

*Write!*  
**Mathematics**  
Multiple Intelligences & Cooperative Learning Writing Activities



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EDUCATION

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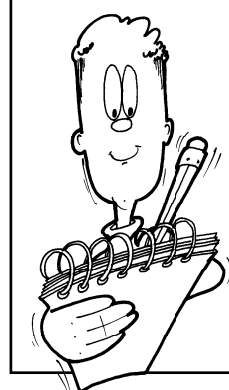
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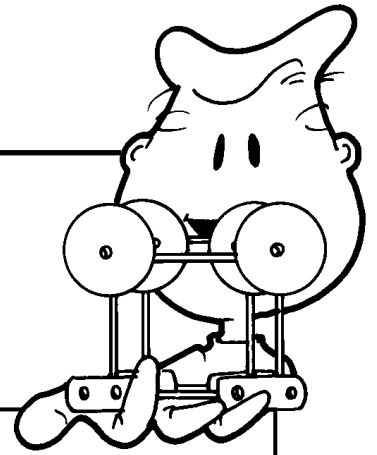
## *Journal Topic Chart*



You will find  
Journal Topics  
on pages:

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# Chart of Structures



	Basic Description	See Also Activities
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Formations	108	7
4S Brainstorming	109	2
Jigsaw	110	16, 20
Pair Discussion	111	7
Pair Project	111	8, 22, 27, 29, 35
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# Integrating Writing and Mathematics

*“Countless careers  
rise or fall on the  
ability or inability  
of employees to  
state a set of facts,  
summarize a  
meeting or present  
an idea coherently.”*

—William Zinsser

Today's teachers are encouraged to include writing in all the subject areas, including mathematics. Writing during maths or in the maths classroom may feel foreign at first. Numbers and symbols are perceived to be the language of maths. However, integrating writing in maths enhances and improves students' understanding of maths. Writing is a tool for learning in maths as surely as a compass or a calculator. Teachers can use writing as part of daily instruction. Students can use writing in maths, not as a novelist or poet would use writing, but the way a mathematician would use writing.

To write is to compose. To compose well is to comprehend. Writing is not speaking, where we

hope that the, ah, listeners, like, you know, get it. Writing demands careful word choice, clear thinking, complete communication. The physical act of writing takes longer than thinking or speaking, and so seems to allow the brain time for the discoveries and connections writers often make while writing. Professional writers, when asked to explain why they write, often answer that they write to find out what they're thinking, what they know and what it means. As students write, they develop their knowledge of a subject. They discover, organise, classify, connect and evaluate information.

Integrating writing and maths moves students beyond the basic facts of maths. Writing allows students to look critically and creatively at maths, enriching

### Writing to Learn

What do you have to say?  
Be active. Do it.  
Student chooses the words.  
Productive. Output.

vs.

### Reading to Learn

What did they have to say?  
Sit still. Pay attention.  
Teacher chooses the words.  
Consumptive. Input.

students' understanding and appreciation of maths. By writing about maths, students are doing the work of true maths; learning becomes more real and more meaningful. As you integrate writing and maths, think of it as an enhancement to teaching maths rather than as one more thing to cram into an already crowded curriculum.

Indeed, writing is a terrific tool for teaching maths as well as the other disciplines, but it is more than that. Writing is a life skill, highly valued by society. Writing is everywhere. Every aspect of human endeavour needs writing about—how else would we pass along the information? The box below is a partial list of things people write or write about. Notice how diverse the writings are.

This list is not at all complete. Wander through the nonfiction

stacks in your library. People write about everything. Most writing today is nonfiction, and the need for nonfiction writers continues to grow. Expanding technology in an information age demands it.

Nonfiction has never been so important. We are building our national future on information and writers are in demand to explain it. We live in a wired world where communication is essential. Writing across the curriculum gives students the ability to think and communicate today and tomorrow.


