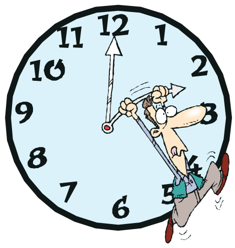
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

The images and the mathematical texts

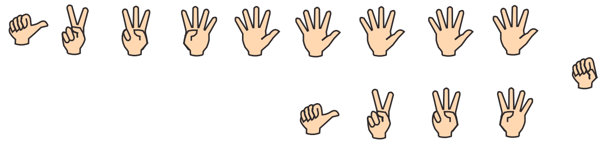
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

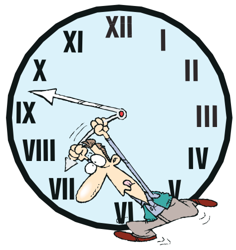
1 HOW MANY DIGITS AND NUMBERS ARE THERE ON A CLOCK



The Arab digits

1 2 3 4 5 6 7 8 9 0





I II III IV V VI VII VIII IX

The Roman numbers

There are many methods of writing a number with the digits. Among them the most famous are the digits of the ancient Romans and the Arabs, who counted with the tenths.

The Roman digits are strict and unusual:

I	V	X	L	C	D	M
one	*five*	*ten*	*fifty*	*a hundred*	*five hundred*	*thousand*

With the help of three first digits the first ten numbers are written:

I	II	III	IV	V	VI	VII	VIII	IX	X
one	*two*	*three*	*four*	*five*	*six*	*seven*	*eight*	*nine*	*ten*

However it's not convenient to write with them large numbers. For example, the number

ten thousand five hudred nineteen is written with the Roman letters this way:

MMMMMMMMMMCCCXIX.

That's why people prefered another digits, which were invented by the Hindu, and a modern view was given to them by the Arabs.

They are familiar to everyone:

1 2 3 4 5 6 7 8 9 0

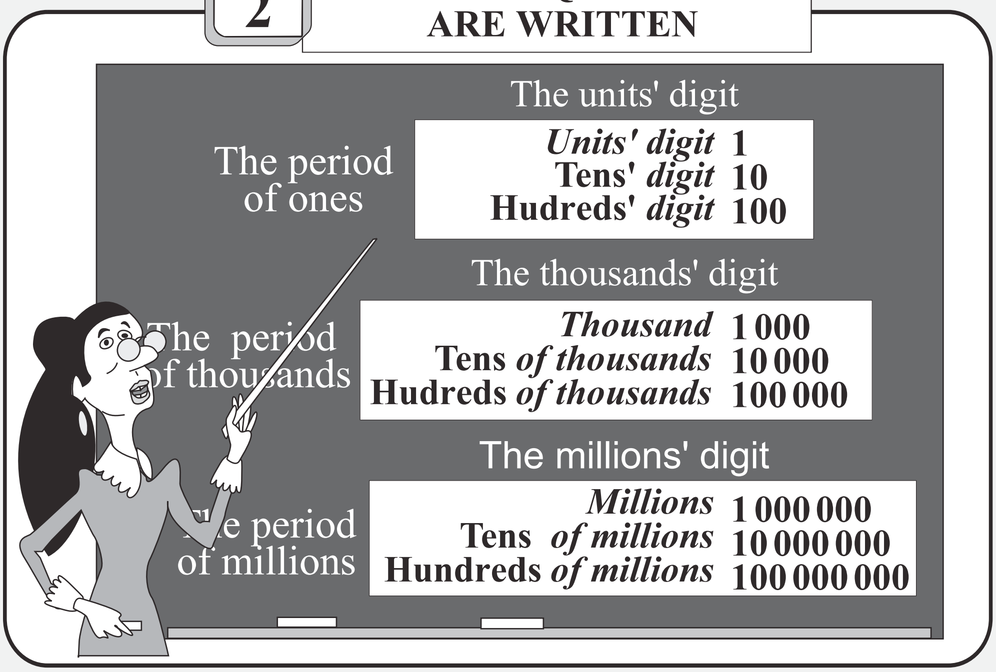
They are convenient for drawing from left to right and inverse.

Their number is enough, to write down a very big number:

10319

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

2 HOW THE QUANTITIES ARE WRITTEN



Large numbers are written with the help of *the groups of orders*, which called **the periods**.

In the writing of a large number each period has:
the units' digit,
the tens' digit,
the hudreds' digit.

