MYP unit planner

Unit title	**Rules, rules, rules!**
Teacher(s)	Eckmann & Mikula
Subject and grade level	Algebra – Year 2 & Year 3
Time frame and duration	3 weeks

Stage 1: Integrate significant concept, area of interaction and unit question

Area of interaction focus Which area of interaction will be our focus? Why have we chosen this?	**Significant concept(s)** What are the big ideas? What do we want our students to retain for years into the future?
Approaches to learning How is communication in mathematics different from that in other subjects? How can learning in mathematics improve my thinking skills? What skills are specific to mathematics? What skills can I take from other subjects and use in mathematics?	Mathematics is the universal language. Rules have been developed to create universal understanding.

MYP unit question
What would life be like without rules?

Assessment What task(s) will allow students the opportunity to respond to the unit question? What will constitute acceptable evidence of understanding? How will students show what they have understood?
Order of operations bingo (Criterion A) Toothpick Squares (Criteria B & C) Squares in a Rectangle (Criterion B) Number tricks (Criteria A & C) Homework and daily grades (Criterion A) Tests (Criterion A)

Which specific MYP objectives will be addressed during this unit?
A – Knowledge & understanding: use appropriate mathematical concepts and skills to solve problems in familiar and unfamiliar situations; select and apply rules correctly to solve problems. [Number (the four number operations, ordering numbers, simplification of numerical expressions, number lines); Algebra (expanding & simplifying algebraic expressions)] B – Investigating patterns: Recognize patterns; describe patterns as general rules [Algebra (Patterns)] C- Communication in mathematics: Use appropriate mathematical language in oral and written explanations
Which MYP assessment criteria will be used?
Criterion A – Knowledge & understanding Criterion B – Investigating patterns Criterion C – Communication in mathematics

Stage 2: Backward planning: from the assessment to the learning activities through inquiry

Content What knowledge and/or skills (from the course overview) are going to be used to enable the student to respond to the unit question? What (if any) state, provincial, district, or local standards/skills are to be addressed? How can they be unpacked to develop the significant concept(s) for stage 1?
Variables **Order of operations** **Translating words into symbols** **Number lines** **Opposites and absolute value** **Properties of addition and multiplication** **Rules of addition, subtraction, multiplication and division** **The distributive property** **Reciprocals** **Transforming one-step equations** **Equations with multiple steps** **Equations with variables on both sides of the equal sign** **Using equations to solve problems** **Using charts to solve problems**
Approaches to learning How will this unit contribute to the overall development of subject-specific and general approaches to learning skills?
Thinking – Understanding & applying knowledge and concepts; identifying and selecting strategies to solve problems

Communication – Know, interpret and use mathematics language & forms of representation

Collaboration – Work in groups

Learning experiences	**Teaching strategies**
How will students know what is expected of them? Will they see examples, rubrics, templates? How will students acquire the knowledge and practise the skills required? How will they practise applying these? Do the students have enough prior knowledge? How will we know?	How will we use formative assessment to give students feedback during the unit? What different teaching methodologies will we employ? How are we differentiating teaching and learning for all? How have we made provision for those learning in a language other than their mother tongue? How have we considered those with special educational needs?
Order of operations bingo Homework & daily grades *Toothpick Squares* *Squares in a Rectangle* Number tricks	Demonstrations Investigations – Toothpick Squares Squares in a Rectangle Number tricks Practice activities – Order of Operations Bingo Homework Formative assessments – all of the above & daily grades

Resources

What resources are available to us?

How will our classroom environment, local environment and/or the community be used to facilitate students' experiences during the unit?

Textbook: *Algebra Structure and Method – Book 1*

http://illuminations.nctm.org

GRCTM Conference (2000) – *Toothpick Squares: An Introduction to Formulas* presented by Donna Dalton, Chesterfield County Public Schools

Ongoing reflections and evaluation

In keeping an ongoing record, consider the following questions. There are further stimulus questions at the end of the "Planning for teaching and learning" section of *MYP: From principles into practice*.

