Algebra Unit Plans
Grade 7

April 2012

Created By: Danielle Brown; Rosanna Gaudio; Lori Marano; Melissa Pino; Beth Orlando & Sherri Viotto
**Unit Planning Sheet for Algebra**

**Big Ideas for Algebra** (Dr. Small)

1. Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
2. Using variables is a way to efficiently and generally describe relationships that can also be described using words.

**Pre- and Post-Task:** Assessment Probes from “Uncovering Student Thinking in Mathematics” by Cheryl Rose (see attached)

**Culminating Task:** Fundraising Activity
Math Makes Sense Unit Ten Chapter Task: pg 402 & 403

**Common Misconceptions:**
- unable to identify equivalent expressions in the form of familiar formulas
- misuse “key words” when writing algebraic expressions
- unable to link symbols and numbers
- discomfort with equations when the variable appears on both sides

**Learning Goals:**
- I can identify equivalent expressions.
- I can explain an algebraic expression using words, numbers, and variables.
- I can use variables to describe relationships.
- I can write and evaluate algebraic expressions.
- I can write and evaluate simple equations.
- I can model an algebraic equation using patterns, tables, and graphs.

**Unit Highlights & Summary**

- an equal sign is like the centre of a teeter totter: each side has to be the same to keep the equation balanced.
- variables can represent unknown quantities in an equation.
- Guess & Check and Inspection are two strategies when finding an unknown quantity.
- any letter can be used as a variable.
- letters are written in cursive or italics.
- when a letter is directly beside a number it means you multiply.
- when a letter is over or under a number it means you divide.
- use brackets to show when you have substituted a number for a variable.
- write each step in a calculation directly under the previous step and line up the equal signs.
- whatever you do to one side of the equation, you do to the other side.
- always check your answer using inspection.
- communicate your answer clearly by showing your work step-by-step.
- the variable can be on the right or the left side of the equation.
- algebraic equations can be shown as a table of values or a graph.

**Vocabulary:**

- algebraic expression
- algebraic equation
- variable
- constant
- constant rate of change
- evaluate
- guess & check
- inspection