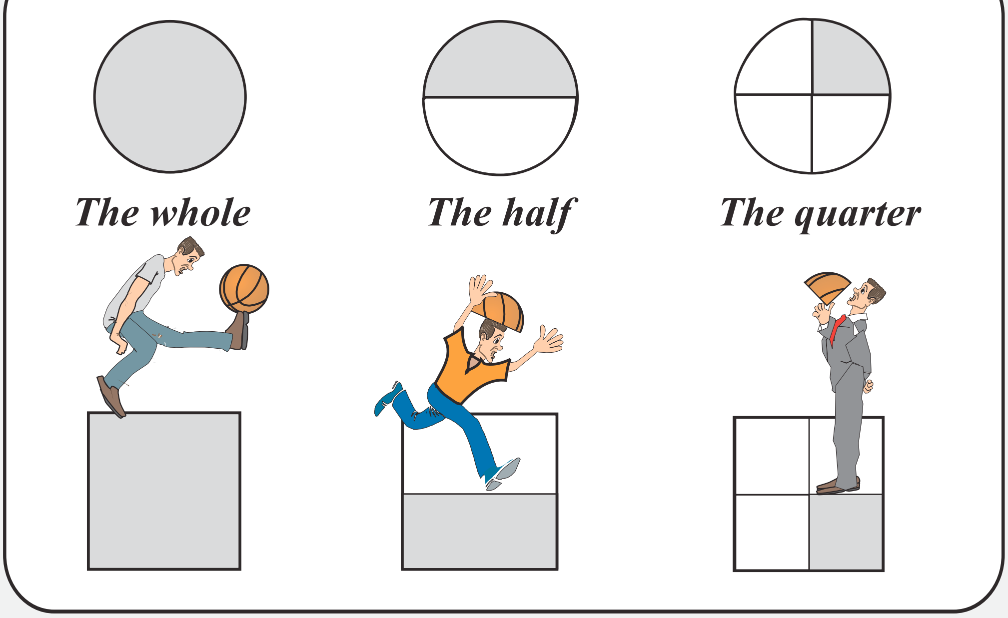
1	6	2	7	3	8	4	9	5
hundreds	***tens***	units	**hundreds**	***tens***	units	**hundreds**	***tens***	units
millions			*thousands*			*units*		

100 + 60 + 2 **700 + 30 + 8** (*the quantity of thousands*) **400 + 90 + 5** (*the quantity of units*)

In a writing of a large number it's convenient to separate one period from another one with a small *gap.* In this case
in each 1-st group of three the units' digit go,
in each 2-nd from the right – the digit of thousands,
in the 3-rd from the right – the digit of millions

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

5 THE WHOLE, THE HALF AND THE QUARTER



It is possible «to divide in halves» (two equal parts), for fun or seriously anything you like. More important to do it reasonably to prevent getting a «half of a man».

The flat figures are considered to be equal, if while applying one figure upon another one they completely coincide.

Any thing (object) makes *the whole*.

If the object is divided **into two equal parts**, each of them is it's *half*.

If the object is divided **into four equal parts**, any of it's parts will be called *a quarter*.

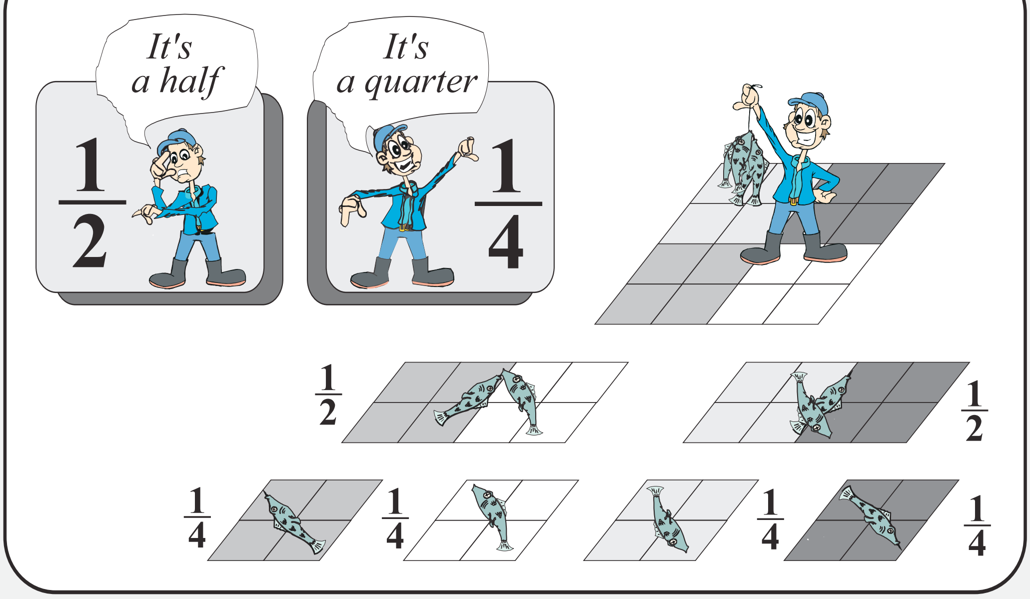
Analogously, each whole contains three thirds, the same thing contains the five fifths...

