ for any integer p and natural q.
Typical examples of irrational numbers are the numbers π, e, $\sqrt{3}$.

- Rational and irrational numbers are called as **real numbers**

A positive number is the number that is greater than zero.

A negative number is the number that is less than zero.

Natural sonlar to'plamini ikki sinfga ajratish mumkin: **juft va toq sonlar**

Agar natural son ikki soniga bo'linsa, u holda bu son **juft son** deyiladi.

Agar natural son ikki soniga bo'linmasa, u holda bu son **toq son** deyiladi.

Misol. 18 natural son. Shuningdek, u musbat va juft son hamdir.

The set of natural numbers can be subdivided into two classes: **even and odd numbers.**

If the natural number is divisible by number two, then this number is called **even number**.

If the natural number is not divisible by number two, then this number is called **odd number**.

Example. Number 18 is natural. It is also positive and even.

Active vocabulary

decimal	o'nli kasr
terminating decimal	chekli o'nli kasr
recurring (repeating) decimal	cheksiz davriy kasr
non-repeating decimal	nodavriy o'nli kasr
non-terminating	o'nli bo'lmagan kasr
to represent	ifodalamoq
divisible	bo'linadigan, bo'linuvchi
Number	son
negative	manfiy
positive	musbat
even	juft
odd	toq
typical	sodda
zero	nol
system	sistema
and vice versa	va aksincha

1.2. ARITHMETIC OPERATIONS ON REAL NUMBERS

Arifmetik amallar.
Haqiqiy sonlar ustida **arifmetik amallar** qo'shish, ayirish, kop'aytirish va bo'lishdir.

Arithmetic Operations.
The arithmetic operations associated with real numbers are addition, subtraction, multiplication and division.

The preliminary table

Jadval 1		Table 1	
Amallar	Ishora	Sign	Operations
Qo'shish	+		Addition
Ayirish	-		Subtraction
Ko'paytirish	$\cdot$ $\times$		Multiplication
Bo'lish	$\vdots$ $/$		Division

The expanded table

Jadval 2			Table 2	
Operation	Signs of operations		Names of components	Examples
	Writing	Reading		
Addition	+	Plus	$a+b=c$ where a and b are addends (or summands or items), $c-$ sum	$x+10=b$ x plus ten equals b or x plus ten is equal to b
Subtraction	-	Minus	$a-b=c$ where a is a minuend, b-subtrahend, $c-$ difference (or remainder)	$y-5=10$ y minus five equals ten or y minus five is equal to ten
Multiplication	*	Multiplied by	$a\cdot b=c$ where a and b are factors (multipliers) c-product	$a\cdot b=a\times b=ab=c$ a times b equals c or a multiplied by b equals c
division	:	Divided by	$a:b=c$ where a is a dividend, b-divisor, c-quotient	$y:2=10$ y divided by two equals ten

Active vocabulary

preliminary	dastlabki
expanded	kengaytirilgan
operation sign	amal belgisi
addition	qo'shish
addend, summand	qo'shiluvchi
sum	yig'indi
subtraction	ayirish
minuend	kamayuvchi
subtrahend	ayriluvchi
difference, remainder	ayirma
multiplication	ko'paytirish
multiplicand	ko'paytuvchi
factor, multiplier	ko'paytiruvchi
product	ko'paytma
division	bo'lish
dividend	bo'linuvchi
divisor	bo'luvchi
quotient	bo'linma

1. Read and write the following arithmetic operations (addition and subtraction).

Sample:

- 265–198= 67 – "two hundred and sixty five minus one hundred and ninety eight is equal to sixty seven".

- 4018–3978=40 – "four thousand and eighteen minus three thousand nine hundred and seventy eight is equal to forty".

- 58001+129799=187800 – "fifty eight thousand and one plus one hundred twenty nine thousand seven hundred and ninety nine is equal to one hundred and eighty seven thousand eight hundred".

1) 689–201   235+129   465–214   741–341;   615–456

2) 634+581   927–478   648–571   634–189   849–379

3) 372–298   463–267   418+2208   4569+423   8742–364

4) 6810–1384   4697–3257   3614+781   6420+3651   881–475

5) 457896+354   1038+5750   5463–251   589+398   1235+543

2. Read and do the following arithmetic operations (multiplication and division).

Sample:

- 84:6=14 –"eighty four divided by six is equal to (equals) fourteen".

- $6 \cdot 45 = 270$ –"six multiplied by forty five equals two hundred and seventy"

1) $5 \cdot 35$ $4 \cdot 25$ $55 \cdot 10$ $17 \cdot 8$ $75 \cdot 7$

2) $43 \cdot 7$ $71 \cdot 4$ $83 \cdot 5;$ $890 \cdot 10$ $85 \cdot 5$

3) $28 \cdot 9$ $34 \cdot 8$ $39 \cdot 4$ $15 \cdot 17$ $55 \cdot 11$

4) $74 : 2$ $88 : 4$ $49 : 7$ $63 : 7$ $144 : 12$

5) $34 : 2$ $45 : 9$ $42 : 7$ $68 : 17$ $84 : 6$

6) $35 \cdot 7$ $54 : 6$ $50 : 10$ $61 \cdot 8$ $36 : 12$

3. Read and do the following arithmetic operations.

Sample:

- 24*7–58=110 –"twenty four multiplied by seven minus fifty eight is equal to one hundred and ten".

- 28*5+36:9+64   –"twenty eight multiplied by five plus thirty six divided by nine plus sixty four".

1) $34 \cdot 2 + 36$ $14 : 7 + 23$ $15 + 14 \cdot 3$ $100 : 25 + 4 \cdot 3$

2) $555 - 10 \cdot 55$ $256 : 16 + 98$ $250 + 50 \cdot 5$ $68 : 17 + 25$

3) $900 - 300 : 150$ $988 : 4 - 20 \cdot 10$ $749 - 49 + 10 \cdot 2$ $1000 : 50 + 25 \cdot 10$

1.3. PROPERTIES OF REAL NUMBERS

Haqiqiy sonlarning xossalari.

Barchs haqiqiy sonlar quyidagi xossalarga ega bo'ladi:

I.Simmetriklik xossasi.
$a = b$ tenglikdan $b = a$ tenglik kelib chiqadi.
Misol:
$x + y = z$ tenglikdan $z = x + y$ tenglik kelib chiqadi.

II.Tranzitivlik xossasi.
Ikkita son bir-biriga teng bo'ladi, agar ularning har biri aynan bir songa teng bo'lsa.
Boshqacha aytganda, $a = b$ va $c = b$ tengliklardan $a = c$ kelib chiqadi.

Misol: $x + y = z$ va $z = 4 + c$ tengliklardan $x + y = 4 + c$ kelib chiqadi.

III.O'rniga qo'yish xossasi.
Har qanday son unga teng bo'lgan ifodaga almashtirilishi mumkin.

Agar $a = b$ bo'lsa, u holda har qanday matematik tasdiqda a ni b ga almashtirish va b ni a ga almahtirish mumkin.
Misol: Agar $x = 2$ va $x + y = c$ bo'lsa, u holda 2+y=c bo'ladi.

IV. Qo'shish va ayirish xossalari.
Agar o'zaro teng sonlar boshqa o'zaro teng sonlarga qo'shilsa, u holda ularning yig'indilari ham teng bo'ladi.

Agar o'zaro teng sonlar boshqa o'zaro teng sonlardan ayrilsa, u holda ularning ayirmalari ham teng bo'ladi.
If $a = b$ and $c = d$, then $a \pm c = b \pm d$.

Properties of Real Numbers.

All real numbers have the following properties:

I. Symmetric Property.
The equality $a = b$ implies $b = a$.

Example:
The equality $x + y = z$ implies $z = x + y$

II. Transitive Property.
Two numbers are equal to each other if each of them is equal to the same number.
In other word, the equalities $a = b$ and $c = b$ imply $a = c$.

Example: The equality $x + y = z$ and $z = 4 + c$ imply $x + y = 4 + c$.

III. Substitution Property.
Any number may be substituted for its equal in any expression.

If $a = b$ then a may be replaced by b and b may be replaced by a in any mathematical statement.

Example: If $x = 2$ and $x + y = c$ then 2+y=c.

IV. Addition and Subtraction Properties.
If equal numbers are added to equal numbers, then the sums are equal.

If equal numbers are subtracted from equal numbers, then the differences are equal.
If $a = b$ and $c = d$, then $a \pm c = b \pm d$.

V. Ko'paytirish xossasi.
Agar o'zaro teng sonlar boshqa o'zaro teng sonlarga ko'paytirilsa, u holda ularning ko'paytmalari ham teng bo'ladi.
Agar $a = b$ va $c = d$ bo'lsa u holda $ac = bd$ bo'ladi.
Eslatma: Ko'paytmadagi sonlar **ko'paytuvchilar** deb ataladi.

