雙語數學誌

July, 2026

MATHLINGUAL

BILINGUAL MATHEMATICS MAGAZINE

攝影/ 雨停旅攝

NUMBERS
MEET LANGUAGE

FRACTIONS
TO RATIONAL NUMBERS

REFUSE
TO BE RATIONAL

Neither friendly nor easy

www.math.ntnu.edu.tw/merc/mbt

A Message from the Dean

I am delighted to share with you the inaugural issue of MathLingual: Bilingual Mathematics Magazine.

As Dean of the College of Science at National Taiwan Normal University, I warmly welcome all of our teachers and students to this exciting new journey.

In science, mathematics is the fundamental language we use to understand how the world works. At the same time, English is the key that connects us to the global community. Bilingual education is therefore about much more than learning another language, it leads to develop new ways of thinking.

When we explore mathematics through a different language, we gain a fresh perspective on its logic, structure, and beauty. We begin to see that mathematical ideas transcend borders and that language can serve as a bridge to deeper understanding.

This magazine was created to provide a meaningful and inspiring learning opportunity. For teachers, it offers a new way to engage and motivate students. For students, it opens a window to a broader world of knowledge and discovery.

I hope that MathLingual will encourage you to look beyond the classroom, broaden your horizons, and experience the unique intersection where mathematics and language come together.

May you enjoy every issue and continue to explore the wonderful world of knowledge with curiosity, confidence, and an international vision.

Jein-Shan Chen

Dean, College of Science,
National Taiwan Normal University

院長的話

欣逢《MathLingual 雙語數學誌》發行，本人謹以學術研究者與教育推動者的身分，向讀者致上誠摯祝賀。

在現代科學體系中，數學是解構宇宙邏輯的本質語言；而在全球化浪潮下，英語則是連結國際學術社群的關鍵工具。雙語教育的趨勢，不僅是語言能力的轉化，更是一種思維角度的切入。透過不同的語言媒介，我們能從異質的文化視野中，重新審視數學邏輯的嚴謹與美感。

本刊的推出，旨在為師生建構一個跨領域的學習契機。對於教師，這是探索數位與語文整合教學的創新實驗；對於學生，這是一扇通往廣闊世界的窗。我期許讀者能藉此跳脫單一學科的框架，在數學與語言的交匯處，培養出更具深度與廣度的國際視野。

願這本月刊，能引領各位走進更為寬廣的知識殿堂。

國立臺灣師範大學
理學院 院長
陳界山

From the Editorial Team

Welcome to MathLingual: Bilingual Mathematics Magazine! We created this magazine to make learning mathematics and English both enjoyable and meaningful.

Many students see math as just numbers and formulas, while in fact, mathematics is actually a language too! Words like *positive*, *negative*, and *difference* are part of how we understand it. As you learn these words in English, you're not only improving your math skills, but also building language skills that help you connect with the world around you.

At the same time, we also hope this magazine can support teachers who want to bring mathematics and language together in their classrooms.

Thanks for being a part of this journey. Take your time to explore, practice, and enjoy the world where math and language meet.

We'd love to hear from you! Complete our feedback survey for the June and July issues for a chance to win stationery prizes in our reader giveaway.

Scan the QR code below to share your feedback.

Magazine Feedback

編輯團隊的話

歡迎閱讀《MathLingual：雙語數學誌》！

我們創辦這本雜誌，是想讓你發現：數學和英文其實可以一起學，而且還可以很有趣！

很多學生認為，數學是一門充滿數字和公式的學科，而英文看起來似乎是完全不同的能力。其實，數學本身也有自己的語言！像是 positive（正數）、negative（負數）和 difference（差）這些詞都是理解數學概念的重要工具。當你學會這些英文數學詞彙時，不但能加深對數學的理解，也能培養與世界接軌的英語能力。

此外，我們也希望這本雜誌能成為老師們在課堂上結合數學與語言教學的實用資源，帶來更多靈感與想法。

謝謝你加入這段充滿探索與發現的旅程。邀請你一起探索、練習，並享受數學與語言結合所帶來的樂趣！

填寫前兩期（6 月與 7 月）的讀者回饋問卷，就有機會參加抽獎，獲得實用的文具小禮物！我們非常期待聽到你的想法與建議！

請掃描下方 QR Code，與我們分享你的意見。

Magazine Feedback

WHERE NUMBERS MEET LANGUAGE

NUMBERS: COUNTING VS. ORDERING

Let's start with the basics: cardinal numbers and ordinal numbers.