So in how many equal parts we divide *the whole*, the same quantity of these parts we get.

When dividing a square into four equal parts we get four equal small squares. Is it possible to get two equal squares when dividing the given square?

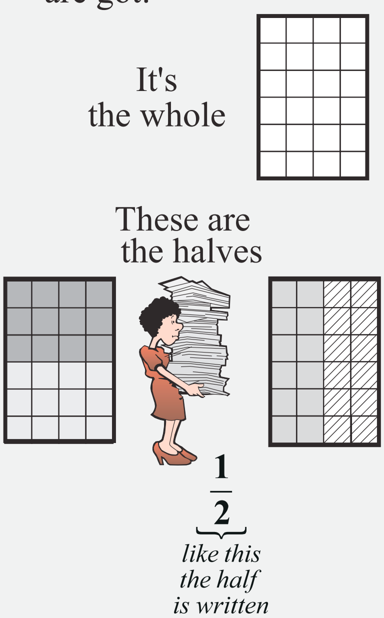
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

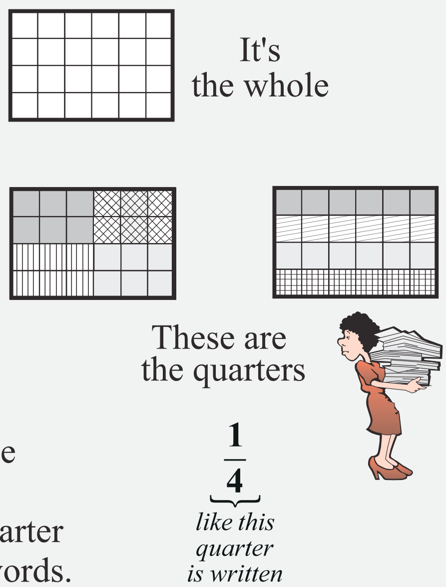
4 HOW ARE THE HALF AND THE QUARTER WRITTEN



The rectangles and the squares are often drawn on a checked paper and their halves or a quarters are colored.

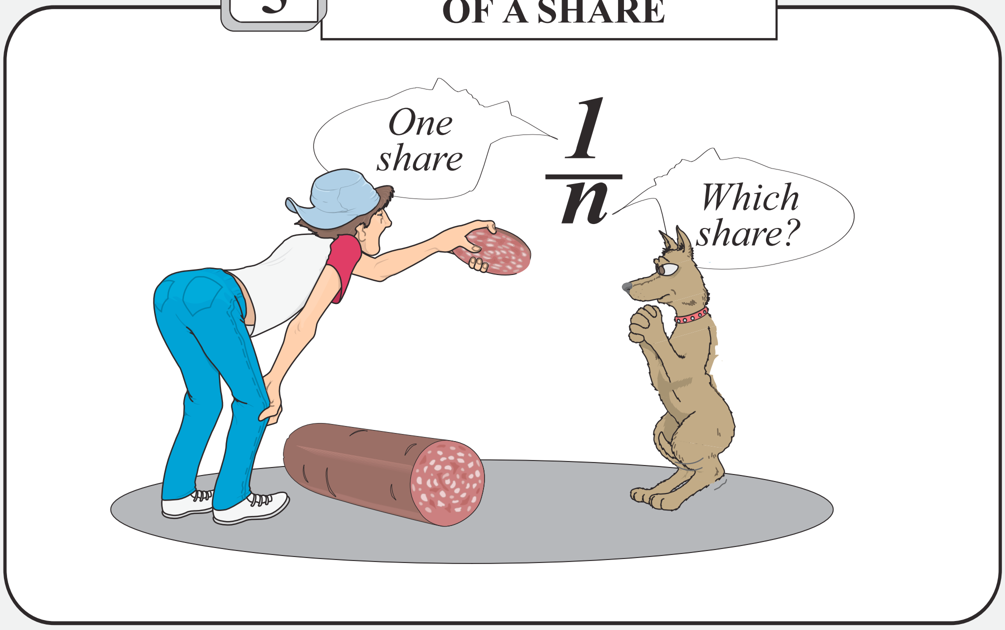
As a result two or four the same new figures are got:





It is possible to write a half and a quarter not only with words. Mostly they are written with the help of the digits.

