

# Table of Contents

<b>Preface</b> .....	<b>5</b>
<hr/>	
<b>Graphic Organisers</b> .....	<b>7</b>
Guidelines for Using Graphic Organisers .....	8
Descriptions of Graphic Organisers .....	9–21
Graphic Organisers for Classroom Use .....	22–47
The ABC's of an Important Maths Topic/Standard .....	22
Biography of a Mathematician Organiser .....	23
Brainstorming Web .....	24
Brochure Building .....	25
Calendar Organiser .....	26
Checklist of Questions to Answer When Studying From Maths Textbook .....	27
Data Graph .....	28
Decision Chart .....	29
Fact and Information Organiser .....	30
Filmstrip Organiser .....	31
Flowchart .....	32
Graph Matrix .....	33
Maths Portfolio or Project Plan .....	34
Maths Project Planning Tool .....	35
Maths Research Study Plan .....	36
Maths Vocabulary Learning Ladder .....	37
Mind Map .....	38
Prediction Web .....	39
Problem Solution Boxes .....	40
Problem Star Organiser .....	41
Sample Graphs .....	42
Step Outline for Writing Maths Reports .....	43
Throw the Dice Organiser .....	44
Training the Mind .....	45
Venn Diagram .....	46
What, So What, Now What? .....	47
Questions for Teachers and Students to Consider about Using Graphic Organisers in the Classroom .....	48
<hr/>	
<b>Writing Prompts</b> .....	<b>49</b>
Guidelines for Using Writing Prompts .....	50
Writing Prompts for Classroom Use .....	51–74
<hr/>	
<b>Rubrics</b> .....	<b>75</b>
Assessment Checklist for Decimals, Ratios and Percentages .....	76
Assessment Checklist for Fractions .....	77
Assessment Checklist for Geometry .....	78
Assessment Checklist for Measuring Temperature and Time .....	80
Assessment Checklist for Measuring Length and Distance .....	82
Assessment Checklist for Measuring Weight .....	83
Assessment Checklist for Measuring Perimeter, Area and Volume of Geometric Shapes .....	84
Assessment Checklist for Whole Number Operations .....	85
Assessment for Maths as Communication .....	86
Assessment Rubric for Circle, Bar or Line Graph .....	87
Assessment Rubric for Constructing a Flowchart or Spreadsheet .....	88
Assessment Rubric for Figuring Averages and Medians .....	89
Assessment Rubric for Making Mathematical Connections .....	90
Assessment Rubric for Maths Projects .....	91

Assessment Rubric for My Number Autobiography .....	92
Assessment Rubric for Oral Presentation .....	93
Assessment Rubric for Participation in Group Discussion .....	94
Assessment Rubric for Problem-Solving Skills .....	95
Assessment Rubric for Rounding Off and Estimation .....	96
Assessment Rubric for Student-Led Conference .....	97
Assessment Rubric for Teamwork or Peer Tutoring on Group Maths Projects .....	98
How Do I Really Feel About Maths? Assessment Rubric.....	99
The Number Report Assessment Rubric .....	100
Portfolio Assessment Rubric .....	101
Self-Assessment or Reflective Questions to Consider When Studying a Maths Topic .....	102
Cooperative Learning Group Performance .....	103
Assessment Rubric for Using Bloom’s Taxonomy to Evaluate a Product, Performance or Portfolio	104
Student Assessment of Rubrics as a Means of Measuring Student Progress and/or as an Option for More Traditional Assessment .....	105
Teacher’s Maths Curriculum Assessment .....	107
Questions for Teachers and Students to Consider About Using Rubrics in the Classroom .....	110

---

<b>Appendix</b> .....	<b>111</b>
Maths Standards .....	112
Maths as Problem-Solving .....	112
Maths as Reasoning .....	112
Mathematical Connections .....	112
Number Systems and Number Theory .....	113
Computation and Estimation .....	113
Patterns and Functions .....	113
Algebra.....	114
Interpreting Data.....	114
Chance – Probability .....	114
Space – Geometry .....	115
Measurement .....	115
Planning Matrix .....	116
Maths Words to Know and Use .....	120
Word-A-Day Calendar Outline .....	122
Understanding and Using Mathematical Symbols .....	123
Understanding and Using Mathematical Symbols – Read and Relate Activities .....	124
Checklist for Writing in the Area of Mathematics .....	125
Checklist for Completing Maths Homework .....	126
Checklist for Maths Test Taking .....	127
Criteria for Creating Your Own Rubric .....	128
Outline for Creating Your Own Rubric .....	129
A Calendar of Creative Thinking and Writing Sparkers to Encourage the Use of Maths Skills and Concepts Across the Curriculum .....	130
Take Ten Minutes Challenges Calendar .....	131
Bloom’s Taxonomy .....	132
Sample Bloom’s Lesson Plan .....	133
Outline Arranged According to Bloom’s Taxonomy for Developing a Project or Lesson Plan for a Maths Topic .....	134
Williams’ Taxonomy .....	135
A High Probability Lesson Plan .....	136
Suggestions for Using Graphic Organisers to Integrate Maths into the Total Curriculum .....	137
Bibliography .....	138
Index .....	140