VI. Qo'shish va ko'paytirishga nisbatan kommutativlik xossasi.
Sonlar istalgan tartibda qo'shilishi mumkin:
$$a + b = b + a.$$
Sonlar istalgan tartibda ko'paytirilishi mumkin:
$$a \cdot b = b \cdot a$$

VII. Qo'shish va nisbatan assosiativlik xossasi.
Qo'shiluvchilarni istalgan tartibda guruhlash mumkin:
$$a + (b + a) = (a + b) + c.$$
Ko'paytuvchilarni istalgan tartibda guruhlash mumkin:
$$a(bc) = (ab)c.$$

VIII. Distributivlik xossasi.
Qavslarni ochish mumkin; umumiy ko'paytuvchini qavsdan tashqariga chiqarish mumkin:
$$a(b \pm c) = ab \pm ac$$
$$(a \pm b)c = ac \pm bc$$

Ixtiyoriy a va b haqiqiy sonlar uchun quyidagi shartlardan bittasi va faqat bittasi o'rinli:
$a > b$ $\quad$ (a is greater than b)
$a = b$ $\quad$ (a is equal to b)
$a < b$ $\quad$ (a is less than b)

V. Multiplication Property.
If equal numbers are multiplied by equal numbers, then the products are equal.
If $a = b$ and $c = d$ then $ac = bd$.

Note: The numbers in a product are called **factors**.

VI. Commutative Laws for Addition and Multiplication.
Numbers can be added in any order:
$$a + b = b + a.$$
Numbers can be multiplied in any order:
$$a \cdot b = b \cdot a$$

VII. Associative Laws for Addition and Multiplication.
Addition items can be combined in any groups:
$$a + (b + a) = (a + b) + c.$$

Factors can be combined in any groups:
$$a(bc) = (ab)c.$$

VIII. Distributive Law.
Parentheses can be expanded; a common factor can be taken out:
$$a(b \pm c) = ab \pm ac$$
$$(a \pm b)c = ac \pm bc$$

For any real numbers a and b one and only one of the following conditions holds:
$a > b$ $\quad$ (a is greater than b)
$a = b$ $\quad$ (a is equal to b)
$a < b$ $\quad$ (a is less than b)

1.4. NATURAL NUMBERS

Natural sonlar miqdorni aniqlash uchun sanashda ishlatiladi.

Natural numbers are used as Cardinal Numbers for counting.

Numbers (Sonlar)	Writing by words (So'zlar bilan yozilishi)
1	One
2	Two
3	Three
4	Four
5	Five
6	Six
7	Seven
8	Eight
9	Nine
10	Ten
11	Eleven
12	Twelve
13	Thirteen
14	Fourteen
15	Fifteen
16	Sixteen
17	Seventeen
18	Eighteen
19	Nineteen
20	Twenty
21	Twenty-one…
30	Thirty
40	Forty
50	Fifty
60	Sixty
70	Seventy
80	Eighty
90	Ninety
100	One hundred
101	One hundred and one…
1000	One thousand
1000000	One million

1. Write the given natural number by words.

Sample:

- 203 – "two hundred and three".

- 5146 – "five thousand one hundred and forty six".

- 21698 – "twenty one thousand six hundred and ninety eight".

- 203532 – "two hundred three thousand five hundred and thirty two".

1)	762	145	971	323	988
2)	456	396	396	345	932
3)	243	163	756	839	192
4)	365	526	276	432	567
5)	198	298	354	426	132

1)	1323	9874	2589	2563	2541
2)	4563	4129	4852	1256	3245
3)	1592	2498	7475	7419	3215
4)	6581	1249	1338	2357	3277
5)	2196	8532	5456	5448	9896

1)	15963	35784	85236	25874	74125
2)	14789	35269	15842	95746	32658
3)	65741	32585	56982	32192	35362
4)	21645	95397	32547	75761	19898
5)	96932	46825	46289	37916	45721

2. Transform to numbers.

1) Two hundred and sixty eight

2) Four hundred and twenty seven

3) Five hundred and seventy one

4) Three hundred and twelve

5) Seven hundred and thirty seven

6) Six hundred and fifty four

7) Four hundred and twenty

8) Nine hundred and seventy six

9) Eight hundred and fifty eight

10) Six hundred and ninety nine

11) Five hundred and seventy eight

12) Nine hundred and forty one

13) Seven hundred and thirty six

14) One hundred and sixty one

15) Eight hundred and sixty nine

16) Four hundred and ninety two

17) Seven hundred and ninety nine

18) Five hundred and forty four

19) Eight hundred and eighty eight

20) Two hundred and seventy

3. Transform to numbers

1) five thousand one hundred and forty six

2) one thousand one hundred and sixty three

3) six thousand five hundred and seventy two

4) two thousand six hundred and eighteen

5) seven thousand seven hundred and eighty two

6) three thousand four hundred and ninety five

7) five thousand five hundred and fifty five

8) six thousand six hundred and ninety nine

9) one thousand nine hundred and eighty three

10) four thousand and thee

4. Transform to numbers

1) Sixty three thousand and thirty one

2) Ten thousand one hundred and one

3) Forty two thousand two hundred and thirty four

4) Seventy five thousand three hundred and two

5) Twelve thousand three hundred and eighty nine

1.5. ORDINAL NUMBERS

Tartib sonlar tartibni, o'rinni bildirish uchun ishlatiladi	**Ordinal numbers** are used for ranking**.**

Writing shortly (Qisqacha yozilishi)	Writing by words (So'zlar bilan yozilishi)
1st	the first (birinchi)
2nd	the second (ikkinchi)
3rd	the third (uchunchi) va hakozo
4th	the fourth
5th	the fifth
6th	the sixth
7th	the seventh
8th	the eighth
9th	the ninth
10th	the tenth
11th	the eleventh
12th	the twelfth
13th	the thirteenth
14th	the fourteenth
15th	the fifteenth
16th	the sixteenth
17th	the seventeenth

18th	the eighteenth
19th	the nineteenth
20th	the twentieth
21st	the twenty-first
22nd	the twenty-second
23rd	the twenty-third
24th	the twenty-fourth
25th	the twenty-fifth
26th	the twenty-sixth
27th	the twenty-seventh
28th	the twenty-eighth
29th	the twenty-ninth
30th	the thirtieth
40th	the fortieth
50th	the fiftieth
60th	the sixtieth
70th	the seventieth
80th	the eightieth
90th	the ninetieth
100th	the hundredth
101st	the hundred and first
1000th	the thousandth

1.6. FRACTIONS

Kasrlar.

Kasr bu $\dfrac{a}{b}$ ko'rinishida yozilgan sondir, bu yerda a son kasrning **surati**, b esa **maxraji** deyiladi.

Surati maxrajidan kichik bo'lgan kasr **to'g'ri kasr** deyiladi. Masalan,

$\dfrac{1}{2}, \dfrac{2}{7}, \dfrac{102}{115}, \dfrac{10}{11}, \dfrac{1}{100}$ lar to'g'ri kasrlar.

Surati maxrajidan katta yoki teng bo'lgan kasr **noto'g'ri kasr** deyiladi. Masalan, $\dfrac{2}{2}, \dfrac{8}{7}, \dfrac{102}{15}, \dfrac{12}{5}, \dfrac{101}{100}$ lar noto'g'ri kasrlar.

Aralash son bu butun son bilan to'g'ri kasrning yig'indisidir. Misol uchun, $2\dfrac{1}{2}, 10\dfrac{5}{7}, 2\dfrac{1}{15}$ lar aralash sonlardir.

Fractions.

A **fraction** is a number written in the form $\dfrac{a}{b}$, where number a is called a **numerator** and number b is called a **denominator**.

A proper fraction is a fraction, whose numerator is less than denominator. For example, $\dfrac{1}{2}, \dfrac{2}{7}, \dfrac{102}{115}, \dfrac{10}{11}, \dfrac{1}{100}$ are proper fractions.

An improper fraction is a fraction, whose numerator is greater than or equal to the denominator. For example, $\dfrac{2}{2}, \dfrac{8}{7}, \dfrac{102}{15}, \dfrac{12}{5}, \dfrac{101}{100}$ are improper fractions.

A mixed number is an integer and a proper fraction written together. For example, $2\dfrac{1}{2}, 10\dfrac{5}{7}, 2\dfrac{1}{15}$ are mixed numbers.

Active vocabulary

fraction	kasr
numerator	surat
denominator	maxraj
proper fraction	tog'ri kasr
improper fraction	noto'g'ri kasr
mixed number	aralash son

1.7. ARITHMETIC OPERATIONS ON FRACTIONS

Bir xil maxrajli kasrlarni qo'shish uchun (shu) maxrajni o'zi yozilib, suratlari qo'shiladi

In order to add fractions with the same denominators, add together the numerators and keep the same denominator

$$\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}.$$

Bir xil maxrajli kasrlarni ayirish uchun (shu) maxrajni o'zi yozilib, suratlari ayriladi

In order to subtract fractions with the same denominators, subtract together the numerators and keep the same denominator

$$\frac{a}{b}-\frac{c}{b}=\frac{a-c}{b}$$

Turli maxrajli kasrlarni qo'shishda ikkala maxrajning umumiy karralisi topilib kasrlar umumiy maxrajga keltiriladi va bir xil maxrajli kasrlar qo'shiladi

In order to add fractions with different denominators, reduce the fractions to a common denominator by finding a common multiple of both denominators ant then add the fractions with the same denominators

$$\frac{a}{b}+\frac{c}{d}=\frac{ad}{bd}+\frac{bc}{bd}=\frac{ad+bc}{bd}$$

Turli maxrajli kasrlarni ayirishda ikkala maxrajning umumiy karralisi topilib kasrlar umumiy maxrajga keltiriladi va hosil bo'lgan bir xil maxrajli kasrlar ayriladi

In order to subtract fractions **with different denominators**, reduce the fractions to a common denominator by finding a common multiple of both denominators ant then subtract the fractions with the same denominators

$$\frac{a}{b}-\frac{c}{d}=\frac{ad}{bd}-\frac{bc}{bd}=\frac{ad-bc}{bd}$$

Ikkita kasrni ko'paytirish uchun kasrlarning suratini suratiga, mahrajini mahrajiga ko'paytiriladi	In order to multiply **two fractions**, multiply the numerators together and the denominators together

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ad}{bd}$$

Ikkita kasrni nisbatini topish uchun birinchi kasrni teskarilangan ikkinchi kasrga ko'paytiriradi.	To find the quotient of two fractions, multiply the first fraction by the reciprocal fraction

$$\frac{a}{b} : \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}.$$

Example.

$$\frac{5}{7} : \frac{3}{4} = \frac{5}{7} \cdot \frac{4}{3} = \frac{20}{21}$$	Five sevenths divided by three fourths equals five sevenths multiplied by four thirds and it equals twenty twenty first.