Students and teachers

What did we find compelling? Were our disciplinary knowledge/skills challenged in any way?

What inquiries arose during the learning? What, if any, extension activities arose?

How did we reflect—both on the unit and on our own learning?

Which attributes of the learner profile were encouraged through this unit? What opportunities were there for student-initiated action?

Possible connections

How successful was the collaboration with other teachers within my subject group and from other subject groups?

What interdisciplinary understandings were or could be forged through collaboration with other subjects?

Assessment

Were students able to demonstrate their learning?

How did the assessment tasks allow students to demonstrate the learning objectives identified for this unit? How did I make sure students were invited to achieve at all levels of the criteria descriptors?

Are we prepared for the next stage?

Data collection

How did we decide on the data to collect? Was it useful?

Figure 12

MYP unit planner

Toothpick Squares: An Introduction to Formulas

1. Arrange your toothpicks to form 5 squares in a row as shown on the attachment.

2. Can you see ways, without one-by-one counting, to determine the total number of toothpicks in the 5 squares? There are at least four.

3. For each method, write verbal direction for using that method. Begin each set of directions with the words:

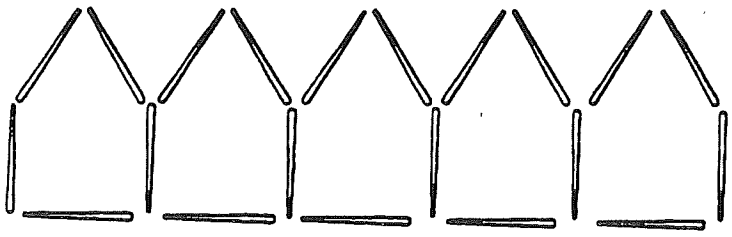
"To determine the number of toothpicks for 'x' squares ...."

Review your directions to be sure they are clear and correct. You will be sharing them with the class.

4. Predict how many toothpicks are needed to build a row of 6 squares. 7 squares? 12 squares?

20 squares?

5. Select a variable to stand for "the number of squares" and write an equation that represents each set of verbal directions that you wrote in step 3.
6. If the row of squares in step 1 is extended until 142 toothpicks are used, how many squares will be in the row? Show your work algebraically.
7. Examine the row of pentagons below. Write a variable equation relating the number of toothpicks used with the number of pentagons in a row. Solve, showing all work algebraically.



8. What would the equation be to find the number of toothpicks in a row of 5 hexagons?

9. What would the equation be to find the number of toothpicks in a row of 5 octagons?

10. What would the equation be to find the number of toothpicks in a row of figures with 20 sides?

NUMBER TRICKS

The left column shows the instructions for the number trick. One person reads the instructions and a second person performs the given operations.

Then complete the **algebra expression** for each "number trick in the right column.

TRICK #1	
Pick a number.	_____
Double it.	_____
Subtract 9.	_____
Add your original number.	_____
Divide by 3.	_____
Add 3.	_____
Answer?	_____

Trick #2	
Pick a number.	_____
Add the next 2 consecutive numbers.	_____
Add 5.	_____
Multiply by 3.	_____
Subtract the original number.	_____
Divide by 8.	_____
Subtract the original number.	_____
Answer?	_____

Trick #3

Start with 4.	_____
Multiply by any number	_____
Add 9.	_____
Multiply by 2.	_____
Subtract 2.	_____
Divide by 8.	_____
Subtract 2.	_____
Answer?	_____

Trick # 4

Pick a number.	_____
Multiply by 4.	_____
Subtract 20.	_____
Add your original number tripled.	_____
Subtract 1.	_____
Divide by 7.	_____
Subtract your original number.	_____
Answer?	_____

Now devise your own number trick. Try to have at least 6 steps, using all 4 operations. Include the original verbal instructions and the corresponding algebra expressions. Do not have "opposite" directions.