**Extra:** Word Play from TIPS4RM

**I’m Done! Now What Do I Do?**

**Extra Activities:**

1. Word Play from TIPS4RM Unit 5
2. Substitution Toss Game from MMS
3. Algebra Concentration Game from MMS
4. Algebra Game from MMS
<table>
<thead>
<tr>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Expectations:</strong></td>
<td><strong>Overall Expectations:</strong></td>
<td><strong>Overall Expectations:</strong></td>
</tr>
<tr>
<td>• use variables in simple algebraic expressions and equations to describe relationships;</td>
<td>• use variables in simple algebraic expressions and equations to describe relationships and to represent the changing quantities in the relationship (e.g. the equation ( p = 4t ) represents the relationship between the total number of people that can be seated ( p ) and the number of tables ( t ) given that each table can seat 4 people [4 people per table is the constant rate]).</td>
<td>• model real-life linear relationships graphically and algebraically, and solve simple algebraic equations using a variety of strategies, including inspection and guess and check.</td>
</tr>
<tr>
<td><strong>Specific Expectations:</strong></td>
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</tr>
<tr>
<td>• demonstrate an understanding of different ways in which variables are used;</td>
<td>• determine the solution to a simple equation with one variable, through investigation using a variety of tools and strategies.</td>
<td>• solve and verify linear equations involving a one-variable term and having solutions that are integers, by using inspection, guess and check, and a “balance” model (Sample problem: What is the value of the variable in the equation ( 30x - 5 = 109 ))</td>
</tr>
<tr>
<td>• identify through investigation, the quantities in an equation that vary and those that remain constant;</td>
<td>• solve problems that use two or three symbols or letters as variables to represent different unknown quantities;</td>
<td>• model real-life linear relationships graphically and algebraically, and solve and verify algebraic equations, using a variety of strategies, including inspection, guess and check, and using a “balance” model.</td>
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<td>• solve problems that use two or three symbols or letters as variables to represent different unknown quantities;</td>
<td>• determine the solution to a simple equation with one variable, through investigation using a variety of tools and strategies.</td>
<td>• describe different ways in which algebra can be used in real-life situations (e.g., the value of $5 bills and toonies placed in an envelope for fund raising can be represented by the equation ( v = 5f + 2t ))</td>
</tr>
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<td>• determine the solution to a simple equation with one variable, through investigation using a variety of tools and strategies.</td>
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<td>• model linear relationships graphically and algebraically, and solve and verify algebraic equations, using a variety of strategies, including inspection, guess and check, and using a “balance” model.</td>
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<td><strong>Sample Problem:</strong> Create a table of values and graph the relationship between distance and time for a car travelling at a constant speed of 40 km/hr. At that speed, how far would the car travel in 3.5 h? How many hours would it take to travel 220 km?</td>
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<td><strong>Sample Problem:</strong> Sample problem: Leah put $350 in a bank certificate that pays 4% simple interest each year. Make a table of values to show how much the bank certificate is worth after five years, using base ten materials to help you. Represent the relationship using an equation.;</td>
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<td>• make connections between evaluating algebraic expressions and determining the term in a pattern using the general term (e.g. for the pattern with the general term ( 2n + 1 ) the algebraic expression ( 2n + 1 ); evaluating this expression when ( n = 12 ) tells you that the 12th term is ( 2(12) + 1 ), which equals 25)</td>
<td>• evaluate algebraic expressions with up to three terms, by substituting fractions, decimals, and integers for the variables (e.g., for a collection of triangles, the total number of sides is equal to three times the number of triangles or ( s = 3n ));</td>
<td>• make connections between solving equations and determining the term number in a pattern, using the general term (e.g. for the pattern with the general term ( 2n + 1 ) solving the equation ( 2n + 1 = 17 ) tells you the term number where the term is 17;</td>
</tr>
<tr>
<td>• solve linear equations of the form ( ax = c ) or ( c = ax ) and ( ax + b = c ) or variations such as ( b + ax = c ) and ( c = bx + a ) (where ( a ), ( b ), and ( c ) are natural numbers) by modelling with concrete materials, by inspection, or by guess and check, with and without the aid of a calculator</td>
<td>• use variables in simple algebraic expressions and equations to describe relationships and to represent the changing quantities in the relationship (e.g. the equation ( p = 4t ) represents the relationship between the total number of people that can be seated ( p ) and the number of tables ( t ) given that each table can seat 4 people [4 people per table is the constant rate]).</td>
<td>• solve and verify linear equations involving a one-variable term and having solutions that are integers, by using inspection, guess and check, and a “balance” model (Sample problem: What is the value of the variable in the equation ( 30x - 5 = 109 ))</td>
</tr>
<tr>
<td>Learning Goal</td>
<td>Sample Question</td>
<td>Red</td>
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<tr>
<td>---------------</td>
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<td>-----</td>
</tr>
<tr>
<td>I can identify equivalent expressions.</td>
<td>How many different ways can you balance the animals? 1 bear = 5 wolves 2 wolves = 4 turtles 1 turtle = 3 mice</td>
<td></td>
</tr>
<tr>
<td>I can explain an algebraic expression using words, numbers, and variables.</td>
<td>Write an algebraic expression for each of the following: 1. Double a number and add three. 2. Subtract one-half of a number from 17. 3. Divide a number by 7, then add six. 4. Twenty-eight is subtracted from a number.</td>
<td></td>
</tr>
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<td>Learning Goal</td>
<td>Sample Question</td>
<td>Red</td>
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<tr>
<td>--------------------------------------------------</td>
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<tr>
<td>I can write and evaluate algebraic expressions.</td>
<td>For a school trip, the charge for using the school bus is $50.00. The cost of food is $10.00/student. What is the total cost for each number of students: a.) 5 b.) 15 c.) 20 Write an algebraic expression and use it to solve the problem.</td>
<td></td>
</tr>
<tr>
<td>I can write and evaluate simple equations.</td>
<td>Solve each equation: a) $12 = 3n$ b) $21 - n = 18$ c) $\frac{27}{n} = 9$ d) $\frac{n}{9} = 27$ e) $n - 21 = 30$ f) $3n + 2 = 11$</td>
<td></td>
</tr>
<tr>
<td>I can model an algebraic equation using patterns, tables, and graphs.</td>
<td>1. Copy and complete the table and use this pattern: multiply each number by 5, then subtract 3. 2. Graph the pattern. 3. How can you find the Output number when the Input is 47? 4. How can you find the Input number when the Output number is 47?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Subtask One: Equal Shmequal</td>
<td>Grade 7</td>
</tr>
<tr>
<td>----------------------------</td>
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</tr>
<tr>
<td><strong>Math Learning Goal:</strong></td>
<td></td>
</tr>
<tr>
<td>• I can identify equivalent expressions.</td>
<td></td>
</tr>
<tr>
<td><strong>Big Ideas:</strong></td>
<td></td>
</tr>
<tr>
<td>• Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.</td>
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<tr>
<td><strong>Curriculum Expectations:</strong></td>
<td></td>
</tr>
<tr>
<td>• model real-life linear relationships graphically and algebraically, and solve simple algebraic equations using a variety of strategies, including inspection and guess and check</td>
<td></td>
</tr>
<tr>
<td><strong>Read Aloud:</strong> Equal Shmequal by Virginia Kroll</td>
<td>copy of book</td>
</tr>
<tr>
<td>• teacher will read book to class and discuss concept of what it means when things are equal to each other</td>
<td></td>
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<tr>
<td><strong>Part One:</strong> Mind’s On</td>
<td></td>
</tr>
<tr>
<td>5 min.</td>
<td></td>
</tr>
<tr>
<td><strong>Materials</strong></td>
<td></td>
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<tr>
<td><strong>Part 2:</strong> Action!</td>
<td></td>
</tr>
<tr>
<td>35 min.</td>
<td></td>
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<tr>
<td><strong>Pairs: Parallel Task</strong></td>
<td></td>
</tr>
<tr>
<td>How many different ways can you balance the animals?</td>
<td></td>
</tr>
<tr>
<td><strong>Choice A:</strong></td>
<td>Choice B:</td>
</tr>
<tr>
<td>1 bear = 5 wolves</td>
<td>1 bobcat = 3 deer + 3 rabbits</td>
</tr>
<tr>
<td>2 wolves = 4 turtles</td>
<td>1 rabbit = 4 mice</td>
</tr>
<tr>
<td>1 turtle = 3 mice</td>
<td>2 deer = 4 turtles</td>
</tr>
</tbody>
</table>
### Part 3: Consolidate/Debrief