5 WHAT IS A FORMULA OF A SHARE



A formula for designation of **a share** *of the whole* was created in the Ancient Greece. The Greeks suggested writing of one **share** *of the whole* strictly in a column of two natural numbers with a stroke between them.

$$\frac{1}{n}$$

One over the stroke underlines, that **one share** *of the whole* is taken

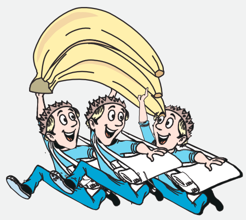
Digits under the stroke point ***into how many*** **shares** it was divided

Such entry *of* **a share** was called **a fraction**

This entry may be used for designation **of shares** of any *whole*.

For example:

one divides *the whole* into ***three*** **equal parts**



one gets ***three*** **shares** *of the whole*

the first **third**

the second **third**

the third **third**

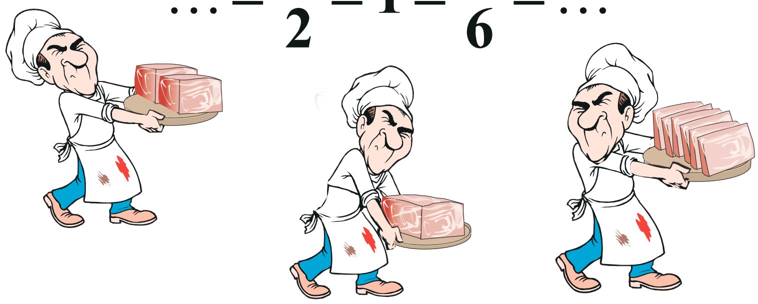
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

6 HOW ARE DIFFERENT MEASURES USED

The whole may be divided into any quantity **of shares**

For **a share** *of the whole* it is always possible to choose its measures

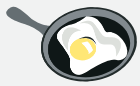
$$\ldots = \frac{2}{2} = 1 = \frac{6}{6} = \ldots$$



The single whole may be divided into different **shares.**

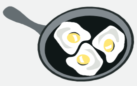
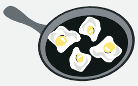
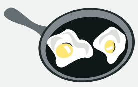
An intercept may be divided into different **shares**.
If the length of all cutoff is taken for the *whole,*

so that for a number one, we may write: $1 = \frac{24}{24} = \frac{12}{12} = \frac{6}{6}$

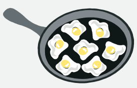


As we previously have known, that: $1 = \frac{n}{n}$, it's easy to guess

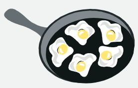
$$1 = \frac{3}{3} = \frac{4}{4} = \frac{10}{10} \quad \text{or} \quad 1 = \frac{2}{2} = \frac{4}{4} = \frac{12}{12}$$

The single whole may be measured with different *measures.*



It is important, that in a share must be presented one or several **full** *measures.*



For example, if we divide an intercept we get,

 into **12 shares**, in all, **24** *measures*;

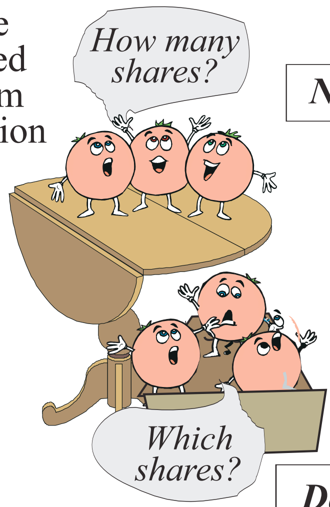
 into **4 shares**, in all, **12** *measures*;

 into **6 shares**, in all, **6** *measures.*

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

7 HOW IS THE FORMULA OF THE WHOLE COMPOSED

The whole may be presented in a form of a fraction



Numerator — **How many shares are there** *in the whole*

$$\frac{n}{n}$$

Denominator — **Into how many** shares was *the whole* divided

The fraction consists of two storey.

A number, written *over a stroke*, is called ***a numerator* of the fraction**.

In the numertor of **a share** there is always the unity.