Mathematics Year 3
Criterion A: Knowledge and understanding

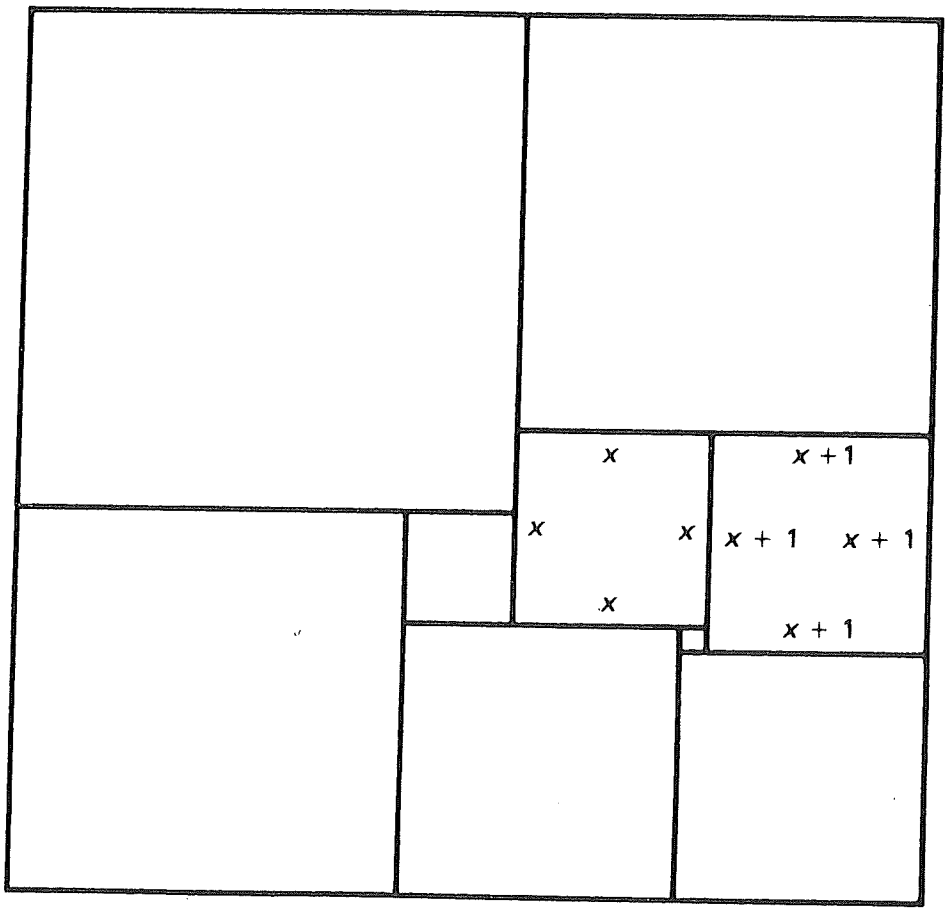
Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below
1-2	The student attempts to make deductions when solving simple problems in familiar contexts.
3-4	The student sometimes makes appropriate deductions when solving simple and more complex problems in familiar contexts.
5-6	The student generally makes appropriate deductions when solving challenging problems in a variety of familiar contexts.
7-8	The student consistently makes appropriate deductions when solving challenging problems in a variety of contexts including unfamiliar situations.

Mathematics Year 3
Criterion C: Communication in mathematics

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1-2	The student shows sufficient use of mathematical language and/or forms of mathematical representation. The lines of reasoning are difficult to follow.
3-4	The student usually shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are clear though not always logical or complete. The student moves between different forms of representation with some success.
5-6	The student shows good use of mathematical language and forms of mathematical representation. The lines of reasoning are concise, logical and complete. The student moves effectively between different forms of representation.