## So, What Do I Need to Know About Writing?

Enough about the rationale for integrating writing. You're probably reading this book now because you're already convinced about the value of writing. So what do you need to know? The first thing you and your students should know about writing is that



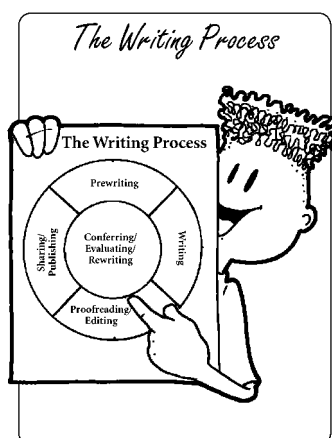
## What We Write About

- advertisements
- agendas
- animal medicine
- animals
- annotated calendars
- art
- autobiographies
- awards and inscriptions
- biographies
- biology
- business
- captions and labels
- cartoons
- case studies
- chemistry
- coin new words
- collecting
- computer programs
- concerts
- constellations
- contest entries
- dance
- diaries and journals
- drug abuse
- email
- economics
- editorials and opinions
- essays
- eulogies
- fashion
- features
- field guides
- field journals
- film
- folk remedies
- folk traditions
- folklore
- foreign language journaling
- forms
- games and puzzles
- geography
- history



*10 Rules for Writers*

1. Write.
2. Write.
3. Write Often.
4. Write about anything.
5. Write about everything.
6. Write about what you see.
7. Write about what you learn.
8. Write about what you think.
9. Write about what you read.
10. WRITE!



there are 10 rules to writing that are absolutely critical. See the 10 Rules at left. These 10 rules are a way to emphasise that the road to becoming a better writer (and mathematician) is to write, write and write some more! Use these 10 rules as a handout or overhead as you describe the use of writing to your students (see page 14).

The next thing about writing you and your students should know is that writing is considered a process—the Writing Process. This process includes prewriting, revising, editing, proofreading and publishing. Publishing is not necessarily a “publication”. Publishing could be reading work aloud to the class, posting work on a display board, polishing an essay to turn in to the teacher or other types of sharing. Teaching students to move about in the process of writing is often considered as important as the final written product.

The writing process is not linear. It is a process. At any point, students can confer, evaluate and rewrite. For that reason, the writing process is put in a wheel with Conferring/Evaluating/Rewriting in the centre of the wheel (see page 15).

The activities in this book focus heavily on the prewriting and writing stages of the process. We’ve already covered writing, what’s so important about prewriting? It’s the time when concepts form, vocabulary develops, ideas grow from the synergy of interaction with other students. Prewriting is a social act. Students talk, banter, give and receive feedback. Prewriting develops the readiness to write. Prewriting primes the pump from which the writing will pour.

In the activities in this book, students discuss, plan, outline and brainstorm cooperatively before

## *What We Write About*

- humour
- instructions and advice
- interactive media
- interviews
- learning logs
- lists and notes
- literature
- medicine
- memoirs
- memoranda and messages
- mottos and slogans
- music
- mythology
- nature

- news stories
- office business
- oral histories
- parodies
- petitions
- philosophy
- physics
- public notices
- recipes
- reports of current events
- research reports
- resumes and cover letters
- reviews
- rules and regulations

- scrapbooks
- simulations
- song lyrics
- sports
- technology
- telegrams
- textbooks
- thumbnail sketches
- time capsule lists
- travel



## Integrating Writing and Maths

they actually do any writing. The reason is because prewriting makes writing easier and better. Writers will tell you that they are always writing. A composition of words swirls inside the brain no matter what else a writer might appear to be doing. When a writer sits down to write, it may seem that the words flow easily, when actually considerable time was spent on the words already.

Since most students will not be rehearsing compositions during their spare moments, you can improve the quality of what students write by providing ample time for prewriting activities. As a rule of thumb, the more time you allow for prewriting, the better the writing will be. Therefore, if you draw from only one aspect of the writing process, let it be prewriting.

But prewriting and writing are not the whole story for integrating writing and maths. Consider these examples: *Lives of a Cell* by Lewis Thomas, *Silent Spring* by Rachel Carson, *Voyage of the Beagle* by Charles Darwin, *The Immense Journey* by Loren Eiseley. These books contain some of the most powerful and beautiful language ever written. Like all good writing, these books were not just written. They were revised, proofread, carefully edited and finally published, to be shared with others.

Sharing and publishing are extremely important parts of the writing process, not to be

overlooked. By sharing, students can learn from each other what good writing looks and sounds like. Since the writing is about maths, students become their own maths teachers as they share their learning, connections and reflections.

Many activities include a sharing component. You can easily have students read any of their writing to a partner, to teammates or even to the entire class. Students can also share their writing by exchanging papers or by posting their papers in a location where classmates can read them. Sharing and publishing make writing a learning experience not only for the writer, but for the recipient as well.

## Peer Editing and Conferencing

The maths writing activities in this book focus primarily on using writing as a means to teach maths. The emphasis is more on the content than the writing itself. However, with a little work, any writing assignment can be easily turned into a polished work of art. What do you do when students need to revise, proofread and edit? Let students help each other. Establish small groups for peer editing and conferencing.

