

# M a t h s

## 中学双语阅读·数学

徐海生 编著



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少年儿童出版社



*MATHS*

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## Introduction of Algebra

## 代数简介

### Pre-reading 阅读前准备

algebra	代数学
add	加
subtract	减
multiply	乘
divide	除
power	幂
perimeter	周长

In algebra letters (or sometimes other symbols) are used to represent numbers. The letters are used to show patterns, or to represent an unknown number (or numbers) that will make a mathematical sentence true. Basic algebra letters need to be understood and practiced so that problems can be accurately and quickly solved. Substitution means replacing the variables with numbers, and usually results in calculation.

If  $x$  and  $y$  represent two numbers then:

$x+y$  represents the number obtained by adding  $y$  to  $x$ .

$x-y$  represents the number obtained by subtracting  $y$  from  $x$ .

$xy$  represents the number obtained by

在代数中,我们会用到许多字母或符号。这些字母或符号常用来表示数学语言中的格式或未知数。要对代数学中常用的字母或符号理解后,才能准确快速地求解。在解代数问题时,可以用数字替代字母变量,然后再进行运算。

如果用  $x$  和  $y$  表示两个数:

$x+y$  表示两个数的和;

$x-y$  表示两个数的差;

$xy$  表示两个数的乘积(在





multiplying  $x$  and  $y$ . (In algebra, the multiplication symbol “ $\times$ ” is usually omitted.)

$\frac{x}{y}$  represents the number obtained by dividing  $x$  by  $y$ . (In algebra, the division symbol “ $\div$ ” is usually replaced.)

$x^2$  means  $x \times x$ , in the term  $x^2$  is the power (or exponent or index) of the base  $x$ .

Using the above,  $5x^2y+2x^3$  represents  $5x \times x \times y + 2x \times x \times x$ .

For example: the dimensions of a square can be represented by the letter  $l$ , which can be any number depending on the size of the square. The area of the square is represented by the number  $l^2$ . The perimeter of the square is  $4l$ . If  $l=1\text{m}$ , the area of the square is  $1\text{m}^2$  and the perimeter of the square is  $4\text{m}$ .

代数中, “ $\times$ ”号常被省略);

$\frac{x}{y}$  表示两个数的商(在代数中, “ $\div$ ”号有时用分数线代替);

$x^2$  表示  $x \times x$ , 2 是  $x$  的指数。

因此,  $5x^2y+2x^3$  表示  $5x \times x \times y + 2x \times x \times x$ 。

例如: 用字母  $l$  可以表示一个正方形的边长,  $l$  可以用任何的数字代替。那么正方形的面积可以用  $l^2$  表示, 周长用  $4l$  表示。如果边长  $l=1\text{m}$ , 那么正方形的面积就是  $1\text{m}^2$ , 周长就是  $4\text{m}$ 。

## Exercise 练习

1. Find the value of  $C$  in the formula  $C=2A-4B$  when  $A=5$  and  $B=2$ .
2. The formula for the area of a circle is  $A=\pi R^2$  where  $A$  is the area and  $R$  is the radius. Find the area to 2 decimal places. If  $R=8.215\text{ cm}$ .





## Pre-reading 阅读前准备

operation	运算符
plus	加
product	积
quotient	商

Many mathematical problems are expressed in words. The first step toward solving such a word problem is to change it into a mathematical sentence so that a solution can be found. A word problem is changed into a mathematical sentence by using letters to represent unknown quantities, and using numbers and mathematical operations to replace words and phrases. Each different unknown in a problem must be represented by a different letter.

许多数学问题可以用语言来表达。解决数学问题的第一步要将文字语言转换成数学语言；用字母表示未知量，用数字和数学运算符代替文字和语言。每一个不同的未知量要用不同的字母来代替。

Words and phrases used (常用数学表达式)	Operation(运算符)
Plus, is added to, is increased by, more than, exceeds, sum (加)	addition, +
Minus, less than, is decreased by, difference, subtracted from(减)	subtraction, -
Product, times of(乘)	multiplication, $\times$
Divided by, quotient, share(除)	division, $\div$





The table shows some commonly used words and phrases, and the operation which usually replaces them:

For example: “the product of 3 and another number is 12” is written  $3x=12$ , where  $x$  represents “another number”.