# PREFACE

Recent research studies have confirmed a belief that intuitive teachers have long held germane to classroom success: when students are meaningfully involved in active learning tasks and in the planning and evaluation of their work, they are more enthusiastic about instructional activities, they learn and retain more, and their overall rate of achievement is greater. With the emphasis placed on measurable achievement as an overriding goal driving school system mandates, curriculum, classroom organisation and management, and instructional practices and procedures, teachers are faced with great challenges. While striving to fulfil societal demands, at the same time they must be creating and using new instructional strategies, procedures and teaching methods to meet the diverse needs of students with widely varying interests and abilities. In the complex and rapidly changing world in which we live, middle years maths teachers are turning to student-centred instruction, active learning strategies and authentic instruction to capture and hold students' interest and attention, resulting in increased achievement levels.

## Graphic Organisers

As the body of material to be covered in a given time frame grows more massive and multifaceted, and content demands on students and teachers multiply, graphic organisers are becoming an important component of middle years maths programs.

In the information-saturated classroom of today, sorting and making meaningful use of specific facts and concepts is becoming an increasingly important skill. Knowing where to go to find information, and how to organise it once it is located, is the key to successfully processing the information gathered. Graphic organisers can be used to: provide visual organisation; develop scope and sequence; furnish a plan of action or to aid in assessment; clarify points of interest; and document a process or a series of events. Their construction and use encourages visual discrimination and organisation, use of critical thinking skills and meta-cognitive reflection.

In other instances, a graphic organiser may be developed as a reporting or review exercise, or sometimes as a means of self-assessment. Graphic organisers are valuable and effective instructional and assessment tools. The degree of their effectiveness for both students and teachers is determined by clarification of purpose, careful planning, visual organisation and attention to detail.

## Rubrics

Authentic assessment, as opposed to more traditional forms of assessment, gives both students and teachers a more realistic picture of gains made and information processed for retention. Emphasis is placed more on the processing of concepts and information than on the recall of facts. Collecting evidence from authentic assessment exercises, taking place in realistic settings over a period of time, provides students and teachers with the most effective documentation of both skills and content mastery. Traditional measurements of student achievement such as written tests and quizzes, objective end-of-chapter tests and standardised tests play a major role in the assessment picture as well.

The use of standards-based rubrics in middle years maths classes has proven to be an extremely useful means of authentic assessment for helping students maintain interest and evaluate their own progress.

Rubrics are checklists that contain sets of criteria for measuring the elements of a product, performance or portfolio. They can be designed as a qualitative measure (holistic rubric) to gauge overall performance of a prompt, or they can be designed as a quantitative measure (analytic rubric) to award points for each of several elements in response to a prompt.

Additional benefits from rubrics are that they: require collaboration among students and teachers; are flexible and allow for individual creativity; make room for individual strengths and weaknesses; minimise competition; are meaningful to parents; allow for flexible time frames; provide multifaceted scoring systems with a variety of formats; can be sources for lively peer discussions and interaction; can include meta-cognitive reflection provisions which encourage self-awareness and critical thinking; and can help teachers determine final marks that are understood by and hold meaning for students.

## Writing Prompts

Over the past several years, the significance of journals and writing prompts has been well-documented by student and teacher observations. When students write about experiences, knowledge, hopes, fears, memories and dreams, they broaden and clarify skills and concepts while acquiring new insights into themselves and the huge world of which they are a part.

While random journal entries hold their own place of importance in the maths classroom, writing prompts designed to elicit specific responses play a vital role in the instructional program.

Journal entries may be presented in many different formats, and may be shared and assessed in a variety of ways. The flexibility of their use and the possibilities they provide for integrating instruction cause them to be viewed as an important component of the personalised maths program. They may take the form of a file card project, a multimedia presentation, a special notebook or a diary. They may be private to be discussed with the teacher only or shared with a small group of peers or the total class. Word prompts can be used in parent-student-teacher conferences, or as take-home projects to be shared with parents, saved, or used as a portfolio entry to give an account of a unit of study, field trip or independent project.