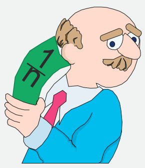
In the numerator *of the whole* there is always number **n**.

A numerator **of the fraction** is read as an ordinary number.

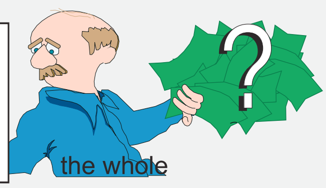
A number, standing *under the stroke*, is called ***the denominator* of the fraction.**

The denominator **of a fraction** is read in accordance to the rule of reading of **a share**.

In all there are ***n* shares** in *the whole*.
Each of them is designated with **the fraction** $\frac{1}{n}$.



$$\underbrace{\frac{1}{n}}_{\text{a share of the whole}} \Rightarrow \underbrace{\frac{n}{n}}_{\text{the whole}}$$



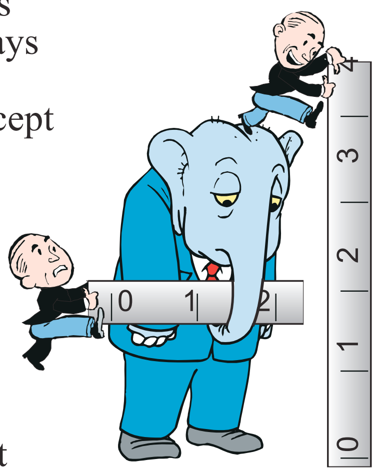
In order to get *the whole*, all its **shares** must be added
As a result we get ***n* shares** totally
and write the searched *whole* as **the fractions** $\frac{n}{n}$

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

8 WHAT DO WE MEASURE THE DISTANCES WITH

Two points may be always jonted with an intercept

With the help **of a measure** it's possible to measure a length, a height and a width



It's possible to mark **a measure** on an intercept

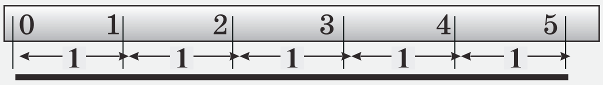
Two points of a straight line may be jointed with an intercept. In order, to find the length of the intercept it is necessary to measure *the distance* between its end points.

The distance is a basical notation.

It's difficult to explain what the *distance* means, but it is always possible to designate it, to measure and to write.

In order to measure something, instruments for measuring are necessary.

The simplest one is an ordinary ruler. It is divided into equal parts with special primes.



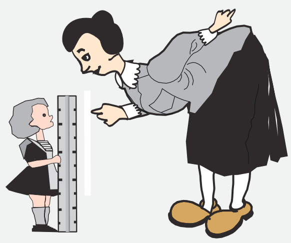
Nearby each prime the digits are written in special order: 0, 1, 2, 3,...
The distance between neighbouring primes is considered to be equal 1.

An intersept with the length equals **1** is called the **unit** intercept

With the same unit intercept it is possible to measure the distances,the length, the width and the height of the objects and alive creatures.

