

# Enrichment Project

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This enrichment project was compiled to assist in developing a problem solving classroom. This project includes activities that have been developed for **geoboards, napier bones (napier rods), and base ten sticks (bean sticks)**. These activities are tied back to the Saskatchewan Middle Years Mathematics Curriculum Guide. Also included are some links to problem solving web sites which can be used by both students and teachers.

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## Math Course:

*Scieska, J and Smith, L. (1995). **Math Course** . New York: Viking.*

This book would be used on the first day of school to launch the students into a problem solving based classroom. Student's should be aware of the different types of problem solving questions that surround their daily experiences. Through this book students would see that everything in life can be viewed as a mathematics problem to be solved. **Math Course** in an excellent book that every mathematics teacher should have in their classroom.

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## Problem Solving Strategy Poster

The problem solving strategy poster could include different problem solving strategies. Each strategy would be introduced and reinforced slowly with practice. As each strategy is discussed in class it can be revealed on the poster. When all the strategies are used, the poster will be fully uncovered. It can serve as a resource to the students when they are stuck with a problem. The first question I would ask a frustrated student is "What strategy did you use?". If they have not picked a strategy then I would direct them to the poster to find one that is appropriate for there needs.

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## Math Manipulatives

- geoboards
- napier bones
- base ten sticks

These activities are appropriate for a **grade six to a grade seven** level. However, the materials are easily adapted to be used with any grade. I have also included extra activities which are a review of perimeter and area.

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# Math Activities for Created Materials

## Geoboards:

1. The first activity that geoboards could be used for is the recognition of different types of geometric shapes. Students would each have their own geoboard to work with and they would practice making these shapes. These shapes would include squares, triangles, parallelograms, pentagons, rhombus, etc. The students would be expected to make these shapes and then to enlarge and decrease them during the activity.
  2. The second activity that could be done with the students is to measure the perimeter of geometric shapes. *For example: A square has a perimeter of 10.* Students would have to make that square on their geoboards taking into consideration the perimeter. The students would be expected to make a number of different shapes using the same idea.
  3. The final activity using geoboards would deal with fractions. On a geoboard students would make a rectangle and they would label it a "Whole". (Students should use a single elastic band in order to accomplish this.) Students would then continue to subdivide the shape on their geoboards with other elastic bands. A number of different shapes could be used for the students to divide.
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## Base Ten Sticks:

1. The first activity using base ten sticks comes from the Middle Years Curriculum strand N-5 (a). This objective is **rounding to the nearest 100**. Numbers would be shown to the students and the students would then use their base 10 sticks to represent each number to the nearest 10. The numbers used can be increased with more base ten sticks.
  2. The next activity comes from the Middle Years curriculum strand N-3, **identifying the place value positions as increasing and decreasing powers of ten**. As in rounding the students would use the base ten sticks to practice increasing and decreasing with powers of ten.
  3. Activity three using base ten sticks comes from the middle years curriculum strand N-7(a). This is **writing equivalent expressions using powers of 10**. The students would use base ten sticks to write out number expressions provided for them. This helps the students with grouping and expression skills.
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## Napier's Bones:

Napier Bones are used to develop practice with multiplication in a different form than that of traditional multiplication learning. There will be students who find multiplication either difficult or easy. Therefore Napier Bones can be used to help students who are having trouble and to assist those students who could benefit from an extra challenge. This is what I think the Napier's Bones will do. For the students that are having trouble with multiplication Napier Bones will give them with an alternative method to try when multiplying. For the students that are having no trouble with multiplication there will be another method that will challenge them in

their daily use.

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## Internet Problem Solving:

I was specifically looking for sites that had daily or weekly mathematics word problems. It is important for students to see that problem solving is a world wide occurrence via the Internet. Students can participate in solving problems created by other students in other locations of the world.

As I started this part of my project I thought that it would be an easy job. I knew the existence of [Math Central](#) and I thought that other math sites would be easy to find. I was very wrong with my presumption. I searched the Internet using the following keywords: *Mathematics, Problem + Solving, Problems, Word + Problems, and Math*. I knew Math Central was a good site, what I didn't know was that it was a rare site. Overall there was a lack of good Canadian mathematics resources for problem solving on the Internet. The following are the sites which I believe are good resources for problem solving.

### Problem Solving Math Sites:

1 [Brain Teasers](http://www.hmco.com/school/math/brain/) (http://www.hmco.com/school/math/brain/)

Here is a good site that has tons of "brain teasers" or word problems. This site is set up to search for problems according to grade level. The grade 5-7 sections have a great deal of excellent problems. This site also has American measurements but the problems can be adapted to Canadian standards.

2. [The Math Forum](http://forum.swarthmore.edu/home.survey.html) (http://forum.swarthmore.edu/home.survey.html)

This site is an excellent resource. It is a mathematics homepage that has a grade appropriate search engine. The site has many problem solving links and other math links.

3. [Appetizers and Lessons for Math and Reason](http://www.cam.org/~aselby/lesson.html) (http://www.cam.org/~aselby/lesson.html)

This site has many different lesson plans for different mathematical topics. Although there are only a few different problem solving sites the overall content is excellent.

4. [Some Problem Solving Ideas](http://mathcentral.uregina.ca/RR/database/RR.09.95/maeers3.html) (http://mathcentral.uregina.ca/RR/database/RR.09.95/maeers3.html)

This site deals with the way that a problem solving program should or can be set up in your classroom. It covers step by step procedures and different methods for making problem solving a part of your everyday mathematics class. One sample question is included in this site

5. [Mathmania](http://csr.uvic.ca/~mmania) (http://csr.uvic.ca/~mmania)

This is a Canadian site and with good potential. However this site is still under development and should be better in the future.

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## Problem Solving Strategies

Act out or use Objects

**Make a Picture or Diagram**

**Make a Table or Chart**

**Work Backwards**

**Use Logical Reasoning**

**Brainstorm**

**Find a Pattern**

**Guess and Check**

**Solve a Simple Problem**

**Change your Point of View**

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Obtained from Math Central

<http://MathCentral.uregina.ca/>