Writing prompts provide the opportunity for students to: create a dialogue with teachers in a meaningful sense; write about self-selected topics of interest; process and internalise material being learned; communicate with peers; express private opinions, thoughts and insights without judgment or censorship; write personal reactions or responses to textbooks, research assignments, group discussions and experiences; make records of what and how they are learning and what it means to them; develop a source book of ideas and thoughts related to a specific topic; question material being studied and record answers as they are uncovered; assess their academic or social progress; and engage in meta-cognitive reflection on new skills and concepts being acquired. They can also record plans for further exploration.

These standards-based graphic organisers, writing prompts and rubrics have been designed to provide busy teachers with a bank of resources to draw from as the need arises. For ease in planning, the matrix on pages 118–121 provides a complete correlation of activities to these standards.

## The ABC's of an Important Maths Topic/Standard

Choose a key maths topic or standard that you are studying and record an important fact, example, definition, comment or piece of information that you want to remember about it.

Use the ABC outline to help organise your thoughts.

See page 22 for reproducible copy.

The ABC's of An Important Maths Topic/Standard	
A	_____
B	_____
C	_____
D	_____
E	_____
F	_____
G	_____
H	_____
I	_____
J	_____
K	_____
L	_____
M	_____
N	_____
O	_____
P	_____
Q	_____
R	_____
S	_____
T	_____
U	_____
V	_____
W	_____
X	_____
Y	_____
Z	_____

## Biography of a Mathematician Organiser

The biography organiser is useful for organising the major facts of a specific life story. Students may use it as a writing aid for sorting out information and events related to the subject's life in preparation for writing the most interesting biography possible. This is especially true when the study allows for use of a variety of resource materials that need to be clarified and coordinated to provide details, as well as eliminate overlap or redundancy of facts and information.

See page 23 for reproducible copy.

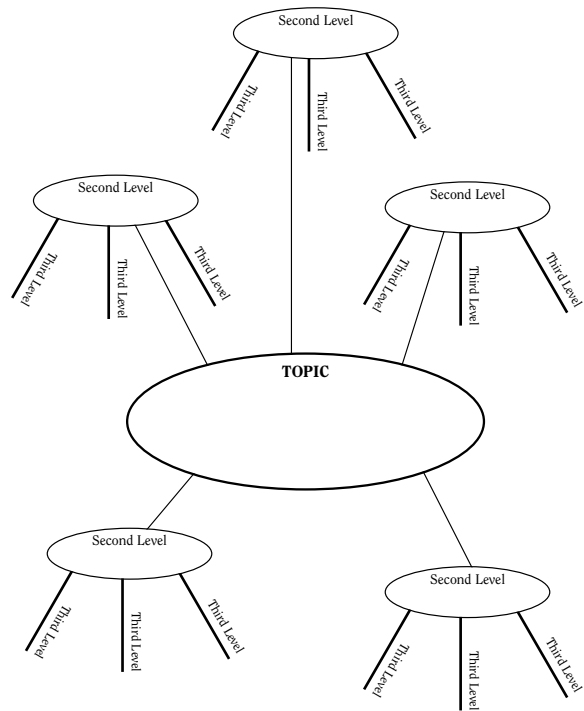
A Biography of: \_\_\_\_\_

Place/Date of Birth	
Family History	
Early Life	
Education	
Major Actions	
Major Events	
Major Influences	
Major Contributors	
Major Friends	
Major Problems	
Famous Quotes or Words	

## Brainstorming Web

This web can be used as an effective planning tool for cooperative learning groups, peer tutoring or class discussion. It may be especially valuable for recording spontaneous responses in problem-solving settings and as a follow-up organisational framework for sorting out and making meaningful use of the recorded information. It may also be used as a planning outline for an individual student report or research project. In this instance, it might be included in the student portfolio as part of the planning process and as a component of the assessment criteria.

See page 24 for reproducible copy.



## Brochure Building

Using a brochure format to outline one's thoughts about mathematics is a good way to explore, convey and clarify mathematical concepts and ideas. Duplicate the graphic organiser below, fold the sections on the dotted lines, and complete each of the six sections (three per side) following these guidelines for recording and discussing your thoughts. Label each section 1 through 6.

- Section 1: Write your name, date and the maths-related topic for this brochure.
- Section 2: Write down a series of important facts or key things to remember about this topic.
- Section 3: Write down some specific and concrete examples of this topic in action to show how it works.
- Section 4: Write out some questions you might ask of others to test what they know about this topic.
- Section 5: Write down the correct answers to these questions that you would accept as valid.
- Section 6: Construct a drawing or model of something related to this topic.

See page 25 for reproducible copy.

Section __
Section __
Section __