We record our thought processes and how we’ve changed our thinking in our journals. Contradictions in reasoning that go against ideas I believe frequently pop up, and questions are raised that set me up for new discoveries.

— Mathematics Student
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Students could be encouraged to keep journals describing their mathematical experiences, including reflections on their problem-solving thought processes. Journal writing also can help students clarify feelings about mathematics or about a particular experience or activity in a mathematics classroom. These activities can foster students’ positive attitudes about mathematics, particularly if the journal entries are accompanied by discussions about any negative feelings and ways to deal with unpleasant experiences.

~ NCTM Curriculum Standards

The suggestions that follow provide starting points for organizing and implementing the Student Journal Masters from The Math Learning Center. These suggestions are based on our classroom experiences and reports we have received from other teachers. We hope reading about these ideas will provoke questions, new thoughts, and discussions as you design your own strategies for implementing journals. We also hope that you will contact us regarding successful ways that you adapt our suggestions.
Starting Points for Using Mathematics Journals

■ Journal Contents and Purposes
Following are the contents and purposes of the Student Journal Masters. We encourage you to adapt these ideas to meet your needs.

Title Page  This opening page of the journal is designed by each student at the end of the year and contains the student's title for the journal, and the date and location of "publication."

About the Mathematician–Author, Beginning of the Year  Each student completes this brief mathematical autobiography at the start of the year.

About the Mathematician–Author, End of the Year  This two page entry is completed by each student at the end of the year and emphasizes special aspects of the student’s mathematical growth during the year.

Table of Contents  These five pages reference important mathematical moments and evidence of mathematical growth that are documented in the journal. The student completes this list at the end of the year, giving a descriptive title and page number for each journal entry they wish to highlight.

Preface  This two page introduction is completed at the end of the year. It previews the journal contents, special features, and strengths of the journal. A few specific examples are cited as illustrations.
Goals for Learning Mathematics  These are our classroom goals, which provide the basis for many journal entries during the year. You may wish to add to the list, have your students add to the list, or replace the list based on your classroom goals.

A Philosophy About Learning Mathematics  These provide the philosophical basis for all math activities in our classrooms. Many journal entries throughout the year focus on these ideas.

Opening Journal Entry  This entry is completed on the first day that journals are used in class.

Blank Grid Paper  Students make daily entries, in and out of class, in this 137 page section of the journal. You may wish to increase or decrease the number of pages in this section, based on your plans.
Introduction to Daily Reports  This provides the students guidance for completing Daily Reports.

Daily Reports  Students complete these each day to keep track of assignments and to reflect briefly on work done for assignments. Thirty-six sets of Daily Reports are included, one for each week of the typical school year. Adjust according to your school calendar. If your school provides daily planners for students, you may prefer to remove this section of the Student Journal Masters before printing journals.

"Our journals are nice to have, just to look back through and see the progress we've made."
– Mathematics Student

Glossary  In this 14 page section, students list new terminology and include diagrams and brief explanations to illustrate the meaning of each term. While it is up to students to decide which terms to include in their glossaries, you might keep a Glossary Ideas poster in the classroom and invite students to list terms as they come up during class discussions.
What to Emphasize in Your Journal  This gives students information about the qualities the teacher looks for when reviewing journals. Edit this to include criteria that you will emphasize when you assess their journals.

When you write in your journal, remember to record the problem or question you are writing about so that your entry will make sense when you or your teacher reads it later. Be sure to date each journal entry. Emphasize the following in your journal entries:

- mathematical communication (describe your understanding of concepts and your methods or ideas in words, diagrams, and math symbols)
- mathematical reasoning (whenever possible, support your ideas with logical arguments)
- your own solutions to math problems and ideas you get from others
- your conjectures and generalizations
- your AHA!s and “lightbulb” moments
- your feelings (joy, disequilibrium, excitement, confidence, worries, etc.)
- your questions and math ideas you wonder about
- ways your thinking about a math concept or procedure has changed
- connections you notice among math ideas, between math and other subjects, and between math and your life outside of school

Regularly review your journal. When you do this, write a new journal entry describing the mathematical growth, strengths, and needs you notice.