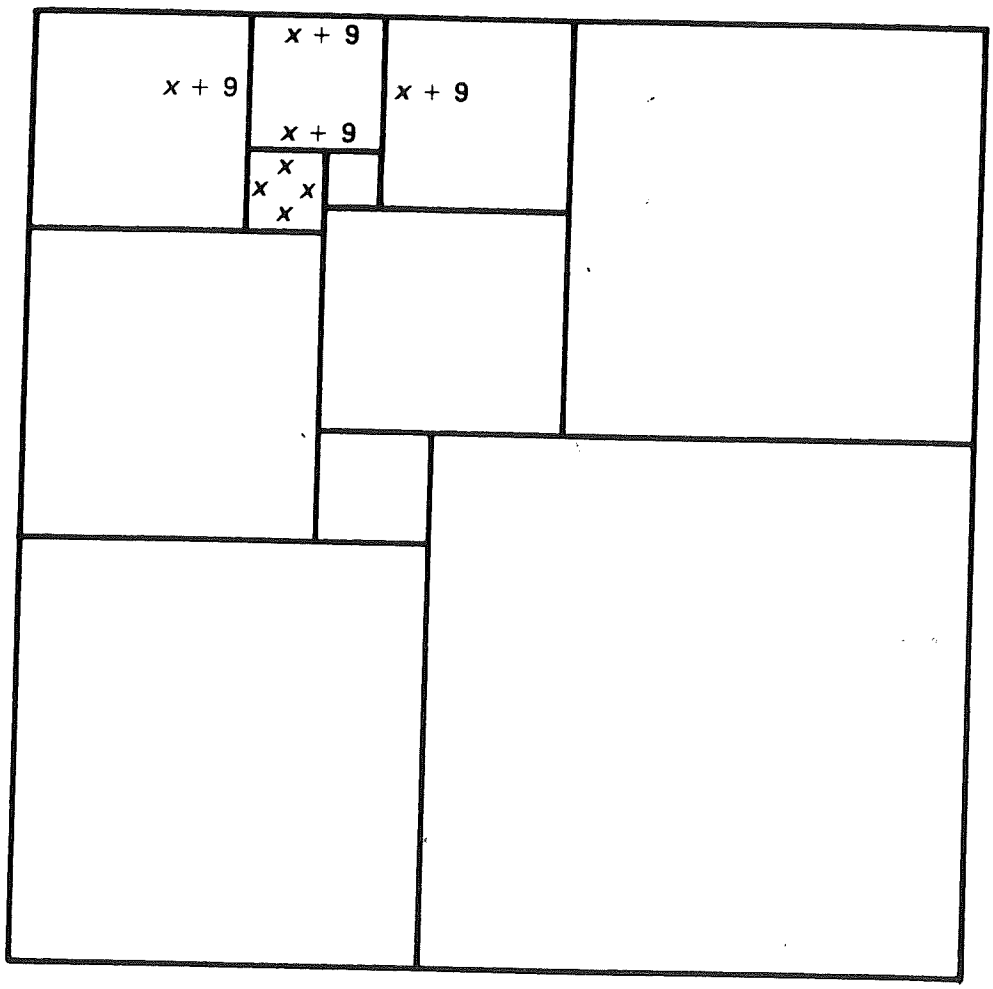
Squares in a Rectangle

1. The figure below shows a rectangle that has been divided into nine squares, all of different dimensions. The smallest square has sides 1 unit long, and the sides of two of the other squares have been labeled. Write an equation that will yield the value of x. (*Hint:* First complete the labeling of the sides of the squares. Then, to write the equation to find x, use the fact that opposite sides of a rectangle are equal.)



Equation _____

Solution _____



Equation _____

Solution _____

Mathematics Year 3
Criterion B: Investigating patterns

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below
1-2	The student applies, with some guidance, mathematical problem-solving techniques to recognize simple patterns.
3-4	The student selects and applies mathematical problem-solving techniques to recognize patterns, and suggests relationships or general rules.
5-6	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, and draws conclusions consistent with findings.
7-8	The student selects and applies mathematical problem-solving techniques to recognize patterns, describes them as relationships or general rules, draws conclusions consistent with findings, and provides justifications or proofs.