Noto'g'ri kasrni aralash songa keltirish uchun uning butun va kasr qismi yig'indisi ko'rinishiga keltirish kerak.	To convert an improper fraction into a mixed number, break it up into the sum of an integer and a proper fraction.

$$\frac{ar}{br} = \frac{a}{b}$$	*ar* over *br* equals *a* over *b*
$$\frac{a}{b} = \frac{ar}{br}$$	*a* over *b* equals *ar* over *br*
$$\frac{a}{b} \pm \frac{c}{d} = \frac{ad \pm bc}{bd}$$	*a* over *b*, this fraction followed by plus or minus *c* over *d* equals *ad* plus or minus *bc* this sum or difference over *bd*
$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$	*a* over *b*, this fraction multiplied by *c* over *d* equals *ac* over *bd*
$$\frac{5}{6} * \frac{1}{2} = \frac{5}{3} = 1\frac{2}{3}$$	Five sixths divided by a half equals one and two thirds

$\dfrac{a}{b} / \dfrac{c}{d} = \dfrac{ad}{bc}$	a over b ,this fraction divided by c over d equals ad over bc

Active vocabulary

fractions with the same denominator	bir xil mahrajli kasrlar
like fractions	bir xil mahrajli kasrlar
fractions with different denominator	turli mahrajli kasrlar
unlike fractions	turli mahrajli kasrlar
reciprocal	teskari
reciprocal fraction	teskari kasr
above of the fraction bar	kasr chizig'ining usti (surati)
below of the fraction bar	kasrning chizig'ining tagi (mahraji)
value	qiymat
to reduce a fraction	kasrni qisqartirmoq
common factor/measure/divisor	umumiy ko'paytuvchi/bo'luvchi
to combine	yig'moq, birlashtirmoq
to convert	o'tkazmoq, aylantirmoq
an integer	butun
integer solution	butun yechim
ratio	nisbat, kasr
inverse ratio	teskari kasr

1.8. READING OF FRACTIONS AND MIXED NUMBERS

Oddiy kasrlarda, kasrning surati miqdor sonlar orqali, maxraji esa tartib sonlar orqali ifodalanadi:

1/3- a (one) third,

1/5 - a (one) fifth,

1/8 - an (one) eighth.

1/2 - a (one) half

1/3 - a (one) third

1/4 - a (one) fourth/quarter

1/5 - a (one) fifth

1/10 - a (one) tenth

1/25 - a (one) twenty fifth

1/100 - a (one) hundredth

1/1225 - a (one) thousand two hundred and twenty fifth.

Biroq, 1/2 - a (one) half (one second emas), 1/4 - a (one) quarter (a fourth) deb o'qiladi.

Agar kasrning surati birdan katta bo'lsa, kasrning maxraji –s

qo'shimcha **oladi**:

2/3 - two thirds

3/5 - three fifths

5/6 - five sixths

3/4 - three fourths/quarters

4/7 - four sevenths

7/18 - seven eighteenths

9/10 - nine tenths

Aralash sonlarda butun qism va kasr qism o'rtasida and bo'g'lovchi ishlatiladi:

$2\dfrac{1}{2}$ - two and a half

$3\dfrac{1}{4}$ - three and a quarter/fourth

$3\dfrac{4}{7}$ - three and four sevenths

$10\dfrac{11}{12}$ - ten and eleven twelfths

2/5 ton - two fifths of a ton

1/4 kilometre - quarter of a kilometre

1/2 kilometre - half a kilometre

Kasrdan keyin kelgan otlar birlikda ifodalanadi:

2/3 ton - two thirds of a ton;

3/4 kilometre - three quarters of a kilometre;

1/2 ton - half a ton ("half" dan oldin artikl ishlatilmaganligiga va "of"

predlogining tushirib qoldirilganligiga e'tibor bering.)

Aralash sonlar bilan ishlatilga otlar ko'plikda ifodalanadi:

$2\dfrac{1}{2}$ tons – "two and a half tons" yoki "two tons and a half");

$4\dfrac{1}{3}$ tons – "four and a third tons" yoki "four tons and a third".

1. Read fractions below.

1) $\dfrac{2}{5}$ $\dfrac{5}{9}$ $\dfrac{7}{6}$ $\dfrac{4}{3}$ $\dfrac{3}{4}$ $\dfrac{5}{8}$

2) $\dfrac{12}{17}$ $\dfrac{29}{85}$ $\dfrac{25}{33}$ $\dfrac{19}{51}$ $\dfrac{89}{87}$ $\dfrac{65}{79}$

3) $\dfrac{39}{58}$ $\dfrac{79}{19}$ $\dfrac{23}{65}$ $\dfrac{43}{94}$ $\dfrac{49}{87}$ $\dfrac{32}{51}$

4) $\dfrac{123}{894}$ $\dfrac{546}{987}$ $\dfrac{781}{359}$ $\dfrac{735}{198}$ $\dfrac{371}{424}$ $\dfrac{561}{354}$

5) $\dfrac{891}{121}$ $\quad$ $\dfrac{951}{357}$ $\quad$ $\dfrac{365}{934}$ $\quad$ $\dfrac{376}{698}$ $\quad$ $\dfrac{561}{632}$ $\quad$ $\dfrac{739}{428}$

2. Read mixed numbers below.

1) $1\dfrac{1}{2}$ $\qquad$ $1\dfrac{1}{3}$ $\qquad$ $1\dfrac{1}{7}$ $\qquad$ $1\dfrac{1}{9}$ $\qquad$ $1\dfrac{1}{4}$

2) $2\dfrac{1}{3}$ $\qquad$ $2\dfrac{3}{4}$ $\qquad$ $2\dfrac{3}{7}$ $\qquad$ $2\dfrac{4}{5}$ $\qquad$ $2\dfrac{3}{8}$

3) $3\dfrac{3}{5}$ $\qquad$ $5\dfrac{4}{7}$ $\qquad$ $3\dfrac{5}{9}$ $\qquad$ $6\dfrac{5}{7}$ $\qquad$ $9\dfrac{8}{9}$

4) $1\dfrac{1}{12}$ $\qquad$ $2\dfrac{5}{13}$ $\qquad$ $6\dfrac{9}{11}$ $\qquad$ $3\dfrac{12}{19}$ $\qquad$ $3\dfrac{19}{33}$

5) $12\dfrac{2}{3}$ $\qquad$ $11\dfrac{5}{7}$ $\qquad$ $45\dfrac{3}{8}$ $\qquad$ $32\dfrac{19}{51}$ $\qquad$ $32\dfrac{16}{23}$

1.9. THE DECIMALS (FRACTIONS)

O'nli kasrlarni o'qishda butun qism kasr qismdan nuqta bilan ajratiladi. Agar butun qism nol bo'lsa, *nought*, *naught* yoki *zero* so'zlaridan biri ishlatiladi. Ba'zan, butun qism umuman o'qilmaydi:

0.25-naught point two five yoki point two five

0.1 – naught point one yoki point one;

0.01- naught point naught one yoki point naught one;

0.2 – (zero) point two

.2 – point two

0.5 – (zero) point five

0.7 — point seven, naught (zero, o) point seven

0.08 — point naught eight, naught point o [ou] eight, o [ou] point o [ou] eight

0.001 — point naught naught one, naught point double o [ou] one

Agar butun qism noldan katta bo'lsa:

2.35 – two point three five;

3.4 – three point four

3.215 – three point two one five

32.305 – thirty-two point three naught five

53.75 – fifty three point seven five

1.02 — one point naught two, one point o [ou] two

4.25 — four point twenty five, four point two five

15.106 — one five point one naught six

1. Read and write the following decimals by words.

Sample:

- 0.8 – "naught point eight".
- 12.09 – "twelve point oh nine".
- 1.005 – "one point double oh five"

1) 0.1	0.3	0.5	0.9	0.7
2) 0,02	0,05	0.01	0.09	0.08
2) 0.017	0.011	0.031	0.014	0.013
4) 0.001	0.003	0.009	0.007	0.008
5) 0.0002	0.0007	0.0009	0.0003	0.0001

2. Read and write the following decimals by words.

Sample:

- 1.6 – "one point six".
- 2.19 – "two point one nine".
- 10.75 – "ten point seven five".
- 57.705 – "fifty seven point seven oh five".
- 107.26 – "one hundred and seven point two six".