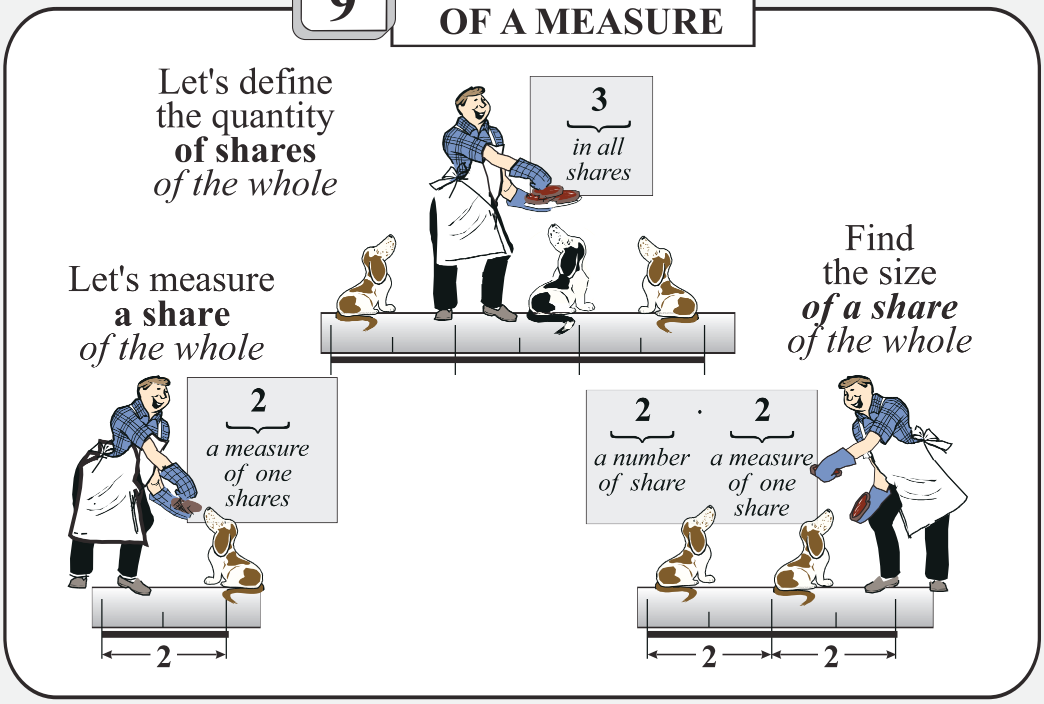
It's important to know, that

the lengths of identicall intercepts are equal

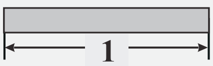


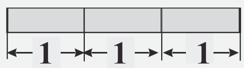
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

9 WHAT IS A PRICE OF A MEASURE



When measuring of the sides or the perimeters of polygons people used mostly **a unit measure** *of the length:*





In this case people say, that **a price of a measure** equals **1**.

Sometimes other **prices** *of measures* are defined.

For example:

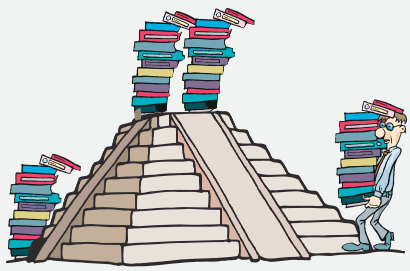
The price of a measure equals **2**

The price of measure equals **3**

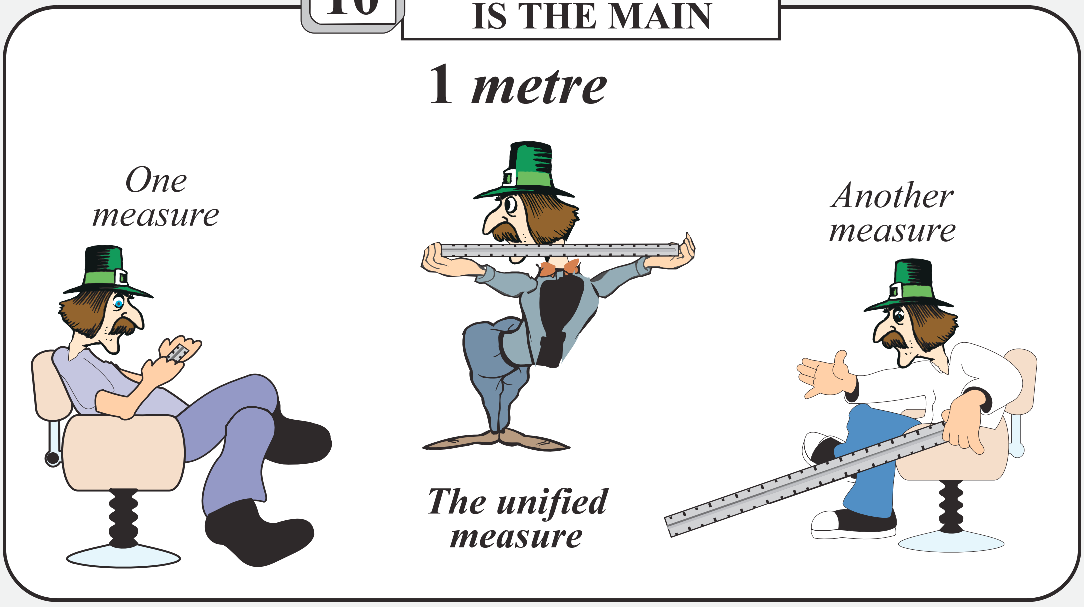
When counting the sizes of the intercept ***parts***

the addition is performed with equal numbers in the form of a product:

$$\overbrace{a + a + \ldots + a + a}^{x\ times} = \begin{matrix} x \cdot a \\ or \\ a \cdot x \end{matrix}$$



10 WHICH MEASURE IS THE MAIN



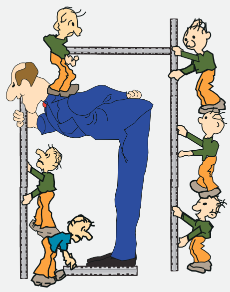
Measures are different. One may choose a big *measure,* the other can take a less *measure*.In such case when comparing distances a confusion is inevitable. That's why people negotiated about the unified *measure,* called it a *metre* and produced the metal pattern, which is kept in France in the International Bureau of measures and weights.