It is important not to erase a journal entry, even if you feel what you wrote before is wrong. Instead, show growth by adding new ideas (write the date that you make the addition). Or, on another page describe how your thinking has changed.

Thought Starters I-IV  These are intended to motivate thoughtful journal entries by students. Sometimes the teacher assigns thought starters from these lists; sometimes students choose from the lists; and frequently class activities and discussions prompt other journal entries.
Colored dividers  Including blank colored sheets in the journal, as shown in the Student Journal Masters, helps students find journal sections more easily. Students may also find book marks and snap-in rulers from daily planners convenient for marking their most recent entry or daily report.

Journaling Procedures

Journal entries are frequently assigned by us and many are initiated by the students. The journaling process helps students trace and clarify their mathematical thinking and questions, and helps us understand the development of each student’s thinking and engagement in the mathematical process. Students write in their journals during class activities and at home. Journal entries include:

- their self-initiated reflections about important mathematical moments during class and at home;
- their explorations or drafts of ideas for homework problems;
- their responses to thought starters or questions posed by us which are based on ideas that come up during class activities or assigned from Thought Starters I–IV.

If students are unfamiliar with the use of journals, we set aside at least 5 minutes of class time each day during the first 2–3 weeks of the school year for journaling in response to specific thought starters posed by us (from the lists in the back of the journal or based on an idea that comes up in class). During these first 2–3 weeks, we also ask that students make at least three at-home journal entries each week in response to specific thought starters or problems posed by us. For the next 1–2 weeks, we allow 5 minutes of free-write (they pick the topic or thought starter) time in class each day and require at least
three additional free-write entries at home. After that, we periodically pose thought starters or problems, and we expect students to make a minimum of four thoughtful entries each week.

Although we want to encourage students to reflect on their feelings about mathematics and to reflect on the development of their attitudes toward mathematics, sometimes it is necessary to require a minimum number of entries that focus on the "meat" of the mathematics they are exploring in class. Another way to keep emphasis on students’ mathematical thinking is to assign a specific problem or thought starter related to a math idea.

Journals provide a convenient place for students to gather their thoughts and respond to questions and ideas that come up "on the spot" in class. On those occasions when an activity has not been completed in class and hence, students are not ready to begin work on a homework assignment you have prepared, journals provide a setting for students to reflect on the development of ideas so far.

We find it helpful to keep a class poster that documents (including dates) all journal assignments.

Daily Reports

Daily Reports serve several purposes: to encourage students to keep track of and reflect about their daily assignments; to assure students a chance each day to privately tell us about their needs and accomplishments; and to enable us to get a quick sense of the needs and progress of the class as a whole.

Following is one way that we quickly spot check Daily Reports for questions and concerns: At the end of class on Monday, for example, students record the assignment, and then prior to class on Tuesday, they complete their homework and the rest of Monday’s Daily Report. At the start of class on Tuesday, students open their journals to Monday's Daily Report. Throughout the class period, we randomly review these as we circulate around the classroom to look for any pressing questions or issues to address during class. Students can call our attention to special questions at this time. Notice the overall quality of Daily Reports is assessed on the Journal Self-Assessment form (see page 8).

Journal Assessment and Feedback

In the beginning, you may wish to collect journals every 2–3 weeks to provide encouragement for the journaling process. As students become more comfortable with the process, we collect journals only at the middle and end of each grading period. Prior to collecting journals for review by us, we distribute blank Journal Self-Assessment forms (see page 8) for the students to complete. Notice that this form requires students to code each entry with one or more of the letters A–J to indicate the emphasis of the entry. Each time the students complete a Journal Self-Assessment, we ask them to tape it in their journals following their most recent entry.

"I use my journal as a place to assess my growth. I use this information to assess which areas I'm more comfortable with and which areas I should try to expand on.