1)	2.3	0.2	5.8	3.6	9.2
2)	8.37	5.91	7.29	4.38	6.37
3)	12.35	19.64	17.35	10.45	16.39
4)	69.397	52.834	69.102	72.926	51.302
5)	189.45	170.29	607.71	716.97	897.29

1)	6.03	0.023	1.006	2.59	5.002
2)	19.09	79.03	0.008	0.294	89.01
3)	10.078	97.079	62.001	79.647	82.020
4)	54.5002	0.0097	3.0704	59.506	0.3217
5)	1.05401	29.027	84.0907	105.058	21.7905

Nol raqaminig ba'zi hollarda ishlatilishi | **Using of number zero in some cases**

	Using (Ishlatilishi)	Examples (Misollar)
0=oh(asosan sonlar yakka yakka aytiladigan hollarda)	after a decimal point o'nli kasrlarda butundan keyin	79.02 – ''Seven point oh two.''
	In bus or room numbers (avtobus yoki xona raqamlarida)	Room 101 – ''Room one oh one.''(101 xona) Bus 602 – ''Bus six oh two.''(602 avtobus)
	In phone numbers (telefon nomerlarda)	9130472 – ''Nine one three oh four seven two.''
	In years (yillarda)	1906 – ''Nineteen oh six.''
0=naught	Before a decimal point (o'nli kasrlarda butundan oldin)	0.08 – ''Naught point oh eight.''
0=zero	In temperature (temperaturada)	-10^{0}C – ''10 degrees below zero.'' 0 dan 10 gradus pastda
	US English for the number Amerikaliklar zero so'zini ishlatadi doimo o uchun	0=''Zero.''
0=nil	In football (futbolda)	Chelsea 2 Manchester United 0 – ''Chelsea two Manchester United nil''
0=love	In tennis (tennisda)	30-0=''Thirty love''

1.10. ABSOLUTE VALUE OF REAL NUMBERS

Haqiqiy sonning **absolyut qiymati** $|a|$ bilan belgilanadi va quyidagi formula bilan aniqlanadi:

The absolute value of a real number **a** is denoted by the symbol $|a|$ and defined by the following formula:

$$|a| = \begin{cases} a, & a \geq 0 \\ -a, & a < 0 \end{cases}$$

Nomanfiy sonning absolyut qiymati shu sonning o'ziga teng, manfiy sonning absolyut qiymati esa shu manfiy sonning manfiysiga teng

The absolute value of a nonnegative number is the number itself, the absolute value of a negative number is the negative of the number.

$$|5| = 5, \quad |-5| = -(-5) = 5, \quad |0| = 0.$$

Geometrik interpretatsiya
Haqiqiy sonning absolyut qiymati son o'qidagi mos nuqta bilan nol nuqta otasidagi masofadir. Har bir a va b sonlar uchun, son o'qida a va b nuqtalar orasidagi masofa $|a - b|$ ga teng.

Geometric interpretation
The absolute value of a real number is the distance between the corresponding point on the number line and the zero-point regardless of the direction. For any numbers a and b, the distance between points a and b on the number line is $|a - b|$.

Absolyut qiymatlar quyidagi xossalarga ega:

Absolute values have the following properties:

I. $|a| \geq 0$

II. $|-a| = |a|$

III. $|a - b| = |b - a|$

IV. $|a \cdot b| = |a| \cdot |b|$

V. $\left|\dfrac{a}{b}\right| = \dfrac{|a|}{|b|} \quad (b \neq 0)$

VI. $|a|^2 = a^2.$

2. ORDINAL AND RELATION SIGNS

2.1. BRACKETS

Parenthesis, round bracket	()	qavs
Brackets	[]	kvadrat qavs
Braces	{}	figurali qavs

Reading brackets table

Jadval 3		Table 3	
Qavslarning o'qilishi		**Reading of Brackets**	
Qavs	( )	Parentheses.	
• Qavs ichida a . • Qavs (ochiladi) a qavs (yopiladi). (boshlang'ich) qavs a (oxirgi) qavs	(a)	• a in parentheses. • Parenthesis (open) a Parenthesis (close). • (initial) parenthesis a (final) parenthesis	
• a qavs b plyus c qavs • a qavs ochiladi b plyus b qavs yopiladi	$a(b+c)$	• a parenthesis b plus c parenthesis. • a parenthesis open b plus c parenthesis close.	
a taqsim b ko'paytiruv qavs ichida c plyus d .	$\dfrac{a}{b(c+d)}$	a over b times c plus d in parenthesis.	
• Qavs ichida a taqsim b ko'paytirilgan c plyus d. • Qavs a taqsim b, bu kasr ko'paytirilgan c va plyus d , qavs.	$(\dfrac{a}{b}c+d)$	• a over b times c plus d in parenthesis. • Parenthesis a over b, this fraction multiplied by c plus d, parenthesis.	
Kvadrat qavs ichida a	$[a]$	a in brackets.	
	$[a+b]c$	Brackets (open) a plus b brackets (close) multiplied by c .	
	$\{a+b\}c$	Brace (open) a plus b brace (close) multiplied by c .	

Active vocabulary

to open	ochmoq
to close	yopmoq

1. Read and write these expressions by words.
Sample:

- $a \cdot (m-n)$ – "a multiplied by m minus n"

- $\dfrac{a}{b-c}$ –"a over b minus c";

- $\dfrac{2}{x} + \dfrac{y}{27x}$ –"two over x plus y over twenty seven x (two divided by x plus y

  divided by twenty seven x);

- $\dfrac{c+5}{3} - \dfrac{2c+9}{8}$ c plus five divided by three minus twice c plus nine divided by

  eight.

1) $\dfrac{a}{b}$ $\qquad$ $\dfrac{x}{y}$ $\qquad$ $\dfrac{a+b}{c}$ $\qquad$ $\dfrac{a}{b-c}$ $\qquad$ $\dfrac{x+2}{4}$

2) $\dfrac{8-a}{13}$ $\qquad$ $\dfrac{10}{3-x}$ $\qquad$ $\dfrac{a-b}{c+d}$ $\qquad$ $\dfrac{m}{42} + \dfrac{5m}{6}$ $\qquad$ $\dfrac{c}{10} + \dfrac{d}{4}$

3) $\dfrac{7}{a} + \dfrac{8}{15a}$; $\qquad$ $\dfrac{x}{5} + \dfrac{2x}{3}$ $\qquad$ $\dfrac{x}{4} + \dfrac{y}{5}$; $\qquad$ $\dfrac{a}{b} + \dfrac{b}{a}$; $\qquad$ $\dfrac{x}{7y} - \dfrac{1}{y}$;

4) $\dfrac{a}{12b} - \dfrac{3}{b}$; $\qquad$ $\dfrac{x-1}{3}$ $\qquad$ $\dfrac{y-6}{3y}$ $\qquad$ $\dfrac{a^2}{b} + \dfrac{b^2}{a}$; $\qquad$ $\dfrac{2}{xy} + \dfrac{3}{yz}$;

5) $\dfrac{a+8}{9} + \dfrac{a-2}{12}$; $\dfrac{x-1}{3} + \dfrac{x+1}{4}$; $\dfrac{d+2}{9d} + \dfrac{c+3}{9c}$; $\dfrac{x-5}{3x} + \dfrac{y-6}{3y}$;

2. Read and write these expressions by words.
Sample:

- $a \cdot (m-n)$ "a parenthesis m minus n parenthesis" or "a parenthesis open m

minus n parenthesis close" or a times m minus n in parenthesis.

- $a \cdot (m - n)$

- $z(\dfrac{x}{y} - \dfrac{y}{x})$ z parenthesis x over y minus y over x parenthesis.

3. Read and write these expressions by words.

1) $(m + \dfrac{m}{n}) \cdot (m - \dfrac{m}{n})$; $(2 - \dfrac{r}{s}) : (2 + \dfrac{r}{s})$; $(1 + \dfrac{u}{v}) : (1 - \dfrac{u}{v})$;

2) $(\dfrac{c}{2} + \dfrac{c}{3}) \cdot \dfrac{1}{c}$; $(\dfrac{x}{y} - \dfrac{y}{x}) \cdot \dfrac{5xy}{x - y}$; $(1 - \dfrac{2c}{d} + \dfrac{c}{d}) \cdot \dfrac{d}{c - d}$;

3) $(p - \dfrac{5p}{p + 2}) : \dfrac{p - 3}{p + 2}$; $(\dfrac{q}{q - 5} - 2q) : \dfrac{11 - 2q}{q - 5}$; $(\dfrac{3d + 1}{2d + 2} - 1) : \dfrac{6d - 6}{d + 1}$;

4) $(\dfrac{a}{b} - \dfrac{b}{a}) \cdot \dfrac{3ab}{a + b}$; $(\dfrac{2m + 1}{2m - 1} - \dfrac{2m - 1}{2m + 1}) : \dfrac{4m}{10m - 5}$;

2.2. EQUALITY AND INEQUALITY SIGNS

Table of Reading of Equality and Inequality Sings

Jadval 4		Table 4	
Tenglik va tengsizliklarning o'qilishi		**Reading of Equality and Inequality Sings**	
• a b ga teng.	$a = b$	• a equals b. • a is equal to b.	
a b ga teng emas.	$a \neq b$	a is not equal to b.	
a b ga aynan teng	$a \equiv b$	a is identical with b.	
• a taqriban b ga teng.	$a \approx b$	• a is approximately equal to b. • a is nearly equal to b.	
a b dan kichik	$a < b$	a is less than b.	
a b dan katta	$a > b$	a is greater than b.	
Kichik yoki teng	$\leq$	Less or equal to.	
a b dan kichik yoki teng	$a \leq b$	• a is less than or equal to b. • a is not greater than b.	
katta yoki teng	$\geq$	Greater or equal to.	
a b dan katta yoki teng	$a \geq b$	• a is greater than or equal to b. • a is not less than b.	
	$a \ll b$	a is much less than b.	
	$a \gg b$	a is much greater than b.	