So, *the metre* is a basical unit of measurement of the length.

The word *metre* is of a foreign origination.The Greeks write it as *a metron*, the French – *metre*, in the Russian translation it means *a measure* and is abbreviated with one russian letter *м*..

Very often this measure is too big. Sometimes **shares** *of metre* are used, for example, **a half** *of the metre* or **a quarter** *of the metre*, and say: one quarter of the metre, one eighth and so on.

There are **the tenth, the hundredth** and even **the thousandth share** *of the metre* in use, which correspondingly (in the same order).



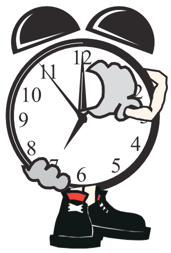
$$\frac{1}{10}m, \frac{1}{100}m, \frac{1}{1000}m$$

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

11 ABOUT MINUTES AND SECONDS ON A CLOCK

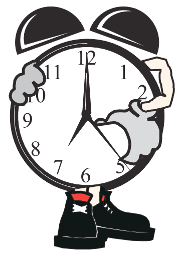
If
the half of a circle was passed

by ***the big hand*,**
the half of an hour
has gone



by ***the* small hand,**
6 hours
have gone

by ***the second hand,***
the half of a minute
has gone



A clock is an instrument for the measurement of time.

A dial of a clock may be taken for the completed circle, the circumference of which is divided with digits in **12** equal parts. Joining digits with intercept to a centre of a dial we get **12** of its *shares*, that is **12** central angles.

Each of such share the small hand passes per **1** hour. This hand is called the *hour* hand. The whole circle it passes per **12** hours.

The hour is a basic unit of measurement of time.

Each **12**-*th share* of a dial the big hand passes within **5** minutes. The whole circle *the minute* hand passes per $\mathbf{5 \cdot 12 = 60}$ minutes.

Sometimes there is another one small circle, in which the *second* hand revolves. The complete circle this hand passes per one minute.Therefore, there are **60** seconds in a minute.

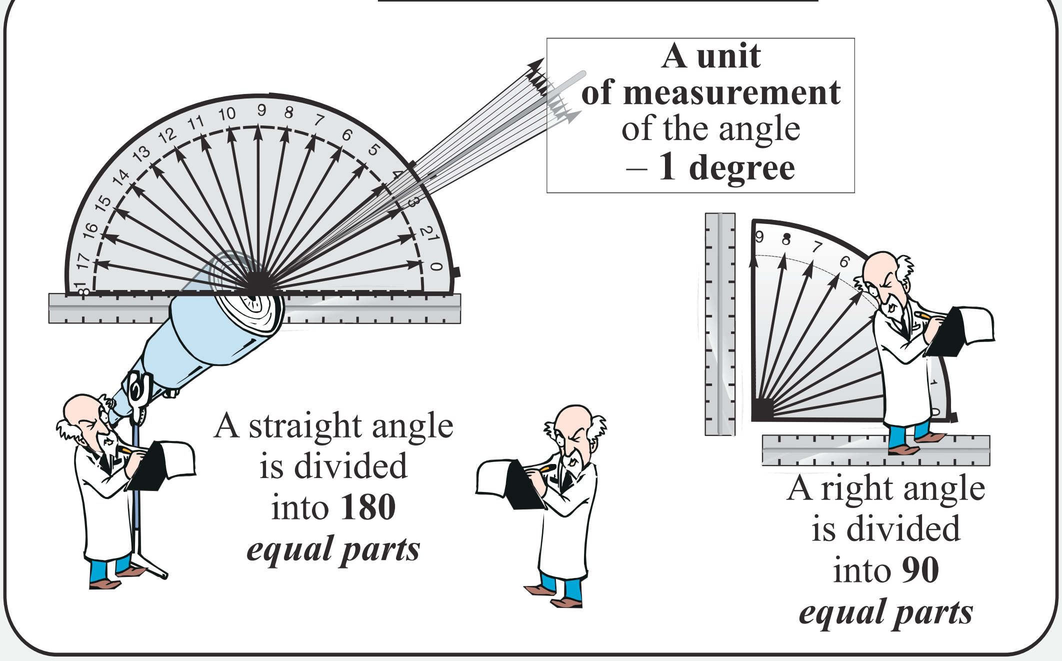
When recording the time, special abbreviations of these words are performed.

