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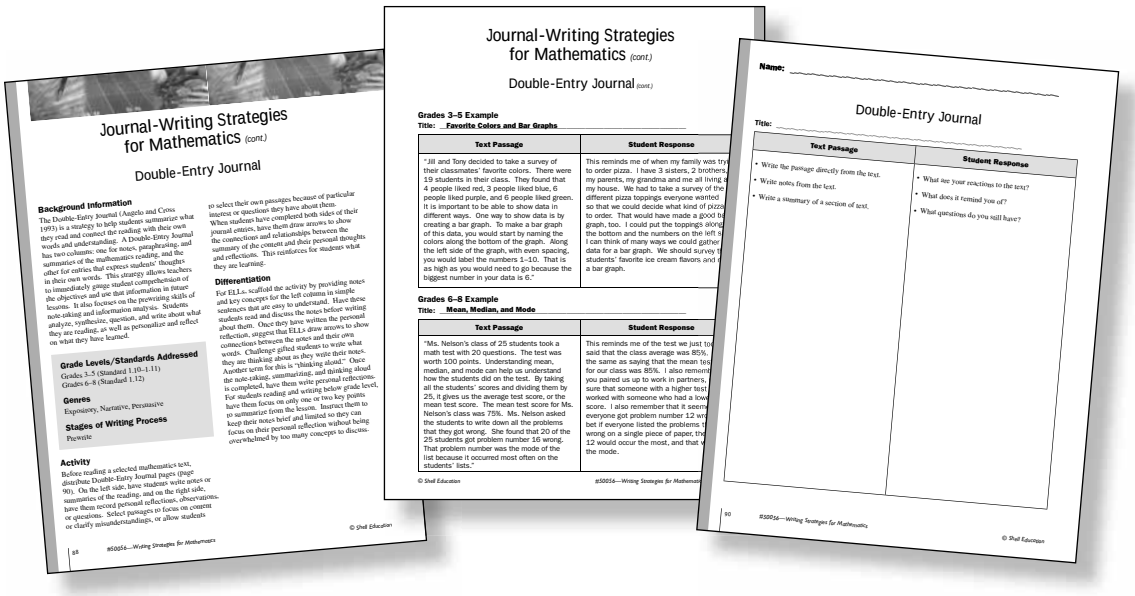
Introduction: How to Use This Book

The focus of this research-based book is to demonstrate how to incorporate more writing in the mathematics class. Increasing the use of writing is a key way to promote stronger literacy in the content areas. Research shows that using writing in mathematics is the best way to help students understand the complex concepts and terms introduced in the content areas. This book provides mathematics teachers with the information needed to implement writing activities and assignments that correlate with mathematics objectives and goals. The strong research connection in this book helps tie what teachers actually do in the classroom with the most current research available.

Part 1: Writing to Learn in Mathematics
This section is composed of strategies for using writing to learn in mathematics. These include vocabulary development, previewing and reviewing, journal writing, note-taking, and diagramming and mapping. These strategies use writing as a tool for students to process and personalize what they learn so that they are able to synthesize and break down the complex mathematics terms and concepts.

Part 2: Writing to Apply in Mathematics
This section offers strategies for using writing to apply new knowledge in mathematics: authoring skills, summarizing, and writing applications in all genres. These strategies provide opportunities to utilize the entire writing process to compose a piece of writing that incorporates their mathematics knowledge. Teachers may wish to use strategies from Part 1 as building blocks for working toward these application assignments.

Part 3: Assessment
This section describes several holistic assessment options for writing in the mathematics classroom. Each strategy listed in the book includes the purpose for and benefits of the strategy and its connection to writing and mathematics, the grade levels for which it is appropriate, and the McREL standards that it meets. A step-by-step activity description follows, along with variations, if appropriate, and differentiated instruction to accommodate all types of students. These alterations and suggestions are written for English language learners, gifted students, and students who are reading and writing below grade level.



Writing Strategies for Previewing and Reviewing in Mathematics *(cont.)*

Probable Passages

Background Information

The Probable Passages strategy (Wood 1984) incorporates writing directly into a mathematics lesson. This strategy is primarily used with basal readers, but Readence, Bean, and Baldwin (1981) suggest that this strategy can be adapted for use with expository text. Its focus is to use key concepts or terms to make predictions about the content of a text. Students use key terms or concepts provided by the teacher to write short passages that could appear in the text. The goal is not necessarily to have their information correct the first time. The goal is to write using the types of language and sentence structure common to the genre and use the process of analyzing the information against a reliable source.