- Cardinal numbers tell us how many (one, two, three…)
- Ordinal numbers tell us position or order (first, second, third…)

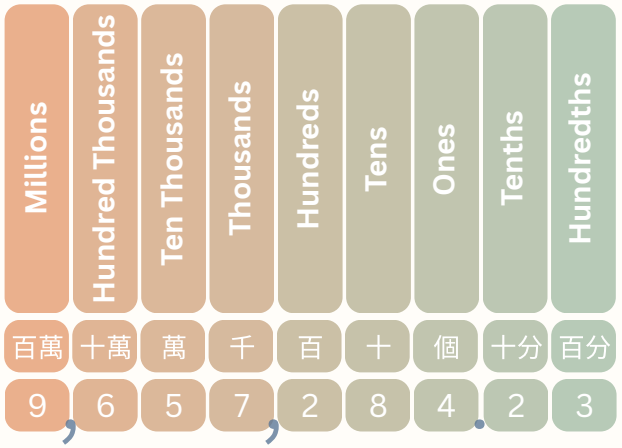
In mathematics, we mostly use cardinal numbers. However, ordinal numbers appear when we talk about things like powers (exponents) or fractions.
Understanding this distinction is the first step toward reading math naturally in English.

Cardinal Numbers (基數)		Ordinal Numbers (序數)	
1	ONE	1ST	FIRST
2	TWO	2ND	SECOND
3	THREE	3RD	THIRD
4	FOUR	4TH	FOURTH
5	FIVE	5TH	FIFTH

When numbers get longer, or include decimals, we rely on **place value**.
Take this number: 9,657,284.13. We read it as: "nine million, six hundred and fifty-seven thousand, two hundred and eighty-four point one three."
A few key tips:

- Say the "place value" where the commas are.
- Say "point" for the decimal.
- Read each digit after the decimal individually.

For numbers below 0, just say negative first.

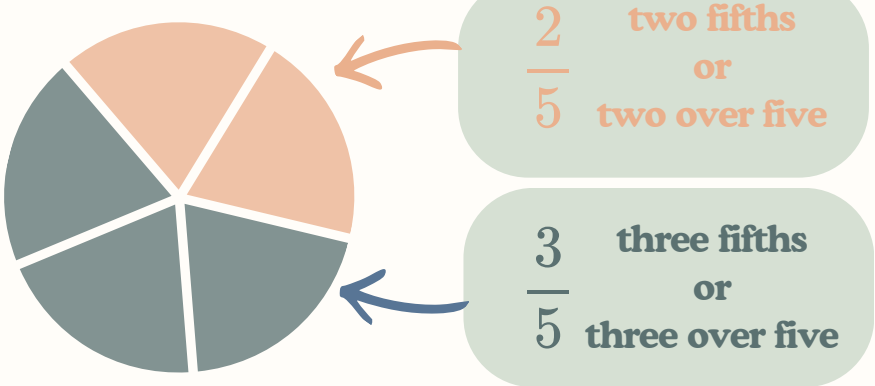


Fractions: A Language of Parts

Fractions describe parts of a whole. They have two components:

- Numerator (top number)
- Denominator (bottom number)

When reading fractions in daily English, we often use a cardinal number for the numerator and an ordinal number for the denominator.



Number Talk: LET'S PRACTICE HOW TO SAY IT

Numbers		How To Say It	Example
fraction	$\frac{1}{2}$	one-half	One-half of the students passed the exam.
fraction	$\frac{3}{4}$	three-quarters	Three-quarters of the circle is shaded.
fraction	$\frac{2}{3}$	two-thirds	Two-thirds of my screen time is spent on social media.
mixed number	$2\frac{1}{2}$	two and a half	It takes two and a half hours to drive to the airport.

Your turn to give it a try

There are 240 first-year students. Three-quarters of them are going to the annual school trip.
How many students are going to the trip? Write your answer in a complete sentence.

參考回答： Three-quarters of 240 students is 180, so 180 students finished all three rounds.

From Fractions to Rational Numbers 有理數

Fractions have been used for thousands of years. Archaeologists (考古學家) have found evidence in the Rhind Mathematical Papyrus (萊茵德紙草書) from ancient Egypt that, around 1650 BCE, people were already using fractions to solve everyday problems of sharing, measurement, and trade. Later, ancient Greek mathematicians, including the Pythagoreans (畢達哥拉斯學派), began thinking about numbers and ratios in a more abstract way. This helped shape a more systematic way of thinking about mathematics.

