# Using Geoshapes® to Create Mathematical Challenges

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**Geoshapes offer many possibilities for teachers to develop challenging mathematical questions for students at a variety of ages and abilities. This paper suggests the importance of a shared learning model, to enhance student learning and the professional growth of teachers. Activity cards (in the style of the Curriculum Corporation?s Problem Solving Task Centres) are available online from http://www.ozemail.com.au/~mskoss/geoshapes**

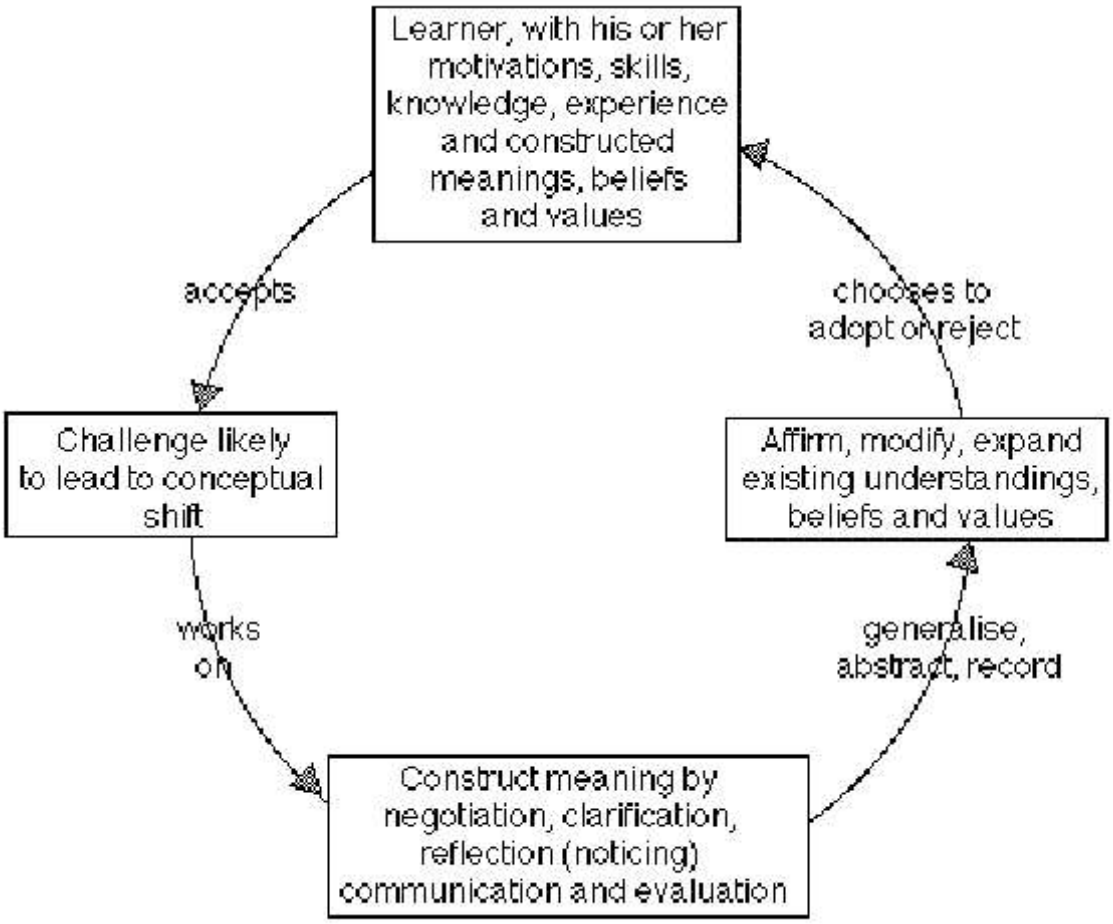
**What provokes teachers to ?create? a new idea to support students? learning in mathematics? Why are some teachers around us extraordinary ?havers? of good ideas? How can we create the conditions to tap into the creativity of classroom teachers, and support them in adding to the collective wisdom of teachers?**

**We feel that many teachers have a strong intuitive sense of ?what works for me.? It appears that teachers know what works, but perhaps not why it works. In supporting the professional growth of mathematics teachers, and probing why a teaching idea works, it is valuable to have a shared understanding of a learning model.**

**The following learning model (Figure 1) was derived from the Mathematics Teaching, Learning and Assessment Project (MaTLAP, 1993), run Territory-wide in 1993-95. The learning model reflects social constructivist learning theory. It is useful to guide teachers? thinking in developing challenges, and helping teachers attend to ?creating the conditions? for students to accept the challenge offered to them (9 o?clock position on the MaTLAP Learning Model). This process requires constant monitoring of events in the classroom ?in the moment?, with the teacher having to make skillful judgments to intervene strategically.**

**A feature common of the following activities using Geoshapes is they offer a vehicle for students to ?do? mathematics as a social activity. Encouraging conversation and interaction with each other helps students to construct their meaning of the mathematics (6 o?clock position). The intervention of teachers is critical in helping students become aware of ?what they now know? (3 o?clock position). An explicitly stated learning model shared at a school level gives teachers opportunities to probe student learning at a precise level, and to form generalisations about rich learning experiences for students. A learning model can help to create a new lens for teachers to view their lessons with. In time, they will use the same lens to develop an idea from conception to classroom.**

**We invite you to trial the following activities with your students, using a learning model that resonates with you as your ?lens.? Some of the ideas are not original, but have been adapted to take advantage of attributes that Geoshapes offer. Many of the activities can be ?tweaked? to offer different challenges to students.**




**Back to back building**
**Set up two chairs back to back at the front of your classroom. Invite one student to make a shape with Geoshapes, and give the other student instructions on how to make it. The second student is only allowed to listen.**
**Using different shaped Geoshapes can vary the complexity. You may choose to draw students? attention to the colour of the Geoshapes.**

**Touchy feely box**
**Tape up a cardboard box and cut a hole in each end that is large enough to slide a hand in. Make up a flexible flap, to obscure the view of others.**
**Make several figures from Geoshapes, and place them in your touch feely box. Invite a student to respond to questions from the class by answering only Yes and No. As answers are given, students have the challenge to draw the figure on paper.**
**An extension to this is to challenge the students who are listening to make the structure in the box, using a range of Geoshapes.**

**The Land of Constant Surface Area**
**Queen Caesar, hereafter known as Queen CSA, decreed that all her subjects live in houses made from square Geoshapes. To reduce complaints from her subjects, she decided that all houses are to have a surface area of 16 squares.**
**What do the houses look like? How many are there? How do you know when you have found them all?**

**Bridge building**
**Make a bridge that can span a distance of 20-30 cm. Try to make your structure symmetrical. Test the strength of your bridge by putting a house brick on it.**
**Find all the different shapes of Geoshapes used in your structure. Count how many of each shape you? ve used. If you doubled the length of your bridge, how many of each shape would you use?**
**If your bridge had to span a distance of exactly 1.2 m, how many Geoshapes would you need? Build it now. Test its strength again.**
**What if your bridge had to span a distance of 50 m? How many Geoshapes would you need? 1 km?**

**Acknowledgements**
**?Haver of ideas?: Liddy Nevile referred to one of her colleagues in this way.**

**Touch feely box: This idea was modeled by Marj Horne in her Keynote Address at the Conference in 1998.**

**Bibliography**
**MaTLAP Steering Committee, 1993, MaTLAP Users? Guide-Draft.**