<table>
<thead>
<tr>
<th>20 min</th>
<th>Gallery Walk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students will walk around and view the work of their peers</td>
<td></td>
</tr>
<tr>
<td>• They will use stickies to ask questions about the work if they have any</td>
<td></td>
</tr>
</tbody>
</table>

**Questions:**
- How did you know the teeter-totter was balanced?
- How would the problem change if we used shapes instead of animals?

**Highlight & Summary:**
- An equal sign is like the centre of the teeter-totter: each side always has to be the same to keep the equation balanced

<table>
<thead>
<tr>
<th>5 min</th>
<th>Practice Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Students will complete the “Clear/Unclear” exit card (see attached)</td>
<td></td>
</tr>
</tbody>
</table>

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**Exit Card:**

<table>
<thead>
<tr>
<th>Clear</th>
<th>Unclear</th>
</tr>
</thead>
</table>

Name: __________________________  Date: ______________
## Subtask 2: Balancing Scales

### Math Learning Goal:
- I can explain an algebraic expression using words, numbers, and variables.

### Big Ideas:
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

### Curriculum Expectations:
- Translate phrases describing simple mathematical relationships into algebraic expressions using concrete materials

### Minds On: Think, Pair, Share

<table>
<thead>
<tr>
<th>8 kg</th>
<th>12 kg</th>
</tr>
</thead>
</table>

**How much does each figure weigh? Explain**

| Which figure weighs the most? Explain. |
| Which figure weighs the least? Explain |

### Materials
- Copy of question on smart board or handout
### Parallel Task: Pairs

**Part 2: Action!**

- **35 min.**

  A question from page 138 in *Good Questions: Great Ways to Differentiate Math Instruction* by Dr. Marian Small.