The messages “No, cost too much” and “No cost too much” have entirely different meaning, yet they differ by just one comma. Whether a problem is written in words or as a mathematical sentence, punctuation symbols are as important in mathematics as they are in English.

表格中列出了常用的数学语言和数学运算符。

例如:某数和3的乘积为12, 可以写成  $3x=12$ , 其中  $x$  表示这个数。

短语 “No, cost too much” (不, 太贵了) 和 “No cost too much” (不太贵) 表达了完全不同的意思, 尽管只相差一个逗号。在英语中, 不管是用文字语言, 还是数学语言来描述一个问题, 标点符号都很重要。

## Exercise 练习

Use the mathematical sentence to describe following:

1. The cost of  $x$  10c stamps plus  $y$  15c stamps is the same as the cost of  $w$  20c stamps.
2. I am  $x$  years old and my brother is  $y$  years old. In 2 years time I will be twice as old as my brother will be.





## Classifying Numbers

## 数的分类

### Pre-reading 阅读前准备

natural number	自然数
counting number	自然数
integer	整数
whole number	整数
rational number	有理数
irrational number	无理数
fraction	分数
real number	实数

Concepts of number begin in childhood, with counting. If an attempt is made to list these counting numbers, the list is found to be endless or infinite. To indicate this, the first few numbers are listed, then three dots are used to mean "and so on".

The counting numbers: 1, 2, 3, 4... they are also called the natural numbers (N).

The integers (I) are numbers, which can be thought of as the whole numbers and their "opposite": ...-3, -2, -1, 0, 1, 2, 3 ...

The positive integers are the integers greater than zero, i.e. the counting num-

我们在小时候学数数时，对数的概念就有了一些了解。数的个数是无限的。为了说明方便，下面我们先列举一些数，然后用三个点表示无穷多个。

自然数(N): 1, 2, 3, 4...

整数(I)包括了所有的正整数、零和负整数: ...-3, -2, -1, 0, 1, 2, 3...

正整数是比零大的整数, 如 1, 2, 3, 4...





bers: 1, 2, 3, 4 ...

The negative integers are integers less than 0: -1, -2, -3, -4...

The rational numbers are numbers which can be written in the form  $\frac{a}{b}$ , where  $a$  and  $b$  are integer,  $b \neq 0$ . These cannot be listed. The rational numbers include integers, recurring decimals and finite (terminating) decimals since, for example,  $5 = \frac{5}{1}$ ,  $0.666\cdots = \frac{2}{3}$ , and  $1.25 = \frac{5}{4}$ .

The irrational numbers are numbers which cannot be written as a fraction or recurring decimal, e.g.  $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{5}$ ,  $\sqrt{6}$ ,  $\pi$ , etc. When written in decimal form, an irrational number is an infinite, non-recurring decimal.

The real numbers (R) are made up of all the rational and irrational numbers. There are no "hole" or "gap" in the real number line.

负整数是比零小的整数, 如-1、-2、-3、-4...

有理数是指可以表示成分数的数, 其中分子、分母(不为零)都为整数。有理数包括整数、有限小数和无限循环小数。例如:  $5 = \frac{5}{1}$ ,  $0.666\cdots = \frac{2}{3}$ ,  $1.25 = \frac{5}{4}$ 。

无理数是指那些不能被写成分数或有限小数的数, 例如:  $\sqrt{2}$ ,  $\sqrt{3}$ ,  $\sqrt{5}$ ,  $\sqrt{6}$ ,  $\pi$ , 等等。把无理数写成小数形式, 都是无限不循环小数。

实数(R)包括所有的有理数和无理数, 在一根数轴上, 实数是完全连续的。

## Exercise 练习

Classify the following numbers:

$5, \sqrt{0.2}, \frac{1}{3}, -3, \sqrt{6}, 0.8, \sqrt{16}, -\frac{3}{4}, 1349, 0.213213\cdots$





## Directed Numbers

## 正数和负数

### Pre-reading 阅读前准备

even	偶数
odd	奇数

Directed numbers are signed numbers, i.e. numbers preceded a positive sign (+), or a negative sign (-). (The positive sign is usually omitted, e.g. +3 is written as 3.) Frequently the negative sign and the minus sign are interchanged, thus the number  $-x$  (read as “negative  $x$ ”) and  $-x$  (read as “minus  $x$ ”) can be regarded as meaning the same thing.

