First Bilingual Mathematics Lesson

(Introduction to key words and phrases)

I. How to read and say the “numbers”?

If we want to read the numbers in English, sometimes we use a cardinal number ( ) and sometimes we use an ordinal number ( ). Generally speaking, a cardinal number is a number that denotes the count of any object. An ordinal number is a number that denotes the order or place of an object. In mathematics, we use cardinal numbers more frequently. We’ll use ordinal numbers when we want to express an **exponent** or **fraction**. You can observe the following table to note the difference between cardinal numbers and ordinal numbers.

Cardinal Numbers ( )		Ordinal Numbers ( )	
1	one	1^{st}	first
2	two	2^{nd}	second
3	three	3^{rd}	third
4	four	4^{th}	fourth
5	five	5^{th}	fifth
6	six	6^{th}	sixth
7	seven	7^{th}	seventh
8	eight	8^{th}	eighth
9	nine	9^{th}	ninth
10	ten	10^{th}	tenth
11	eleven	11^{th}	eleventh
12	twelve	12^{th}	twelfth
13	thirteen	13^{th}	thirteenth
14	fourteen	14^{th}	fourteenth
15	fifteen	15^{th}	fifteenth
16	sixteen	16^{th}	sixteenth
17	seventeen	17^{th}	seventeenth
18	eighteen	18^{th}	eighteenth
19	nineteen	19^{th}	nineteenth
20	twenty	20^{th}	twentieth

<key> Similar patterns can be observed after numbers larger than 20.

<key> We’ll use cardinal + ordinal to say the number between 20 and 30, 30 and 40…

Example1.

Write down the cardinal numbers and ordinal numbers of 21 and 78.

Integers and Decimal numbers

We can use place values to help us understand how to read an integer or a decimal number. The following table about place values can be compared with "個、十、百、千、萬…" in Chinese.

Place Values

billions			millions			thousands			ones			decimals					
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	tenths	hundredth	thousandt	Ten-thousands	Hundred-thousands	millionths
千億	百億	十億	億	千萬	百萬	十萬	萬	千	百	十	個	十分	百分	千分	萬分	十萬分	百萬分
10^{11}	10^{10}	10^{9}	10^{8}	10^{7}	10^{6}	10^{5}	10^{4}	10^{3}	10^{2}	10^{1}	10^{0}	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}
							5	7	2	8	4	2	3				

If we want to read 57,284.23 in English, we can follow the place values table. 57,284.23 in English will be "fifty-seven thousand, two hundred and eighty-four point two three". Please try to read the integers or decimal numbers in Example2 and write them down.

Example2.

Please write down how we read the following numbers in English.

(1) 75.20		(6) 0.1756	
(2) 178		(7) 0.0025	
(3) 12,586		(8) -0.258	
(4) -256		(9) 3.576	
(5) -2,578		(10) -15.2689	

Have you ever seen the decimal of the form 0.333333…. (repeating)? This is a recurring(repeating) decimal. This kind of decimal has a digit (or group of digits) that repeats forever. We can represent these decimals by fractional numbers.

Decimal number $0.333\ldots = 0.\bar{3} = 0.\dot{3} = \frac{1}{3}$ Fractional number

Fractional Numbers

Fractional numbers usually involve two whole numbers. A fraction has two parts. The number above the line is called the numerator. (　　) The number below the line is called the denominator. (　　)

$$\frac{\text{numerator}}{\text{denominator}} = \text{\_\_\_\_\_}$$

To read a fractional number properly, we'll mostly read the numerator as the cardinal number first then the denominator as the ordinal number. Here are some examples:

Fraction	How to read it	Fraction	How to read it
$\frac{1}{2}$		$\frac{2}{3}$	
$\frac{1}{3}$		$\frac{7}{4}$	
$\frac{1}{4}$		$2\frac{1}{3}$	
$\frac{1}{5}$		$5\frac{1}{2}$	
$\frac{3}{2}$		$-2\frac{5}{7}$	

<key> There are three different types of fractions mentioned in the example above:

$\frac{1}{4}$ is a proper fraction. (　　)

$\frac{7}{4}$ is an improper fraction. (　　)

$5\frac{1}{2}$ is a mixed number. (　　)

<key> It's more common for the west to say a fraction with cardinal and ordinal Numbers. For our classroom instruction, we'll use "a over b" to express the fraction numbers.

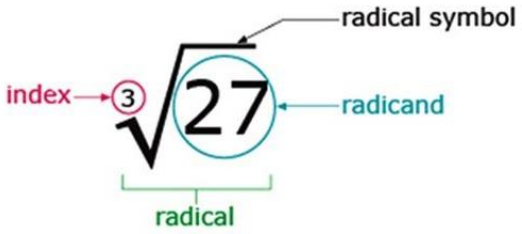
Example3.

