



高中數學雙語教學主題包 2

建構聽、說環境，打造舒適雙語教學環境

從課綱必修課程搭建通用雙語環境

雙語課程單元教案 Bilingual Education Unit Lesson Plan			
單元主題 Topic	級數 Series	科目名稱 Subject	數學 Mathematics
教材來源 Teaching Materials	高中一年級下學期 高一級第一章第二節	教案設計者 Designer	國立臺灣師範大學附屬高級中學課程部
適用年級 Grade Level	高中一年級下學期	授課時間 Time	本單元共 6 節
教學設計理念 Design Concepts	以課本的編排加上英文單字補充教學，再以英文統整觀念及應用題加深學生的數學概念。		
學科核心素養對應 內容 Core Competencies	總綱	A2 系統思考與解決問題 B2 符號運用與溝通表達 數 5-A-2 具備數學探究的基本工具，以數學模型解決典型的現實問題，了解數學在觀察事物之後選擇解釋問題的思辨功能及其價值。	
	領域	數 5-U-1 具備邏輯推理、關係、運算的數學符號的意義，掌握這些符號與日常語言的轉或傳達；並能根據此符號執行操作程序，用以解決情境中的問題，並能用以呈現數學操作或論證的過程。	
學科學習重點 Subject Performance & Content	學習表現	a-V-5 能察覺規律並以一般項或通項方式表現，進而熟悉級數的運作，理解數學歸納法的意義，並能用於數學論證。	
	學習內容	N-10-4 數列、級數與遞迴關係；有限項等差級數、等比級數、常用的求和公式、數學歸納法。	
學生應有知識 Students' Prior Knowledge	1. 學科先備知識	N-8-3 認識數列：生活中常見的數列及其規律性（包括圓形的規律性）、N-8-4 等差數列：等差數列：給定首項、公差計算等差數列的一般項、N-8-5 等差級數求和：等差級數求和公式：生活中相關的應用、N-8-6 等比數列：等比數列：給定首項、公比計算等比數列的一般項、2. 英語先備知識	
	1-V-4 能解釋規律並以一一般項或通項方式表現，進而熟悉級數的運作，理解數學歸納法的意義，並能用於數學論證。	1-V-4 能解釋規律並以一一般項或通項方式表現，進而熟悉級數的運作，理解數學歸納法的意義，並能用於數學論證。	
本單元學習目標 Learning Objectives	1. 學科學習目標 (1) 能夠了解等差級數與等比級數的定義。 (2) 能夠推導等差級數與等比級數的求和公式，並能用於計算生活中的應用問題。 (3) 能夠使用數學歸納法證明常用的級數求和公式（一次方、二次方級數）。		

雙語教學教案共有 4 個主題，規劃完整的雙語教學課程設計，方便教師靈活使用，免去素材準備與大量備課時間，減輕教學壓力。

提供課綱必修課程的教學指引，從暖身、呈現、練習及應用、復習與字庫整理，循序漸進地使用跟理解雙語應用，達到沉浸式雙語教學環境。

頁碼	雙語使用參考示例(投影片備忘稿)
1	<p>《老師開課》 Good morning/afternoon class. Today we'll be discussing sequences and series. We've already covered the concept of sequences, and today we'll begin with "series".</p> <p>《老師說明、說明》 Do you know what "series" is in Chinese? 你們知道系列的中文是甚麼嗎?</p> <p>《老師回應》 Well, sure, series means 級數 in Chinese. 今天我們會介紹一些常見的級數以及他們的計算方式。</p> <p>《投影片開場》 Let's start today's lesson.</p>
2	<p>《老師說明、說明》 We'll start with "Arithmetic series and geometric series". In the previous section, we introduced the terms "arithmetic" and "geometric". Can any of you tell me what these two words mean?</p> <p>《老師回應》 Great, "arithmetic" is translated as "算數" in Chinese, but when we refer to the "arithmetic sequence" or "arithmetic series" it means "等差" in Chinese. The same thing happens with the word "geometric". "Geometric" is translated as "幾何的" in Chinese, but when we refer to the "geometric sequence" or "geometric series" it means "等比" in Chinese.</p> <p>《投影片開場》 接下來我們先看看從「級數」是甚麼吧!</p> <p>《老師說明、說明》 Definition of series: A series is a sequence of numbers that are added together. 級數，也就是將某個數列的各項依序用 "+" 連接，相加後所得的總和。Please read aloud the definition on this page together.</p> <p>在這頁中，有幾個專有名詞跟同學們要特別注意：</p>
3	

Chapter 1-1.1 Arithmetic Series

CLASS: _____ NAME: _____

Introduction
An arithmetic series is the sum of a sequence of numbers with a constant difference between consecutive terms. It's defined by the formula $S_n = \frac{n}{2}[2a_1 + (n-1)d]$, where a_1 is the first (initial) term, d is the common difference, and n is the number of the terms.

Vocabulary
sequence 數列 series 級數 arithmetic series 等差級數
term 項 common difference 公差 initial term 首項
summation 總和/求和

The definition of a series
A series is a sequence of numbers that are added together. Each term of the sequence $\langle a_n \rangle$ is connected with a plus sign (+) to indicate that they are being added together. If we have a sequence $\langle a_n \rangle$, the sum of the first n terms results from adding the terms from a_1 to a_n . That is $S_n = a_1 + a_2 + \dots + a_n$.

When a sequence $\langle a_n \rangle$ is an arithmetic sequence, then $a_1 + a_2 + \dots + a_n$ is an arithmetic series.

For instance
Arithmetic sequence: $1, 3, 5, 7, 9, \dots, 31$ Related finite arithmetic series: $1+3+5+7+9+\dots+31$

To find the sum of an arithmetic series, we can use several formula. Let's try to deduce and explore them together.

1.1 Derive the arithmetic series formula: $S_n = a_1 + a_2 + \dots + a_n = \frac{n(a_1 + a_n)}{2} = \frac{n[2a_1 + (n-1)d]}{2}$

搭配雙語學習單輕鬆檢核學習成果，搭配雙語教材最好上手。

雙語教學教材採中英對照，單字表、發音一應俱全

雙語教學 高中數學 B2 Chapter 01
Presented by Hsiao Yu-Hsiu

因應 2030 雙語政策，與一線優秀教師合作開發雙語化教學教材，適切的中英雙語教材，可針對性的加強學生聽、說能力的培養。

Definition of Series

Definition
級數
A series is a sequence of numbers that are added together. For example, each term of the sequence $\langle a_n \rangle$ is connected with a plus sign (+) to indicate that they are being added together. If we have a sequence $\langle a_n \rangle$, the sum of the first n terms results from adding the terms from a_1 to a_n . That is $S_n = a_1 + a_2 + \dots + a_n$.

Word Bank

series	級數	term	項
arithmetic series	等差級數	system of equations	方程組
geometric series	等比級數	formula	公式
finite	有限的	interest	利息
infinite	無限的	summation	總和/求和
determine	決定	mathematical	數學歸納法
common difference	公差	induction	
common ratio	公比	inductive	歸納的

雙語教學教材採中英對照，並附有常用單字表與英文音檔，大幅縮減老師準備教材時間。

Example 2: Find the sum of the first 10 terms of the arithmetic series with an initial term of 2 and a common difference of -2.

Step I Apply the first formula of the arithmetic series.
 a_1 : the initial term
 n : terms of the series
 d : common difference

Step II Plug in initial term, terms of the series and common difference.