Active vocabulary

Equality	Tenglik
Inequality	Tengsizlik
Equation	Tenglama
Identity	Ayniyat
Identical	Aynan
Approximately	Taqriban

1. Read the following number inequalities.

Sample:

- 12<15   –"twelve is less than fifteen".

- 26>10   –"twenty six is greater than ten".

1) $2 < 4$ $5 > 2$ $7 < 11$ $6 > 5$ $7 < 9$

2) $17 < 19$ $21 > 13$ $23 < 39$ $54 < 78$ $32 < 61$

3) $56 < 87$ $13 < 26$ $84 < 91$ $33 < 62$ $59 > 37$

4) $123 < 256$ $987 > 456$ $651 < 739$ $654 > 375$ $100 < 298$

5) $258 < 269$ $367 < 982$ $659 < 783$ $237 < 798$ $543 < 391$

2. Read the following decimal inequalities.

Sample:

- $0.05 < 9.7$; –"Naught point oh five is less than nine point seven".

- $10.25 > 2.017$; –"ten point two five is greater than two point oh one seven".

1) $0.2 < 0.9$ $0.7 > 0.6$ $0.9 > 0.1$ $0.5 < 0.7$ $0.8 > 0.6$

2) $1.2 < 3.5$ $5.9 < 7.8$ $01. < 0.6$ $2.3 < 9.7$ $8.7 > 6.4$

3) $23.1 < 98.7$ $78.2 < 99.06$ $54.32 < 76.64$ $91.37 < 94.65$

3. Read the following fractional inequalities.

Sample:

- $\dfrac{5}{6} > \dfrac{1}{6}$ –"five sixths is greater than one sixth"

- $\dfrac{5}{9} < 7\dfrac{2}{3}$ –"five ninths is less than seven and two thirds".

1) $\dfrac{5}{11} < \dfrac{6}{11}$ $\dfrac{5}{7} > \dfrac{3}{7}$ $\dfrac{1}{4} < \dfrac{1}{3}$ $\dfrac{7}{13} < \dfrac{10}{13}$ $\dfrac{5}{11} > \dfrac{5}{13}$

2) $\dfrac{19}{3} < \dfrac{20}{3}$ $\dfrac{19}{20} < \dfrac{20}{20}$ $\dfrac{3}{5} < 1$ $2 < \dfrac{9}{4}$ $\dfrac{5}{8} > \dfrac{5}{9}$

3) $\dfrac{1}{2} < 7\dfrac{2}{3}$ $5\dfrac{3}{7} > 2\dfrac{6}{7}$ $3\dfrac{11}{12} > 3\dfrac{5}{12}$ $-4\dfrac{2}{3} < 4\dfrac{2}{3}$ $6\dfrac{2}{5} < 7\dfrac{2}{5}$

4) $7\dfrac{1}{3} > -9\dfrac{2}{3}$ $9\dfrac{4}{7} < 9\dfrac{4}{5}$ $4\dfrac{4}{8} < 4\dfrac{4}{5}$ $9\dfrac{6}{11} < 9\dfrac{6}{11}$ $10\dfrac{5}{8} > 10\dfrac{3}{8}$

4. Read the following simple number inequalities.

Sample:

- $x \leq 67$ – "x is less than or equal sixty seven".
- $a \geq 59$ – "a is greater than or equal fifty nine".
- $x \leq a + b$ – "x is less than or equal the sum of a and b (or x is less than or equal a plus b)".

1) $2a \leq 3b$ $a \leq b$ $3c \leq 4a$ $a \leq bc$ $2b \leq 5c$

2) $2a + c \leq 5b$ $a + 4c \leq 6b$ $a + c \leq 2b$ $4a - 2c \leq b$ $12a - 4b \leq 7c$

3) $ac - b \leq a + b$ $a + d \leq b + c$ $a - cd \leq 5b$ $2a - b \leq cb$ $5c + a \geq c$

4) $2ax \geq a - bc$ $x + a \leq bc + d$ $x + z \leq y + 2a$ $z - c \leq 2a - x$

3. Read the following inequalities.

Sample:

- $a + 31 > b - 33$ – "the sum of a and thirty one (is) greater than the difference between b and thirty three".

- $\dfrac{a}{7} + 2.5 \leq \dfrac{b + a}{2}$ – "the sum of a divided by seven and two point five is less than or equal a half of the sum of a plus b"

1) $x \geq \dfrac{2a}{3}$ $z \leq \dfrac{3b}{7}$ $y \geq \dfrac{cd}{2a}$ $y \geq \dfrac{3c}{d}$ $x \leq \dfrac{5d}{z}$

2) $x \leq \dfrac{2a + c}{b}$ $y \geq \dfrac{z + a}{2b}$ $z \geq \dfrac{x + y}{x + a}$ $x \leq \dfrac{3az}{a + d}$ $y \geq \dfrac{3a + c}{d}$

3) $\dfrac{x + a}{z + b} \geq \dfrac{y + d}{c + a}$ $y \leq \dfrac{c + 2d}{2a}$ $y + k \geq \dfrac{5a - x}{d + c}$ $\dfrac{z + 6d}{x - y} \geq \dfrac{2a - c}{d + a}$

3. POWER AND ROOT
3.1. POWER

Darajaga ko'tarish

x^a ifodada x miqdor **asos**, a esa daraja **ko'rsatkichi** deyiladi, va x^a x ning a-darajasi yoki x a-darajaga oshirilgan deyiladi.

Misol : The exponents of the quantities $x^3, 2^4, 5^y$ va 3^n miqdorlarning daraja ko'rsatkichlari mos ravishda 3, 4, y va n dir.

Exponentiation

In the expression x^a the quantity x is called the **base,** a is the **exponent** of the power, and x^a is the a th power x or x raised to the a th power .

Example: The exponents of the quantities $x^3, 2^4, 5^y$ and 3^n are, respectively, 3, 4

Table of Reading of Formulas

Jadval		Table
Formulalarning o'qilishi		**Reading of Formulas**
x ning kvadrati	x^2	x squared.
x ning kubi	x^3	x cubed.
• 2 ning uchinchi darajasi • 2 ning kubi	2^3	• The third power of 2. • Two cubed.
x ning oltinchi darajasi	x^6	x to the power six.
x ning n-darajasi	x^n	x to the power n.
x ning $\dfrac{2}{n}$-darajasi	$x^{2/n}$	x to the power two over n.
	5^{x-2}	Five to the power x minus 2.

Look through the table and try to memorize it.

Symbols	Reading
$b^n = c$	b to the n-th power is equal to c
	b to the n-this equal to c
	The n-th powe r of b is equal to c
	b to the power of n is equal to c
	b to the power n is equal to c
	b – base
	n – power exponent
	c – value of a power
	b^n – power
b^2, b^3	b squared, b cubed
b^{-n}	b to the power of minus n

$a^{m/n} = \sqrt[n]{a^m}$	The *m* over *n*-th power of *a* equals the *n*-th root of *a* to the *m*-th power

Active vocabulary

power	daraja
to raise to a power to	darajaga ko'tarish
base	asos
power exponent	daraja ko'rsatkichi
value of a power	daraja qiymati
involution	darajaga oshirish

Xossalar.

Noldan farqli har qanday haqiqiy sonning nolinchi darajasi 1 ga teng:

Properties.