For example, we say **6** hours **30** minutes **15** seconds.

we write: **6** *hrs*.**30** *min*.**15** *sec*.

Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

12 WHAT IS A MEASURE OF THE ANGLE



A special **measure - degree** is introduced for measuring angles.

The word *a degree (gradus)* is the Latin and means *a step*.

Such step is performed by a big clock hand per **1** *second.*

> The question *"what is a degree measure?"* may be translated like "*how many degrees?"*

The degree is produced by division *of the straight angle* **into 180 equal parts.**

Hence,

the degree is the one hudred eightyth **share** *of the straight angle.*

The division of a circle into **360** degrees, obviously, is connected with the ancient custom to consider a half of a year to be equal to **180** days

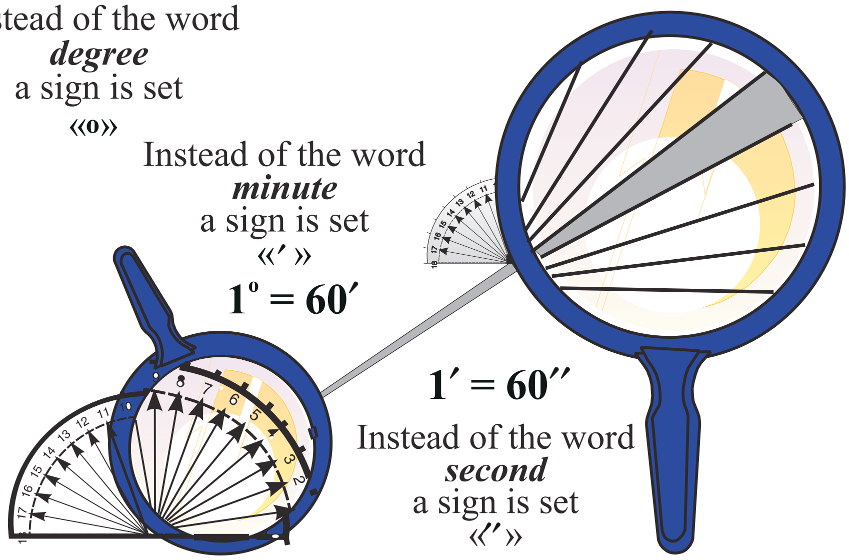
Ефимов В.В., Карасев А.А., Резник Н.А. The primary notions about the translations of the mathematical texts. – Санкт-Петербург, Изд-во ГУ РНХИ им. проф. А.Л. Поленова, 2006. – 48 с.

13 ABOUT MINUTES AND SECONDS ON THE ANGLES

Instead of the word
degree
a sign is set
«o»

Instead of the word
minute
a sign is set
«′»

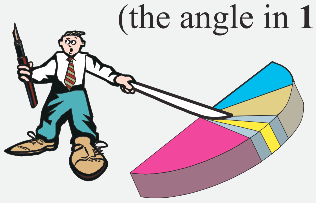
1° = 60′



1′ = 60″

Instead of the word
second
a sign is set
«″»

The words «a minute» (lat. *minutus*)
means «decreased»
(the angle in **1** degree decreased in **60** times).



The words the «second» (lat. *secunda*)
means «second»
(the angle in **1** degree decreased
for the second time in **60** times).

The terms *minute* and *second* are also (like a *degree*) substituted with symbols.

The minute is marked with one prime (′),
the second – with two primes (″).
So, instead of equalities

1 *degree* = **60** *minutes* and **1** *minute* = **60** *seconds*
we write: **1°** = **60′** and **1′** = **60″** .
Hence, if it is known, that
the angle equals **30°** **20′** **10″**

we have to decode it this way:
the angle equals **30** *degrees* **20** minutes **10** *seconds*

Ефимов В.В., Карасев А.А., Резник Н.А.

The primary notions about the translations of the mathematical texts.

Редакторы Осипова Вера Сергеевна,
Темникова Ирина Сергеевна

Компьютерный набор Н.А. Резник

Подписано к печати с оригинал-макета 20.09.2006.
Формат 60x80 1/16 . Бумага офсетная.
Гарнитура Times New Roman.Усл. печ. л. 3,0.
Заказ № 239. Тираж 300 экз.
Издательство ГУ РНХИ им. проф. А.Л. Поленова