<table>
<thead>
<tr>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Balance Scale with 1 cylinder on each side, weighing 5 kg on the left and 1 kg on the right." /></td>
<td><img src="image2.png" alt="Balance Scale with 2 cylinders on each side, weighing 5 kg on the left and 2 kg on the right." /></td>
</tr>
</tbody>
</table>

**Bonus:** What number sentence describes the original picture?

### Math Congress: Whole Group

**Part 3: Consolidate/Debrief**

- **20 min.**

  Students will explain how they figured out the weight of each of the cylinders (Guess & Check Strategy; Inspection Strategy)

**Questions:**

- How did you know whether your cylinder weighed more or less than 5?
- How did you figure out the weight of your cylinder?
- How could you use variables to represent the unknown quantities in your equation?

**Highlight & Summary:**

- Variables can represent unknown quantities in an equation.
- Guess & Check and Inspection are two strategies when finding an unknown quantity.
<table>
<thead>
<tr>
<th>5 min</th>
<th><strong>Practice Activity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td></td>
<td>What will balance 2 spheres? Explain your reasoning.</td>
</tr>
<tr>
<td></td>
<td>(Use both pictures to solve the problem)</td>
</tr>
<tr>
<td></td>
<td>• copy of question on handout or smart board</td>
</tr>
</tbody>
</table>
### Subtask 3: Using Variables

<table>
<thead>
<tr>
<th>Math Learning Goal:</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can use variables to describe relationships.</td>
<td></td>
</tr>
</tbody>
</table>

#### Big Ideas:
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

#### Curriculum Expectations:
- Translate phrases describing simple mathematical relationships into algebraic expressions using concrete materials

### Minds On: Think, Pair, Share

#### Part One: Mind’s On

- Write an algebraic expression for this statement:
  - One more than three times a number

### 5 min.

#### Pairs:

#### Part 2: Action!

1. Use the cards below to make an algebraic expressions to match the statement. Write the expression.

   ![Symbols](symbols.png)

   a. nine times a number subtract 4
   b. the sum of four times a number and nine
   c. a number plus five
   d. nine more than one-quarter of a number

2. Create two more expressions using the cards. Write each expression in words. Show your work.
### Math Congress: Whole Group

- Students will explain how they came up with their algebraic expression.

### Highlight & Summary:

- We can use any letter as a variable.
- Letters are written in cursive or italics.
- When a letter is directly beside a number, it means you multiply.
- When a letter is over or under a number, it means you divide.

### Part 3: Consolidate/Debrief

- **20 min**

  **Practice Activity (Math Makes Sense pg. 380 #s 6 & 7)**

  1. Write an algebraic expression for each statement.
     - a. Double a number and add three.
     - b. Subtract five from a number, then multiply by two.
     - c. Subtract one-half of a number from 17.
     - d. Divide a number by seven, then add six.
     - e. A number is subtracted from twenty-eight.
     - f. Twenty eight is subtracted from a number.

  2. a.) Write each expression in words:
     - i. \((40 - 3)r\)
     - ii. \(40 - 3r\)
   - b. How are the expressions and statements in part a similar? How are they different?

### Copy of question on smart board or handout
Algebra Cards

<table>
<thead>
<tr>
<th>9</th>
<th>4</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>÷</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

\[ n \]
### Math Learning Goal:
- I can write and evaluate algebraic expressions.

### Big Ideas:
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

### Curriculum Expectations:
- Evaluate algebraic expressions by substituting natural numbers for the variables.
- Model real-life relationships involving constant rates, using algebraic equations with variables to represent the changing quantities in the relationship.

### Minds On: Think, Pair, Share

Mrs. Smith plans to hold a party for a group of her friends.

The cost of renting a room is $25.00.
The cost of food is $3.00 per person.

Which algebraic expression gives the total cost, in dollars, of the party for \( n \) people?

\[
3 + 25n \quad 28n \quad 28 + n \quad 25 + 3n
\]