Today, a rational number(有理數) is any number that can be written as: $\frac{m}{n}$
where m and n are integers and $n \neq 0$.
Every integer can be written as a fraction with denominator 1, so every integer is also a rational number.

Scan to explore a section of the Rhind Mathematical Papyrus (萊茵德紙草書), preserved in the British Museum.

Your turn to give it a try

1. In your own words, what is a rational number?
2. How can we tell if a number is a rational number?

Two Forms of Rational Numbers: Fractions and Decimals

Rational numbers have another form—decimals. When we divide any rational number, the result is either a terminating decima (有限小數) or a repeating decimal (無限循環小數). In everyday life, however, we rarely do long division step by step. Instead, we simply use a calculator.

For example, $\frac{2}{3} = 0.\overline{6}$

(we read “zero point six repeating” or “zero point six recurring”), which is a repeating decimal.

$\frac{3}{4} = 0.75$, which is a terminating decimal.

Here’s a question for you: when it comes to a rational number, which form do you prefer—a fraction or a decimal?

Would you use a fraction or a decimal?

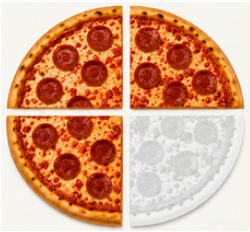
同一個數，不同的表示方式，會帶來不同的感受與理解

In each situation, ask yourself: Which representation helps you understand the number better?

1. Sharing Pizza

A. You ate $\frac{3}{4}$ of the pizza.

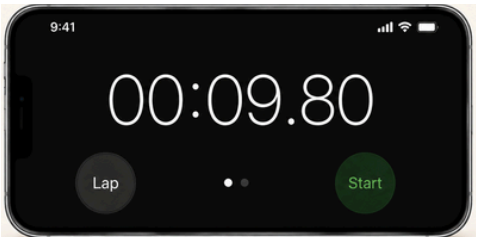
B. You ate 0.75 of the pizza.



2. Running Time

A. You finished the race in 9.8 seconds

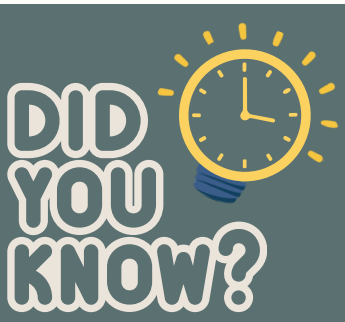
B. You finished the race in $\frac{49}{5}$ seconds



There is no single best form. Use the one that communicates the idea most clearly.

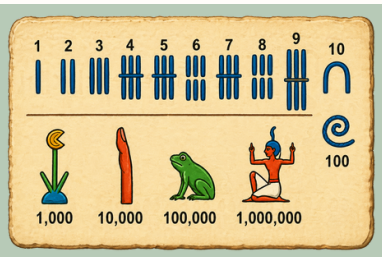
Scan the QR code & read fractions in English like a pro!

THE STORY OF NUMBER BASES



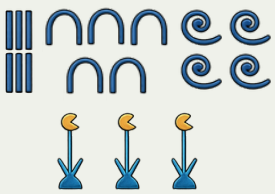
In daily life, we mainly use two number bases: decimal (10進位), or base 10, and sexagesimal (60進位), or base 60. The decimal system comes from counting on our ten fingers and is used for most everyday tasks, like counting money and doing calculations. The sexagesimal system is used for time—for example, 1 hour equals 60 minutes, and 1 minute equals 60 seconds. Even without noticing, we use both bases every day.

Famous number systems such as those of the Babylonians and ancient Egyptians show how early humans used symbols to represent numbers.

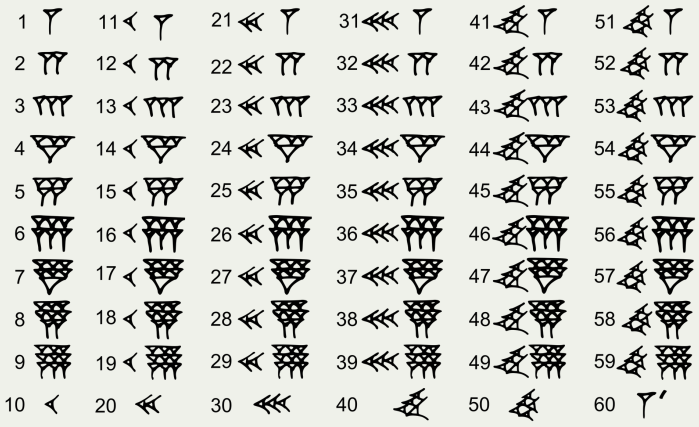


In ancient Egypt, different hieroglyphs (象形文字) were used for different values.
A single stroke (一劃) represented 1, an arch-like symbol represented 10, a rope swirl (漩渦) stood for 100, a lotus flower for 1,000, a finger for 10,000, a frog for 100,000, and a figure with raised arms (showing surprise) represented 1,000,000.