– Mathematics Student"
Starting Points for Using Mathematics Journals

When we review the students' journals, we sometimes write brief comments to draw attention to specific entries. These comments:

• are non-judgmental and hence, encourage students to speak candidly,
• help students see what evidence is revealed by their statements,
• reinforce certain types of entries.

However, to encourage students' “ownership” of their journals and to avoid our becoming overwhelmed by the amount of time required, we minimize comments from us. Most of our comments are written in the Teacher Comments section of the Journal Self-Assessment form.

Some other ideas that facilitate the journal feedback process include:

• Have students number all journal pages so it is easier to reference specific entries.
• Ask students to circle or highlight journal entries they especially want you to read (students’ selections can be very telling about their views of mathematics and of themselves as mathematicians).
• Give students the option of taping paper labeled "private" over entries they prefer that you not read.
• Collect and review journals from a different class (or subgroup of a class) each week.
• Keep in mind that as journals become more useful to students, the need for teacher feedback diminishes.
• Store students’ completed journals with their portfolios to use as a source of evidence of growth over time.

Blackline masters of the Journal Self-Assessment form are provided for you on pages 10–11 of this booklet.

“...Our journals and the mathematical content in them has definitely helped us to become much stronger mathematicians.

– Mathematics student..."
Journal Assembly

The Student Journal Masters packet contains masters for two student journals. You may assemble journals in the following ways:

■ **Option One**

The packet may be cut in half and bound to create two student journals. You may wish to copy the front cover on heavier/colored cardstock. Using a blank piece of cardstock as a back cover will make the journals more durable.

![Cut in half](image)

■ **Option Two**

The packet may be used as a blackline master to create multiple student journals. Remove the colored sheets from the packet, noting their location in the journal. Choose the 2-sided to 2-sided or duplex to duplex option on your copy machine. After copies are complete, insert colored sheets where there were colored sheets in the master packet. Each completed packet can then be cut into two journals and bound. To make your journals more durable you may wish to copy the front cover on heavier/colored cardstock and use blank cardstock as a back cover.

■ **Finishing the Journal**

With either option, we suggest taking the completed copies to your school’s copy center or a local copy center to be cut. Journals should be bound on the left side and will measure $5\frac{1}{2}$" × $8\frac{1}{2}$" when finished.

![Finished Journal](image)
**Journal Self-Assessment**

Mark one or more of the letters A–J next to entries in your journal that show evidence of:

<table>
<thead>
<tr>
<th>Mark</th>
<th>Description</th>
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<tr>
<td>A</td>
<td>Mathematical communication</td>
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<tr>
<td>B</td>
<td>Mathematical reasoning</td>
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<tr>
<td>C</td>
<td>My own solutions and ideas I get from others</td>
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<td>D</td>
<td>Conjectures and generalizations</td>
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<td>F</td>
<td>Explanations of my joy, disequilibrium, excitement, confidence, worries, what helps me, etc…</td>
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<td>My questions and math ideas I wonder about</td>
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<tr>
<td>H</td>
<td>How my thinking about a math idea has changed</td>
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<tr>
<td>I</td>
<td>Connections I notice</td>
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<td>J</td>
<td>Self reviews of the math content in my journal</td>
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Number of entries marked

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<tr>
<th>Week of</th>
<th>Dates of ALL Entries</th>
<th>Quality of Each Entry</th>
<th>Overall</th>
<th>Out of</th>
<th>Average (mean)</th>
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Required Entries Rating

Journal Self-Assessment: A B C D F

Comments / Supporting Statements

Teacher Assessment: A B C D F

Comments

Glossary (circle one) 1 2 3 4 5
**Journal Self-Assessment**

Mark one or more of the letters A–J next to entries in your journal that show evidence of:

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<td>Average (mean)</td>
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<td>Rating _____</td>
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**Journal Self-Assessment:**

A  B  C  D  F

Comments / Supporting Statements

**Teacher Assessment:**

A  B  C  D  F

Comments
We write in math journals in which we keep track of all of our mathematical thinking. Not only are they a place where we can measure our mathematical growth, but they are also a good reference tool. In a way they are like our own text books, but we make them ourselves.

– Mathematics Student