Any non-zero real number raised to the zeroth power equals 1:

$$x^0 = 1 \quad (x \neq 0)$$

Noldan farqli haqiqiy sonning $(-a)$ chi darajasi shu haqiqiy songa teskari sonning *a* chi darajaga oshirilganiga teng:

A non–zero real number raised to power $(-a)$ is the reciprocal of the same real number raised to power *a* :

$$x^{-a} = \frac{1}{x^a} \quad (x \neq 0)$$

Bir hil asosli darajalarni ko'paytirish uchun daraja ko'rsatkichlari qo'shiladi

To multiply powers of value, add the exponents:

$$x^a x^b = x^{a+b}$$

Bir hil asosli darajalarni bo'lish uchun suratning daraja ko'rsatkichidan maxrajning daraja ko'satkichi ayriladi:

In order to divide powers of a value, subtract the exponent in the denominator from the exponent in the numerator:

$$\frac{x^a}{x^b} = x^{a-b} \quad (x \neq 0)$$

Darajaga ko'tarish uchun daraja ko'rsatkichlari ko'paytiriladi:

In order to raise powers of a value by a power, multiply the exponents:

$$(x^a)^b = x^{ab}$$

| Ko'paytmaning darajasi darajalar ko'paytmasiga teng: | A power of a product is equal to the product of powers: |

$$(xy)^a = x^a y^a$$

| Bo'linmaning darajasi darajalar nisbatiga teng: | A power of a ratio is equal to the ratio of powers: |

$$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a} \qquad (y \neq 0)$$

1. Examples for reading.

1) 5^2 $\qquad$ 7^3 $\qquad$ $(-2)^{10}$ $\qquad$ $(-3)^5$ $\qquad$ 10^3

2) 12^2 $\qquad$ 5^4 $\qquad$ 7^2 $\qquad$ 12^3 $\qquad$ 11^0

3) 15^2 $\qquad$ 2^6 $\qquad$ 3^5 $\qquad$ 3^4 $\qquad$ 2^{24}

4) $\left(\frac{3}{4}\right)^2$ $\qquad$ $\left(\frac{1}{3}\right)^{-1}$ $\qquad$ $\left(\frac{2}{5}\right)^3$ $\qquad$ $\left(\frac{5}{4}\right)^{-2}$

5) $\left(\frac{1}{2}\right)^2$ $\qquad$ $\left(\frac{2}{5}\right)^{56}$ $\qquad$ $\left(2\frac{1}{5}\right)^4$ $\qquad$ $\left(\frac{7}{2}\right)^{-2}$

6) 6.3^4 $\qquad$ 3.2^3 $\qquad$ $(-0.2)^5$ $\qquad$ 5.1^6

2. Examples for reading.

1) $\left(2\frac{1}{5}\right)^4$ $\qquad$ $\left(-2\frac{3}{5}\right)^{-2}$ $\qquad$ $\left(1\frac{1}{5}\right)^{-2}$ $\qquad$ $\left(5\frac{1}{2}\right)^6$

2) $\left(\frac{1}{3}\right)^{2q}$ $\qquad$ $\left(\frac{2}{5}\right)^{56a+6}$ $\qquad$ $\left(2\frac{1}{5}\right)^{4b-8}$ $\qquad$ 6^{28x}

3) x^{23} $\qquad$ $(x-9)^2$ $\qquad$ $(t+9)^3$ $\qquad$ $3x^3$ $\qquad$ $(3x+8)^2$

4) a^{3x-4} $\qquad$ c^{-2x+7} $\qquad$ b^{6x+4} $\qquad$ $(x+6)^3$ $\qquad$ $(2x+1)^5$

5) $\left(\dfrac{3n}{5}\right)^2$ $\qquad \left(\dfrac{x+5z}{7-z}\right)^3$ $\qquad \left(\dfrac{3x+2}{4z-9}\right)^8$ $\qquad \left(\dfrac{3}{5z-6}\right)^2$

Ratsional ko'rsatkichli daraja

Darajaga oshirish (ratsional ko'rsatkichli daraja ham) va ildizdan chiqarish amallari bir-biriga bog'liq amallardir.

n birdan katta natural son bo'lsin: $n \in N$ va $n > 1$.

U holda x ning $\dfrac{1}{n}$ ko'rsatkichli darajasi x ning n chi (tartibli) ildizi deyiladi va $\sqrt[n]{x}$ kabi belgilanadi. Shunig uchun,

$$\sqrt[n]{x} = x^{\frac{1}{n}}$$

Ushbu formulada x ildiz ostidagi ifoda deb ataladi, n ildiz ko'rsatkichi va $\sqrt[n]{x}$ esa x ning n-tartibli ildizi deyiladi.

Agar $b = 1/n$ va $c = n$ daraga xossasiga ko'ra quyidagi kelib chiqadi

$$\left(x^{\frac{1}{n}}\right)^n = x^1 = x \Rightarrow \left(\sqrt[n]{x}\right)^n = x$$

x ning ikkinchi tartibli ildizi x ning kvadrat ildizi deb ataladi, va uchinchi tartibli ildiz kub ildiz sifatida ma'lum.

Rational Exponents

The operations of the exponentiation (involving a rational exponent) and extraction of root are related to each other.

Let n be a natural number, which is greater than unity: $n \in N$ and $n > 1$.

Then the power of x with the exponent of the form $\dfrac{1}{n}$ is called the nth root of x and denoted $\sqrt[n]{x}$. Therefore,

In this formula x is called the radicand, n is the index of the radical, and $\sqrt[n]{x}$ is the nth root of x.

If we set $b = 1/n$ and $c = n$ then from by property of power it follows that

The second root of x is called the square root of x, and the third root is known as the cube root.

3. Examples for reading of rational exponents.

1) $x^{\frac{4}{5}}$ $\qquad$ $y^{\frac{7}{2}}$ $\qquad$ $x^{-\frac{10}{11}}$ $\qquad$ $x^{-\frac{5}{3}}$ $\qquad$ $z^{1\frac{1}{4}}$

2) $d^{\frac{2x-4}{3}}$ $\qquad$ $b^{\frac{1-3x}{6}}$ $\qquad$ $x^{\frac{a-d}{c+a}}$ $\qquad$ $(x-9)^{\frac{2d+c}{6+a}}$

3) $(3c-2)^{1/3}$ $\qquad$ $(4x+3)^{2/3}$ $\qquad$ $(3+5y)^{3/4}$ $\qquad$ $(2a-b)^{3/4}$ $\qquad$ $(4-a)^{2/11}$

3.2. ROOTS

Ildizlar	**Roots**
$\sqrt{x}$	The square root of x.
$\sqrt{7}$	The square root of 7.
$\sqrt[5]{x}$	The fifth root of x.
$\sqrt[n]{x}$	The nth root of x.
$\sqrt{a+(3+b)^2}$	• The square root of a plus three plus b squared. • The square root of a plus three and b in parentheses squared.
$x_{1,2} = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	• x sub one comma two equals minus b plus or minus the square root of b squared minus four a times c over two a. • x sub one and two equals long fraction bar, above the fraction bar minus b plus or minus the square root of b squared, minus four a times c below the fraction bar two times a.

Look through the table and try to memorize it.

Symbols	Reading
$\sqrt[n]{c} = b$	(the) $n-th$ root of c is equal to b
$\sqrt[m]{}$	Radical
$\sqrt{}$	Root sign, or ; radical sign
n	Index of a root
c	Radicand
b	Value of a root
$\sqrt{x}$	Square root of x
$\sqrt[3]{x}$	Cube root of x
$\sqrt[n]{c^m} = C^{\frac{m}{n}}$	The $n-th$ root of c to the $m-th$ power equals c to the power of m over n
$L = \sqrt{R^2 \pm x^2}$	Capital L equals the square root of (out) of capital R squared plus or minus x squared

Active vocabulary

to extract a root	Ildizdan chiqarmoq
to express	Ifodalamoq
fractional exponent	Kasr ko'rsatkichi daraja
radical	Ildiz
root sign	Ildiz belgisi
radical sign	Ildiz belgisi
index of a root (pl indexes)	Ildiz ko'rsatkichi (tartibi)
radicand	Ildiz ostidagi son yoki ifoda
value of a root	Ildizning qiymati
square root of	Kvadrat ildiz
cube root of	Kub ildiz

1. Examples for reading of roots.

1) $\sqrt{1}$ $\sqrt{32}$ $\sqrt{25}$ $\sqrt{92}$ $\sqrt{441}$

2) $\sqrt[3]{27}$ $\sqrt[3]{3\frac{3}{8}}$ $\sqrt[3]{2.5}$ $\sqrt[3]{64}$ $\sqrt[4]{81}$

3) $\sqrt{\left(\dfrac{7}{2}\right)^2}$ $\qquad$ $\sqrt[5]{32}$ $\qquad$ $\sqrt[3]{2\dfrac{1}{5}}$ $\qquad$ $\sqrt[6]{64}$ $\qquad$ $\sqrt[4]{625}$

4) $\sqrt{5^2}$ $\qquad$ $\sqrt{(-5)^2}$ $\qquad$ $\sqrt[3]{-27}$ $\qquad$ $\sqrt[4]{16^2}$ $\qquad$ $\sqrt[5]{2\cdot16}$

5) $\sqrt{x^{23}}$ $\qquad$ $\sqrt[3]{(x-9)^2}$ $\qquad$ $\sqrt[3]{t+9^3}$ $\qquad$ $\sqrt[4]{3x^3}$ $\qquad$ $\sqrt[4]{(3u+8)}$

6) $\sqrt{\dfrac{3n+6}{5}}$ $\qquad$ $\sqrt[3]{\dfrac{x+5z}{7-z}}$ $\qquad$ $\sqrt[3]{\dfrac{x^2+5z}{7-z}}$ $\qquad$ $\sqrt{x^5}$ $\qquad$ $\sqrt{3+x}$

7) $\sqrt{x^{2+n}}$ $\qquad$ $\sqrt{x^{2n+m}}$ $\qquad$ $\sqrt{a^2+3a-5}$ $\qquad$ $\sqrt{(x+a)^5}$ $\qquad$ $\sqrt{x^{2n-3}}$

2. Match the columns.

1	$2\dfrac{2}{5}$	a)	radical
2	$1\!\!\Big/\!\!4$	b)	cube root of x
3	( )	c)	braces
4	{ }	d)	(the) n-th roots of c is equal to b
5	$\sqrt[n]{c}=b$	e)	a proper fraction
6	$\sqrt[m]{}$	f)	a mixed fractions
7	$\sqrt[3]{x}$	g)	round brackets

3. Read the following expressions.

- $a^3 = b^3 + c^3$

- $a^2 = 25$

- $a^4 = \sqrt[n]{a^m}$

- $6^3 = 216$

4. Write the following expressions.

- $b^n = c$

- $a^3 = 12 + 15$

- $b^3 + a^2 = c^4$

- $b^{-(n+1)} = a$

- $6^3 = 216$

5. Give names to the components.

Model: $a+b=c$

a and b mean addends; c means a sum

- $b^n = c$

- $\sqrt[m]{}$

- $\dfrac{d}{n}$

- $b \times c = a$

4. SETS.
4.1. SETS AND OPERATIONS ON THEM.

To'plam.