The Egyptian Way to Write 3,456



Although Egyptian numerals look like a collection of symbols, they also include the idea of place value. For instance, ten "10" symbols can be replaced by one "100" symbol. In the same way, a number like 3,456 can be expressed as a combination of symbols for thousands, hundreds, tens, and ones; even if it is written backwards.



Before the Middle Ages (from about the 5th to the late 15th century), people did not have clocks like we do today. Their understanding of time was very different. In earlier times, people learned about time by observing nature, such as the movements of the sun and the moon.

This helped them understand the cycle of day and night and the changing seasons. Time was seen as cyclical (循環的), meaning it repeated in patterns.
In the later Middle Ages, people began to need a more precise way to measure time. Christian monks (修道士) divided both day and night into 12 parts, which became our idea of "hours."
However, these early hours were not all the same length. In summer, an hour could be about 80 minutes, while in winter it could be only 40 minutes. Only around the spring and autumn equinoxes (春分和秋分) were the hours close to 60 minutes.
The system of 60 minutes in an hour and 60 seconds in a minute comes from the ancient base-60 system developed by the Sumerians (蘇美人) and used by the Babylonians (巴比倫人).

「掐指一算」運用的是 60 進位的計算方法。古人利用天干與地支配對，來推算日期、時間與曆法。由於天干有 10 個、地支有 12 個，兩者依序相配後，形成60種周期的紀日法。
天干：甲乙丙丁戊己庚辛壬癸
地支：子丑寅卯辰巳午未申酉戌亥

WHEN NUMBERS REFUSE TO BE FRACTIONS

DID YOU KNOW?

Long ago, a number hidden inside a square shocked Greek mathematics. The length of a square's diagonal is $\sqrt{2}$, and this number cannot be written as a simple fraction.

For a tradition that believed numbers should be based on whole numbers and ratios, this was a major conceptual shock.

Check it out: First Crisis in Math (第一次數學危機)

IN OUR DAILY LIFE

Many students first notice the $\sqrt{\ }$ symbol on a calculator. In mathematics, it is called the radical symbol(根號), but in English we usually read it with the word "root" (根).

Radical Anatomy

In the expression $\sqrt[n]{a}$

- n is the **index (指數)**
- a is the **radicand (被開方數)**
- $\sqrt{\ }$ is the **radical symbol (根號)**

The Language of Roots

- $\sqrt{15}$ is read as the square root of fifteen
- $\sqrt[3]{7}$ is read as the cube root of seven
- $\sqrt[6]{25}$ is read as the sixth root of twenty-five

Try reading it aloud !

Not a fraction, but still real

An irrational number is a real number that cannot be written as a fraction.
The digits of its decimal form never end and never repeat.

Practice Zone

Zone One
Try Reading it aloud

Read these expression in English.

$\sqrt{9}$ .....

$\sqrt[3]{8}$ .....

$\sqrt[4]{16}$ .....

$\sqrt[5]{32}$ .....

Zone Two
Match expression

Match expression with its reading.

$\sqrt{27}$	•	• the cube root of twenty-seven
$\sqrt[3]{27}$	•	• the fourth root of twenty-seven
$\sqrt[4]{27}$	•	• the sixth root of twenty-seven
$\sqrt[6]{27}$	•	• the square root of twenty-seven

Zone Three
Rational / Irrational

Decide whether each number is rational or irrational.

	Rational	Irrational
$\sqrt{4}$	○	○
$\sqrt{2}$	○	○
$\sqrt{9}$	○	○
0.333	○	○
$\frac{1}{3}$	○	○

Editorial Team 編輯團隊

Find Out More !
探索更多！

If you enjoyed this magazine, visit our website to discover more bilingual mathematics resources. Whether you're a student looking for extra challenges or a teacher seeking inspiration for the classroom, you're welcome to explore what we have to offer!

如果您喜歡本期內容，歡迎到我們的網站探索更多雙語數學學習資源！無論您是想要加深學習的學生，或是尋找教學靈感的老師，都歡迎前來瀏覽與交流。

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