

THE TEACHER'S PLAN FOR THE LEARNING

English Language Learners and Mathematics: Patterning and Algebra

<p>Math Workshop</p> <p>Adapted from the following resource by Dr. Ruth Beatty and Dr. Catherine Bruce: <i>From Patterns to Algebra - Lessons for Exploring Linear Relationships</i></p> <p><i>Note: all problems posed by the teacher can be found at the end of this planner.</i></p> <p><i>Record guiding questions on chart paper;</i></p> <p><i>Copy task on different colour paper</i></p> <p><i>Graph Paper, 11X17 paper for solutions</i></p> <p><i>Sharpies</i></p>	<p>Curriculum Expectations</p> <p>Grade 7</p> <ul style="list-style-type: none">● Overall: model real life linear relationships graphically and algebraically and solve simple algebraic equations using a variety of tools● Specific: evaluate algebraic expressions by substituting natural numbers for the variables <p>Grade 6</p> <ul style="list-style-type: none">● Overall: Use variables in simple algebraic expressions and equations to describe relationships● Specific: determine the solution to a simple equation with one variable using a variety of tools and strategies <p>BIG IDEAS</p> <ul style="list-style-type: none">● Changing the values of the constant and the multiplier in a rule affects all the representations of that rule● We can solve 'real world' problems using our understanding of linear growing patterns <p>Minds On</p> <ul style="list-style-type: none">● Review the relevant big ideas so far ~ pattern rules show us relationships between things happening in everyday life. We can show the pattern rule or the relationship in different ways (materials/tiles, drawings/models, graphs, numbers, algebraic equations, letters and numbers).● Setting the context- use the bricks & flower pots to show design for pattern 1<ul style="list-style-type: none">▪ What do you think the pattern rule is for this design? (on chart) Turn and Talk to your partner. Share▪ What do you think the pattern will look like with 5 stones? Can you draw the design with 5 stones? (chart) Turn and Talk. Share.▪ What will the trend line for this pattern look like? (chart)▪ Take a few minutes to draw and label the trend line for this pattern on your graph paper. <p>Hands On</p> <ul style="list-style-type: none">● <i>Grandmother is thinking about some other possible designs. Your work today will be to think about the different ideas she has and to help her answer some questions and make some choices.</i> <p>Students will receive their task sheets, graph paper, and 11x17 paper to work on. Each table should have box with sharpies and markers.</p> <p>Consolidation - Math Circle</p> <p>Focus the discussion to bring out some of the dialogue students had in their groups (how the pattern rules are similar or different, how having the same constant or the same multiplier impacts the different representations and the story problem}. Focus questions (on chart paper):</p> <ul style="list-style-type: none">● How were the designs / pattern rules similar?● How were the designs / pattern rules different?● How did that affect your diagrams / drawings and your graphs? <p>Based on the ideas that come out in discussion, ask:</p> <ul style="list-style-type: none">● *Why are two lines parallel while the others intersect?● *How does changing the constant or multiplier in the algebraic equation affect the various ways we represent linear patterns? (drawings, graphs, numbers) <p>Extension: Grade 7</p> <ul style="list-style-type: none">o Is it possible to say one rule will give us the most flowers always? Why?o Some of you were given 98 flowers others were given 102 flowers - which of the designs/pattern rules did you choose for your flower set? Why?
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	<p>Independent (10min/homework)</p> <ul style="list-style-type: none"> • What do you think a rule that has 8 flowers for one stone will look like? Represent it algebraically, in a drawing/model, and with a trend line. • <i>Student @ STEP 1:</i> Show the rule 8 flowers → 1 stone. What is the rule? Draw a picture. Make a graph of the trend line.
	<p>Accommodations</p> <ul style="list-style-type: none"> • <i>Two Students who are not ELL:</i> <ul style="list-style-type: none"> o Prompt using question about intersection - do you think there are a number of stones that we could use that would require the same number of flowers no matter the design? How do you know? • <i>Partners: one student at STEP 1 and one student @ STEP 3</i> <i>Language goal for student @ STEP 1 - to show thinking using first language and English in proof</i> <ul style="list-style-type: none"> o Check in for understanding of instructions - what are you going to do first? Next? o Prompt student @ STEP 1 to use the sentence starters and key vocabulary o Questions to explain thinking o Story problem - discuss in first language o Math problem has been adapted by simplifying the grammar and vocabulary, shortening sentences, incorporating 'white-space' and first language, and bolding key vocabulary and phrases (see Adapted Math Problem) • <i>Partners: both students@ STEP 3</i> <i>Language goal - to use compound sentences and academic vocabulary</i> <ul style="list-style-type: none"> o How does the story relate to graph? How would you label the axis? Why? o How are the trend lines similar / different? What does that tell you about the story? o How can use what you know to solve the problem?

PROMPTS FOR STUDENTS BASED ON "STEPS TO ENGLISH PROFICIENCY"

Students journeying through STEP 3

- How did you know?
- What do you mean?
- Can you say it another way?
- Why do you think that?
- Can you explain it using the model/picture you have?
- Can you show me with an example?
- Can you tell me what s/he said in your own words?

- Why do you think your idea is right?
- Why do you think your way is better?

Student journeying through STEP 1:

- What is the pattern rule?
- What is the multiplier? What is the constant?
- Show me the Y- intercept? What is the Y-intercept?
- How will you label this axis?
- What is the same? What is different? Can you show me what is the same and what is different?

Which rule will you choose? Did you choose it because it has more flowers or less flowers? Can you show me how you know?

For more information regarding the STEP Ongoing Continua, consult

STEP - Steps to English Proficiency: A Guide for Users

STEP is contained in the print materials of this resource or visit

http://www.edugains.ca/resourcesELL/Assessment/STEP/STEPUserGuide_January2012.pdf