Please write down how we read the following fractional numbers in English.

Fraction	How to read it	Fraction	How to read it
$\frac{3}{4}$		$2\frac{2}{5}$	
$\frac{1}{11}$		$-7\frac{29}{31}$	

Radical Numbers

The radical of a number is the same as the root of a number. The radical symbol "√" expresses a root of a number. The root can be a square root, cube root or in general nth root. To read the radical number "$\sqrt[n]{a}$", we'll say "n^{th} root of a" or "a radical n". The number before the radical symbol is known as the index or degree ( ). The value inside the radical symbol is known as the radicand. ( )



https://byjus.com/maths/radical/

Here are some examples:

Radical	How to read it
$\sqrt{15}$	Square root of fifteen = fifteen radical two
$\sqrt[3]{7}$	Cube root of seven = seven radical three
$\sqrt[6]{25}$	Sixth root of twenty-five = twenty-five radical six
$\sqrt[n]{27.1}$	nth root of twenty-seven point one = twenty-seven-point one radical n

<key> We'll use ordinal number to say the index when we say "n^{th} root of a".
We'll use cardinal number to say the index when we say "a radical n".

Example4.

Please write down how we read the following radical numbers in English.

Radical	How to read it	Radical	How to read it
$\sqrt{2}$		$\sqrt{\frac{1}{3}}$	
$\sqrt[3]{17}$		$\sqrt[4]{\frac{2}{x}}$	
$\sqrt[5]{29}$		$\sqrt[n]{21.532}$	

Exponents

In any general exponential expression of the form a^b, a is the base and b is the exponent. The exponents of number could be whole number exponents, fractional exponents, or irrational exponents.

Whole number exponents can be considered as "how many times to use the number in a multiplication." For example, $5^3 = 5\times5\times5 = 125$. The exponent 3 is a whole number.

Fractional exponents (rational exponents) are ways to represent powers and roots together. When we have a general exponential expression a^b, b is given in the fraction form, it is known as a fractional exponent. For example, $2^{\frac{3}{2}}$, $6^{\frac{-1}{5}}$, etc.

<key> The base of fractional exponents must be a positive number.

Irrational exponents are exponents which are irrational numbers and they cannot be expressed in the form p/q. For example, $2^{\sqrt{2}}$.

<key> The base of irrational exponents must be a positive number.

Generally, to read the exponents in a proper way, we'll read the base as the cardinal number first then the exponent (power) with the ordinal number afterwards. Here are some examples:

Exponents	How to read it	Exponents	How to read it
2^2		$2^{\frac{1}{5}}$	
$\left(\frac{1}{2}\right)^3$		$3^{\frac{2}{7}}$	
4^7		$5^{\sqrt{2}}$	

Example5.

Please write down how we read the following exponents in English.

Exponents	How to read it	Exponents	How to read it
3^2		$7^{\sqrt{3}}$	
$\left(\frac{1}{3}\right)^3$		$\left(\frac{5}{3}\right)^{\sqrt{2}}$	

II. All about the symbols

We'll use different types of mathematical symbols to perform various kinds of operations. Symbols make it easier to refer to mathematics questions. The relationship between the signs and values refers to the fundamental need of mathematics. Here are some frequently used mathematical symbols. We can read the equality, inequality, polynomial, function etc. with the following table:

Symbols	How to read it	Chinese translation
+	Plus	
−	Minus	
x	Times	
÷	Divided by	
=	Equals/Is equal to	
>	Greater than	
<	Less than	
≥	Greater than or equal to	
≤	Less than or equal to	
±	Plus-minus	
$f(x)$	Function of x (f of x)	
$(\ )$	parenthesis or parentheses	
$[\ ]$	Brackets	
$\{ \ \}$	Curly brackets	
$\lvert \ \rvert$	Absolute value	

Example6.

Please write down how we read the following exponents in English.

1. $2x\left[x^2-3x+5-2(x+1)(x-5)\right]=0$:

2. $\lvert x-3\rvert \geq 2$:

3. $f(x)=(x+5)(x-\frac{1}{2})^2$:

4. $\sqrt[n]{a}=2$:

Challenge.

Please write down any mathematical function or equation.

Find a classroom and practice reading the function or equation you wrote.

Your function/equation:

How to read it:

<資料來源>

1. **Ordinal Numbers**
   https://www.cuemath.com/numbers/ordinal-numbers/
2. **Fractional Numbers**
   https://www.splashlearn.com/math-vocabulary/fractions/fraction
3. **Radical Numbers**
   https://www.cuemath.com/radical-formula/
   https://www.mathsisfun.com/definitions/radicand.html
4. **Exponents**
   https://www.cuemath.com/algebra/exponents/
5. **Math Symbols**
   https://byjus.com/maths/math-symbols/