Adding and subtracting directed numbers, two consecutive signs can be simplified to a single sign, according to the following rule:

If the sign are the same, change to “+”, e.g.  $6+(+3)=6+3=9$  and  $4-(-3)=4+3=7$ .

If the sign are different, change to “-”, e.g.  $5+(-3)=5-3=2$  and  $6-(+2)=6-2=4$ .

Simplify the problem first by changing “double” signs to “single” signs us-

有两种带有符号的数:带“+”号或带“-”号(带正号的数前面的“+”号往往被省略,例如+3就记作3)。习惯上,负号和减号表示相同意义, $-x$ 可以读作负 $x$ ,或者减去 $x$ 。

加上或减去一个带有符号的数时,两个连续的符号遵循下列规则,可以简化成一个简单的符号:

同号变正,例如: $6+(+3)=6+3=9$  和  $4-(-3)=4+3=7$ 。

异号变负,例如: $5+(-3)=5-3=2$  和  $6-(+2)=6-2=4$ 。

将两个符号变成一个符号后,问题就简化了。





ing the above rule.

Multiplying and dividing directed numbers, the rules for multiplying and dividing directed numbers are more straightforward. When multiplying or dividing a pair of directed numbers, “like” signs give a positive answer, “unlike” signs a negative answer.

When an even number of negative numbers are multiplied together or divided, the result is a positive number. When an odd number of negative numbers are multiplied together or divided, the result is a negative number.

如果乘以或除以一个带符号的数,规则更直接。同符号的数相乘或相除,结果是正值。不同符号的数相乘或相除,结果是负值。

当偶数个负数相乘或相除,结果是正值;奇数个负数相乘或相除,结果是负值。

## Exercise 练习

1. Craig had \$32.50 in his cheque account. He wrote cheques for \$25.60 and \$45.80. He deposited \$24. What was the balance after these transactions?

2. Patricia enter a number into her calculator, then presses the following keys:  $\times$  3  $\div$   $\div$   $\div$  1  $=$

If the display shows -11, write out the calculation she performed. What answer would she get if she entered the number 8?







## Squares and Square Roots

## 平方和平方根

### Pre-reading 阅读前准备

square	平方的
square root	平方根
complex number	复数
real number	实数

The square of a number is found by multiplying that number by itself, e.g. the square of 5 is  $5 \times 5 = 25$ . In general, the square of a number,  $a$ , is  $a \times a$ , and is written  $a^2$ .

It is useful to be familiar with the squares of the first dozen or so counting numbers:  $1^2=1$ ,  $2^2=4$ ,  $3^2=9$ ,  $4^2=16$ ,  $5^2=25$ ,  $6^2=36$  ... These numbers are often called perfect squares.

The square root of a number, is a number which, when multiplied by itself, gives the original number,  $a$ , e.g. the square root of 49 is 7, since  $7 \times 7 = 49$ . The square root of  $a$  is written as  $\sqrt{a}$ . Thus  $\sqrt{a} \times \sqrt{a} = a$ .

$i$  is defined to be the square root of  $-1$ , i.e.  $i = \sqrt{-1}$ .

$z = a + bi$  is a complex number, where  $a$  and  $b$  are real numbers.

一个数的平方就是自己乘以自己。例如 5 的平方就是  $5 \times 5 = 25$ 。一般情况下, 一个数  $a$  的平方, 就是  $a \times a$ , 记作  $a^2$ 。

下面罗列一些较常用的、需要熟悉的数的平方:  $1^2=1$ ,  $2^2=4$ ,  $3^2=9$ ,  $4^2=16$ ,  $5^2=25$ ,  $6^2=36$ ... 这些数往往被称为完全平方数。

如果第一个数的平方等于第二个数, 那么第一个数就叫做第二个数的平方根。例如, 因为  $7 \times 7 = 49$ , 所以 7 是 49 的平方根。 $a$  的平方根记作  $\sqrt{a}$ , 所以  $\sqrt{a} \times \sqrt{a} = a$ 。

我们定义  $i$  是  $-1$  的平方根, 也就是  $i = \sqrt{-1}$ 。

数  $z = a + bi$  是复数, 其中  $a$  和  $b$  是实数。