To'plam bu chekli yoki cheksiz sondagi obyektlarning jamlanmasidir. Bu obyektlar to'plamning elementlari deb ataladi. Misol uchun, sonlar to'plamning elementi bo'ladi.

To'plamlar odatda katta lotin harflari bilan belgilanadi.

Misol 1. A to'plam a, b, x element-larning to'plami bo'lsin. U holda A to'lam

$$A=\{a, b, x\}$$

ko'rinishda belgilanadi.

"x A to'plamning elementi" degan tasdiq $x \in A$ ko'rinishda yoziladi.

Aksincha, "x A to'plamning elementi emas" degan tasdiq $x \notin A$ ko'rinishda yoziladi.

Misol 2. N barcha natural sonlar to'plami bo'lsin:

$$N = \{1, 2, 3, ...\}$$

U holda $7 \in N$ belgilash 7 soni natural son ekanligini bildiradi, $\sqrt{3} \notin N$ belgilash esa $\sqrt{3}$ natural son emasligini bildiradi.

Set.

A set is a finite or infinitive collection of objects. The objects are called elements or members of the set. For instance, numbers can be elements of a set.

Sets are usually denoted by capital Latin letters.

Example 1: Let A be the set of the elements a, b, x. The set A is defined here by the list of its elements and so it can be denoted as

$$A=\{a, b, x\}$$

The statement "x is an element of the set A" is symbolized as $x \in A$.

Conversely, the statement "x is not an element of A" is written symbolically as.

Example 2: Let N be set of all natural numbers:

$$N = \{1, 2, 3, ...\}.$$

Then the notation $7 \in N$ means that the number seven is a natural number, and the notation $\sqrt{3} \notin N$ means that $\sqrt{3}$ is not any natural number.

To'plamlar ustida amallar

A to'plam B to'plamga teng bo'ladi, agar A ning har bir elementi B ning ham elementi bo'lsa, va aksincha.
Belgilanishi: $A=B$.

Operations on Sets

The set A is equal to the set B if every element of A is an element of B, and vice versa
Notation: $A=B$.

A to'plam B to'plamning qismi deyiladi, agar A ning har bir elementi B ning ham elementi bo'lsa.
Belgilanishi: $A \subset B$.

The set A is said to be a **subset** of the set B if every element of A is an element of B.
Notation: $A \subset B$.

A and *B* to'plamlarning har biriga tegishli bo'gan elementlar to'plami *A* and *B* to'plamlarning **kesishmasi** deyiladi.
Belgilanishi: $A \cap B$

The **intersection** of the sets *A* and *B* is the set of all elements that belong to both sets, *A* and *B*.

Notation: $A \cap B$.

A and *B* to'plamlarning elementlaridan tashkil topgan to'plam, shu to'plamlarning **birlashmas**i deyiladi.
Belgilanishi: $A \bigcup B$.

The **union** of the sets *A* and *B* is the set of all elements that are contained in *A* and *B*.
Notation: $A \bigcup B$.

Active vocabulary

set	to'plam
subset	qism to'plam
union	birlashma
intersection	kesishma
notation	belgilash
symbol	simvol
for instance	misol uchun
to denote	belgilamoq
to belong	tgishli bo'lmoq
vice versa	aksincha
capital letters	bosh harflar

Reading of Formulas

Formulas	Reading of formulas
$A = B$	A is equal to B
$A \subset B$	A is proper subset of B. A belongs to B
$A \subseteq B$	A is subset of B A belongs to B
$A \cap B$	A intersects B. A and B
$A \cup B$	A union B A or B

$x \in A$	x is an element of the set A. x belongs to set A
$x \notin A$	x is not an element of the set A. x does not belong to set A
$A = \{x \mid x \in N, x > 10\}$	A is the set of natural numbers, which are greated than 10.

4.2. Intervals.

Intervallar haqiqiy sonlarning qism to'plamalari hisoblanadi.

Chekli interval son o'qidagi *a* va *b* nuqtalar bilan chegaralangan oraliqqa mos kelgan haqiqiy sonlar to'plamidir.
a va *b* nuqtalar intervalning uchlari deb ataladi.

Agar intervalning uchlari shu interval tegishli bo'lmasa, bunday interval **ochiq** interval deyiladi va (*a,b*) belbilanadi.

Agar ikkala uchlar ham chekli to'plamga tegishli bo'lsa, u holda bu interval **yopiq** deb ataladi va [*a,b*] deb belgilanadi.

Ochiq va yopiq intervallar quyida 1-chizmada ko'rsatilgan.

Intervals are special subsets of real numbers.

A finite interval is a set of real numbers represented by a line segment of the number line between the number two endpoints, *a* and *b*.

An interval whose endpoints are not included in the interval is called **open** and it is denoted by (*a,b*) .

If both endpoints, *a* and *b*, are included in a finite set, then the interval is called **closed** and denoted by the symbol [*a,b*].

Open and closed intervals are shown below in Fig.1.

(*a,b*)
a<x<b

[*a,b*]
a≤x≤b

Fig.1
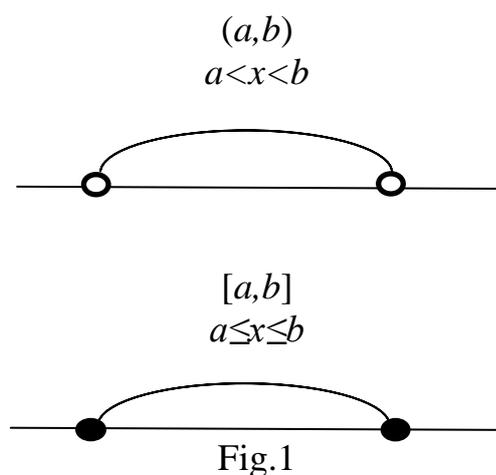
a va *b* nuqtalar orasidagi barcha nuqtalarni va *a* va *b* nuqtalardan fagatgina bittasini (*a* yoki *b*) o'z ichiga olgan intervalga, **yarim ochiq** interval deyiladi.

Yarim ochiq intervallar [*a,b*) yoki (*a,b*] bilan belgilanadi.

Yarim ochiq intervallar quyida 2-chizmada ko'rsatilgan.

An interval is called **half-open** if only one endpoint is included, that is, a half-open interval contains all points between *a* and *b*, and either *a* or *b* but not both.

Half-open intervals are denoted by [*a,b*)] or (*a,b*]

Half-open intervals are represented in diagram form in Fig.2.

$$a \leq x < b, [a,b)$$

$$a < x \leq b \ (a,b]$$
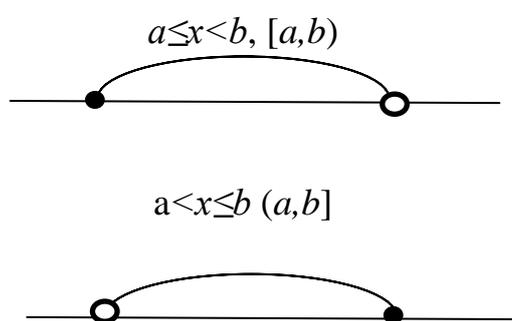
Fig.2

Cheksiz oraliq (-∞,∞) uchlarga ega emas va barcha haqiqiy sonlar to'plamini ifodalaydi.

The **infinity** interval (-∞,∞) has no endpoints and represents the set of all real numbers.