Grade Levels/Standards Addressed

Grades 1–2 (Standards 1.1–1.2)
Grades 3–5 (Standards 1.1–1.2)
Grades 6–8 (Standards 1.1–1.2)

Genres

Expository, Summary, Narrative, Persuasive

Stages of Writing Process

Prewrite, Draft, Revise

Activity

Before reading a selected mathematics text, distribute the Probable Passages activity sheet (page 63). Introduce the topic and write the key vocabulary words on the board or overhead. Discuss the meanings of these words, and then call on students to define and use the words orally in sentences. Once students are familiar with the words, have them look for relationships among the words in the same way that writers look for related information while composing a rough draft. *Which word might be a main idea? Which words have common meanings or definitions? Which words go together? Which words are examples of another word?* You may want to construct a simple outline or diagram of how the words might be related as a quick prewriting scaffold. Then instruct students to write a short passage using the outline. There is no strict format to follow except that the key words must be utilized. Allow time for students to share their passages with their partners or table for feedback and input. After reading the selected mathematics text, have students compare and contrast their Probable Passages with the text. This step is key because students are analyzing their own writing against published writing to verify information.

Differentiation

Provide clear, simple definitions and visuals of the key terms for ELLs to refer to as they write their paragraphs because it might be difficult for them to use complex terms they have just learned. Provide sentence frames and examples of how to write a paragraph for ELLs as well. Instruct gifted students to write more than one paragraph or provide additional words for them to incorporate. Also, challenge them to write the passage and leave the key words blank, and then exchange with a partner to see if they can fill in the blanks. For students reading and writing below grade level, spend individual time in a writing conference working through the writing of the paragraph. Also, provide definitions for the key terms.

Writing Strategies for Previewing and Reviewing in Mathematics *(cont.)*

Probable Passages *(cont.)*

Grades 1–2 Example

Key Concepts:

numbers 1–12, minute hand, hour hand, clock, second hand

Prewrite:

clock
numbers 1–12
hour hand
minute hand
second hand

Probable Passage:

The clock has numbers 1–12. It has a short hand that is the hour hand. It has a longer hand that is called the minute hand. Some clocks also have a skinny red hand called a second hand.

How does your passage compare to the text?

My information is correct. The book gives more descriptions.

Grades 3–5 Example

Key Concepts:

tenths place, hundredths place, thousandths place, decimals, rounding, estimating

Prewrite:

rounding
estimating
decimals
tenths place
hundredths place
thousandths place

Probable Passage:

Sometimes it helps to use estimating and rounding when adding numbers with decimals. The first number after the decimal is in the tenths place. The second number is in the hundredths place. The third number is in the thousandths place. To round a number, you have to decide which place you are rounding to first. Then you look at the digit that is to the right of that number. If it is 5 or more, you round up, and if it is less than 5, you round down. Then you can add the numbers together for a good estimate.

How does your passage compare to the text?

My paragraph made sense and was organized. The book did not use the word *you*. It gave examples of each way to round, along with real-life examples of when to round and estimate.

Writing Strategies for Previewing and Reviewing in Mathematics *(cont.)*

Probable Passages *(cont.)*

Grades 6–8 Example

Key Concepts:

slope, *x*-intercept, *y*-intercept, *x*-axis, linear function, coordinate plane, *y*-axis, constant, graphing, origin, *x*-coordinate, *y*-coordinate

Prewrite:

- graphing
  - coordinate plane
    - origin
    - *x*-axis
    - *y*-axis
    - *x*-coordinate
    - *y*-coordinate
  - linear function
    - *x*-intercept
    - *y*-intercept
    - slope
    - constant

Probable Passage:

To begin graphing, a person must start with a coordinate plane. This includes an *x*-axis, which is a horizontal line, and a *y*-axis, which is a vertical line. The *x*-coordinate is a number to the right or left on the *x*-axis. The *y*-coordinate is a number up or down on the *y*-axis. Where the lines intersect is called the origin. It has a value of zero. Many times, it is necessary to graph a linear function. This is an equation that is often put in the following form: $y = mx + b$. The *x*-intercept is the place where the equation crosses the *x*-axis. The *y*-intercept is where the equation crosses the *y*-axis. The letter *m* is the slope and tells you whether the line goes up or down and how steep it is. The letter *b* is the constant because it has no variable and it is also the *y*-intercept.

How does your passage compare to the text?

I did a good job and used all of the words. The book stated that the lines on a coordinate plane are perpendicular. Also, the book explained that the *x*-intercept is where the equation crosses the *x*-axis when $y = 0$, and the *y*-intercept is where the equation crosses the *y*-axis when $x = 0$. I think that I started too many sentences with the word *the*.

Name: _____

Probable Passages

Directions: Write down the key concepts for the lesson. Use a prewriting strategy and then write a probable passage using these words. After reading, compare your passage to the text.

Key Concepts:

_____

_____

Prewrite:

Probable Passage:

_____

_____

_____

_____

How does your passage compare to the text?

_____

_____

_____

_____