Students offer each other valuable ideas about writing. Since students identify with the words they write and can be



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*Peer Conference Gambit Cards*

Directions: Cut out the cards below. Use these sentence starters when you respond to writing.

I like the part where...

I like the way you used the word \_\_\_\_\_.

What did you mean when you said...

What happened after...


I liked your beginning because...

I would like to know more about...

I had a clear picture in my mind of the part where...

What would you lose if...

What are you going to do next?



*Peer Conference Response Form*

Author's Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Helper's Name \_\_\_\_\_  
 Date \_\_\_\_\_

I like \_\_\_\_\_

I want to know more about \_\_\_\_\_

One thing you might think about doing \_\_\_\_\_

Other \_\_\_\_\_

Peer Response	Title
	Name

eternally wounded by thoughtless critical comments, your task is to keep the conferences positive. Because students can sometimes be masters of the outspoken insult, it helps to establish a few basic rules for peer conferences, such as:

- Begin with positive comments about what is good in the writing.
- Ask questions that help the writer discover ways to change writing for the better, like:

“I don’t understand, could you explain this part a little more?”

“Do you think it would help to change the order of these paragraphs?”

“Would you like for me to underline the words I think you’ve spelled wrong?”

- Remember that the writer is the final judge of how the writing should be changed

As a peer conference technique, teaching students to ask questions about another’s writing works well. The questions become an indicator of where the writing needs to be changed and improved. There are fewer hurt feelings and arguments because the writers learn what doesn’t work in their writing without hearing comments such as, “That third paragraph really stinks—throw it out.”

It will help students maintain a positive attitude toward each other if you brainstorm with them to develop a list of ways to say things

that help without hurt or insult. Ask them, “How would you like to be told that your writing was disorganised or unclear?” Post their ideas for easy viewing.

In the back of this chapter, you will find a number of forms that will be helpful for peer editing and conferencing. On page 16, there is a Proofreader’s Marks form. Have students use these standard marks as they edit each other’s papers. For consistency, use them yourself as you edit students’ papers.

On page 17 there are gambit cards for students to use in peer conferences. These gambit cards are sentence starters for students as they have peer conferences. They direct the conference and promote a positive tone.

The Peer Conference Response Form is another form helpful for peer conferences, see page 18. Have students fill out their response form before the peer conference, then students go over their comments together.

Page 19 is a Peer Response Form. Students write in the lined space provided. When finished, they give it to a peer to respond to the writing in the left margin. They then meet to go over the responses.

### What About Marking?

A writing assignment will sink into quicksand if students think they won’t be marked. The type of marking you do largely depends on

the type and frequency of writing assignments students do. I suggest an on-going, long-term approach to writing and marking, using writing journals and a writing portfolio. We will look at both journals and portfolios in depth after some general comments on marking.

The first comment on marking is: Don't make marking too labour-intensive for yourself to limit the frequency and volume of student writing. The more students write, the more they learn. More writing also means more marking and more work for you, right? Not necessarily. If you have unlimited time and energy, mark and respond to every writing assignment. If not, mark everything but don't read everything. Yes, mark everything but don't read everything. Students need to know that everything they write might be read, but that doesn't mean you have to read everything. We'll examine this idea in more detail in the sections on journals and portfolios.

The second general comment on marking is: Align your marking practices with the type of writing students do. Glance through the journal topics and activities in this book. You will see a range of writing assignments. You should use a different marking approach depending on the type of writing.

Writing assignments that check for understanding should be turned in for immediate response while the

topic is still fresh. Elaborate writing assignments like reports and final papers require individual attention, feedback and usually impact a student's course mark. With most other activities and journal writings, the process of writing and sharing is more important than the evaluation. Students can save these assignments for periodic journal and portfolio checks.

A multipronged approach to marking allows the teacher to hold students accountable for even the most frequent writing assignments, yet at the same time, makes it unnecessary for the teacher to read every word the student writes.

### Writing Journals

Some writing might be done in a daily journal. A spiral-bound notebook is a nice way to keep all journal writing assignments together.

Good journal topics are reusable.

- Write for five minutes about yesterday's homework.
- Tell everything you learned about \_\_\_\_\_ today.
- What did you miss on the test? Do you know it now?
- Summarise last night's assignment.
- We are beginning a new chapter. Write everything you already know about it. Tell what you want to know about it.