Active vocabulary

interval	Interval
open	ochiq
closed	yopiq
half-open	yarim ochiq
finite	chekli
infinite	cheksiz
half-infinite	yarim cheksiz
infinity	cheksizlik

5. CLASSIFICATION OF ELEMENTARY FUNCTIONS
5.1. ELEMENTARY FUNCTIONS

1.Look through the table and try to memorize it.

functions		reading
Rational fractional functions	$y = \dfrac{7+x}{2+x^2}$	y equal the fraction with the numerator 7 plus x and the dominator 2 minus x squared
Irrational functions	$y = -\sqrt{z^2 - x^2}$	y equals the negative square root of the difference z squared minus x squared
Logarithmic functions	$y = \ln x$	y equals "l" "n" "x"
	$y = \log_a x$	y equals the logarithm of x to the base a
Trigonometric functions	$y = \sin x$	y equals the sine of x
	$y = \cos x$	y equals the cosine of x
	$y = tgx$	y equals the tangent of x
	$y = ctgx$	y equals the cotangent of x
	$y = \sec x$	y equals the secant of x
	$y = \csc x$	y equals the cosecant of x
Antitrigonometric functions or inverse trigonometric functions	$y = \sin^{-1} x$	y equals: the inverse sine of x, or: the arcsine of x or: the angle whose sine is x

2.Memorize the following words and word-groups:

Rational fractional functions	Kasr ratsional funksiyalar
Irrational function	Irratsional funksiya
Exponential function	Ko'rsatkichli funksiya
Trigonometric function	Trigonometrik funksiya
Anttrigonometric function	Teskari trigonometrik funksiya
The sine	Sinus
The cosine	Kosinus
The tangent	Tangens
The cotangent	Kotangens
The secant	Sekans
The cosecant	Kosekans
The arcsine	Arksinus
The arccosine	Arkkosinus
The angle	Burchak
The inverse	Teskari
Common logarithm	O'nli logarifm
Natural logarithm	Natural logarifm

3. Read the function

- $y = \sum_{k=1}^{4} ax^k$

- $y = \dfrac{7+x}{2+x^2}$

- $y = -\sqrt{z^2 - x^2}$

- $y = \ln x$

- $y = \sin x$

- $y = \cos x$

- $y = tgx$

- $y = ctgx$

- $y = \sec x$

- $y = \csc x$

- $y = \sin^{-1} x$

4. Match the columns

1	$Y \cap X$	a)	The integral of $2x\,dx$ is x^2
2	$\int 2xdx = x^2$	b)	Exponential functions
3	$\sqrt[m]{}$	c)	y equals the negative square root of the difference z squared minus x squared
4	$y = \dfrac{7+x}{2+x^2}$	d)	the intersection of Y and X
5	$y = -\sqrt{z^2 - x^2}$	e)	y equals the sum of a (sub) K, x of the power of k, taken k equal to zero to k equal 4
6	$y = \ln x$	f)	Rational fractional functions
7	$y = \sum_{k=a^k}^{4} ax^k$	g)	Radical

Sample: 1d)

5. Give the examples of the functions:

Model: | Trigonometric function is $y = \sin x$ |

- Rational integral functions
- Rational fractional functions
- Irrational functions
- Exponential functions
- Trigonometric functions
- Inverse trigonometric functions

5.2. LOGARITHMS

Look through the table and try to memorize it.

Symbols	Reading	Additional word combinations
$\log_b c = n$	The logarithm of c to the base b is equal to n	Natural logarithm of a number ($ln\ c$)
$\log_b c$	logarithm of c to the base b	(common) logarithm of a number ($log\ c$; $lg\ c$)
b	Base	
c	Antilogarithm	
n	Value of a logarithm	
$a^3 = \log_c d$	A cubed equals the logarithm of d to the base c	

Active vocabulary

logarithm	logarifm
natural logarithm	natural logarifm
common logarithm	umumiy (o'nli) logarifm
logarithmic expression	logarifmik ifoda
value of a logarithm	logarifmning qiymati

1. Read the following symbols.

- $\log_a x = m$

- $a^2 = \log_b d$

- $\log_a b = y$

2. What does $b,\ c,\ n$ mean in logarithmic expression $\log_b c = n$? Answer using the following pattern:

> b means _the base_

3. Match the columns.

1	$\sqrt[n]{c}=b$	a)	Radical
2	$\log_b c$	b)	Natural logarithm
3	$\ln c$	c)	Common logarithm
4	$\sqrt{}$	d)	(the) n-th root of c is equal to b
5	b^2	e)	Square root of b
6	b^{-n}	f)	b to the power of minus n
7	$\sqrt{b}$	g)	b squared

6. SOME ALGEBRAIC EXPRESSIONS AND FORMULAS

Reading of notations and formulas

Symbols	Reading
a'	a prime
a''	a second prime; or: a double prime
a'''	a triple prime
a_1'	a first prime
a_2''	a two double prime
a_n''	a second prime sub n; or: a c-th second prime
$\lvert \cdot \rvert$	Modulus
z'	First derivative of z
z''	Second derivative of z
$\dfrac{\partial z}{\partial x}$	The first derivative of z with respect to x
$\dfrac{\partial^2 z}{\partial x^2}$	The second derivative of z with respect to x
$\dfrac{\partial^n z}{\partial x^n}$	The n-th derivative of z with respect to x
$y = f(x)$	y is a function of x; or: equals f of x
$\rightarrow$	approaches; or: approaches the limit; or: tends to
$x \rightarrow a$	x approaches the limit a
$x \rightarrow x_0$	x approaches x naught; or: x tends to x naught
$\displaystyle\int_n^m \ldots$	Integral of … from n to m; or: integral of … between limits n and m
$\displaystyle\int 2xdx = x^2$	The integral of $2xdx$ is x^2
$\displaystyle\int_{t_0}^{t} f(x)dx$	the integral from t sub 0 (or: from x zero-th) to t of $f(x)dx$
$\sum$	The sum
$\displaystyle\sum_{i=1}^{n} x_i$	Summing over x sub i from one to n The sum of x_i, i from one to n

Active vocabulary

a prime	shtrix
a double prime	ikkita shtrix
a triple prime	uchta shtrix
modulus pl. moduli	absolyut qiymat, modul
derivative	hosila
derivative of	...ning hosilasi
with respect to	...ga nisbatan, ...bo'yicha
to approach	intilmoq, yaqinlashmoq
integral	integral
integral of	...ning integrali

7. READING OF YEARS AND DATES

1612 - sixteen twelve

1812 - eighteen twelve

1941 - nineteen forty-one

1960 - nineteen sixty

1900 - nineteen hundred

1905 - nineteen o [ou] five

Yillar boshqacha o'qilishi ham mumkin:

1754 - the year seventeen hundred and fifty-four.

2000 yil - the year two thousand

2001- yildan boshlab, yillar miqdor sonlar ko'rinishida o'qiladi:

2007 - two thousand (and) seven

2010- yildan boshlab yillar ikkita son ko'rinishida o'qilishi kuzatiladi:

2014 - twenty fourteen,

2020 - twenty twenty

SANALARNING BELGILANISHI VA O'QILISHI

25th July, 1976 - The twenty-fifth of July, nineteen seventy-six; - 1976 yil, 25 iyul

July 25 (25th), 1976 - July the twenty-fifth, nineteen seventy-six- 1976 yil, 25 iyul

Appendix 1

signs	reading	examples
1.	Firstly; or: in the first place	
2.	Secondly; or: in the second place	
.	Point; or: decimal point	
…	And so on to	1, 2, 3, …, 25 (read: one, two, three, and so on to twenty five)
Λ ∞	And so on to infinity	1, 2, 3, … (read: one, two, three and so on to infinity)
Θ	I: since, because	
x_1	x one, or: x sub one	
$x \rightarrow \infty$	x approaches infinity or: x tends to infinity	
=	Is equal to, or: equals	$a=b$; a equals b; or: a is equal to; or: a is b
$\neq$	Is not equal to; or: does not equal	$a \neq b$; a does not equal b; or: a is not equal to; or: a is not b
$\alpha, \square$	(is) directly proportional to	$p \square q$
$\approx$	Approximately equals	$a=b$;
$\square$	Or: is approximately equal to	a approximately equals b;
$\cong$		or: a is approximately equal to b
::	As (in proportions)	p:q :: s:t, read p (is) to q as s (is) to t
$\equiv$	Is identical with; or: is always equal to	$F(x)=0$ f of x (is) identical with zero
( )	Parentheses; or: round brackets	
[ ]	Brackets; or: square brackets	
{ }	Braces	
<	(is) less than	$p<q$; p (is) less than q
>	(is) greater than	$p>q$; p (is) greater than q
$\leq$	(is) not greater than	p, q stands for $p=x=q$
	(is) greater than of equals	the closed interval p q stands x not less than
$\geq$	(is) not greater than or equals	$a \geq b$ a (is) greater than or equals b
	(is) not less than	

Appendix 2

Latin alphabet used in mathematics

Capital letter	Small letter	Reading
A	a	[ei:]
B	b	[bi:]
C	c	[si:]
D	d	[di:]
E	e	[i:]
F	f	[ef]
G	g	[dZi:]
H	h	[eiC]
I	i	[ai]
J	j	[dZei]
K	k	[kei]
L	l	[el]
M	m	[em]
N	n	[en]
O	o	[ou]
P	p	[pi:]
Q	q	[kju:]
R	r	[a:]
S	s	[es]
T	t	[ti:]
U	u	[ju:]
V	v	[vi:]
W	w	[dAblju:]
X	x	[eks]
Y	y	[wai]
Z	z	[zed]

Appendix 3

Greek alphabet used in mathematics

Capital letter	Small letter	Name of the letter
Α	α	alpha
Β	β	beta
Γ	γ	gamma
Δ	δ	delta
Ε	ε	epsilon
Ζ	ζ	zeta
Η	η	eta
Θ	θ	theta
Ι	ι	iota
Κ	κ	kappa
Λ	λ	lambda
Μ	μ	mu
Ν	ν	nu
Ξ	ξ	xi
Ο	ο	omicron
Π	π	pi
Ρ	ρ	rho
Σ	σ	sigma
Τ	τ	tau
Υ	υ	upsilon
Φ	φ	phi
Χ	χ	chi
Ψ	ψ	psi
Ω	ω	omega

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