Check your answer by finding the cost for 10 people.
<table>
<thead>
<tr>
<th>Part 2: Action!</th>
<th>Parallel Task: In Pairs from Good Questions: Great Ways to Differentiate Math Instruction by Dr. Small</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A student company charges a $5.00 flat rate fee plus $3.00 / window to wash windows.</td>
</tr>
<tr>
<td></td>
<td><strong>Option 1:</strong> How much more would someone pay to have 35 windows washed than 24 windows?</td>
</tr>
<tr>
<td></td>
<td><strong>Option 2:</strong> Might someone have to pay exactly $87 to have their windows washed? Explain.</td>
</tr>
<tr>
<td>Part 3: Consolidate/Debrief</td>
<td>Math Congress: Whole Group • students will describe their solutions</td>
</tr>
<tr>
<td></td>
<td><strong>Questions during Bansho:</strong> • What is the constant? • What is the variable? • How did you know how to set up your equation? • How did you check to make sure your answer made sense?</td>
</tr>
<tr>
<td></td>
<td><strong>Highlight &amp; Summary:</strong> • use brackets to show when you have substituted a number for a variable • write each step in a calculation directly under the previous step and line up the equal signs one under the other</td>
</tr>
<tr>
<td></td>
<td><strong>Practice Activity (Nelson pg 280 Example 3)</strong> A cafeteria charges $250.00 plus $5.00 per meal after the first 140 students. Create an algebraic expression to calculate the cafeteria bill for 260 students. Evaluate the expression.</td>
</tr>
</tbody>
</table>
## Subtask 5: Evaluating Simple Equations with Addition & Subtraction

### Math Learning Goal:
- I can write and evaluate simple equations.

### Big Ideas:
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

### Curriculum Expectations:
- evaluate algebraic expressions by substituting natural numbers for the variables

### Materials

#### Minds On: Think, Pair, Share

Solve this equation:

\[ x + 3 = 7 \]

**Questions to Ask:**
If you found different values \( x \) than your classmates did, who is correct?

Can both be correct? How can you check?

Teacher will show students how to use Algebra Tiles to model this equation.

#### Part One: Mind’s On

5 min.

**Task for Pairs:**
Use the algebra tiles to model the following algebraic equations:

\[ x - 3 = 11 \]
\[ 9 = n + 7 \]
\[ 8 - n = 4 \]

Communicate your answer clearly by showing your work step-by-step.

#### Part 2: Action!

35 min.

- copy of question on smart board or handout

- Copy of question on smart board or handout
<table>
<thead>
<tr>
<th>Part 3: Consolidate/Debrief</th>
<th>Math Congress: Whole Group</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>students will explain their use of tiles and how they clearly communicated their thinking by showing the progression of their solution</td>
</tr>
</tbody>
</table>

**Questions during Bansho:**
- How do you know your answer is correct? (Use Inspection to check your answer)

**Highlight & Summary:**
- whatever you do to one side of the equation, you have to do to the other side
- check your answer using inspection
- communicate your answer clearly by showing your work step-by-step
- the variable can be on the right or the left side of the equal sign.

<table>
<thead>
<tr>
<th>20 min</th>
<th>Practice Activity</th>
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<td></td>
<td>Students will be given exit card to reflect on their learning (see below).</td>
</tr>
</tbody>
</table>

copy of question on smart board or handout
What part of today’s work is still a bit muddy? Where might you get stuck?
**Math Learning Goal:**
- I can write and evaluate simple equations.

**Big Ideas:**
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

**Curriculum Expectations:**
- evaluate algebraic expressions by substituting natural numbers for the variables
- model real-life relationships involving constant rates using algebraic equations with variables to represent the changing quantities in the relationship.

### Minds On: Think, Pair, Share

Thinking about what you learned from yesterday, how might you solve the following equation:

\[ 5x + 20 \]

\[ \frac{x}{2} = 5 \]

**Questions:** How did you isolate the variable \( x \)? What does it mean when the variable is beside the number? Under it?

### Materials
- copy of question on smart board or handout
### Parallel Task: In Pairs

#### Choice A:
The perimeter of a square is 156 cm. Write an equation you can solve to find the side length of the square. Show the steps you used to solve the equation.

#### Choice B:
Kevin and Zack are playing a number guessing game. Kevin says, “I am thinking of a number. If you double it and then subtract one, the result is seven.” Write an equation that Zack can use to win the game. Show the steps Zack could use to solve the equation.

### Part 2: Action!

35 min.

### Math Congress: Whole Group

- Students will describe and show the steps that they used to develop the equation, isolate the variable and evaluate the equation.

#### Questions during Bansho:
- How did you isolate the variable?
- How do you know your answer is correct? (Inspection)

### Part 3: Consolidate/Debrief

20 min

### Practice Activity

Evaluate the following equation:

\[ 2n + 3 = 27 \]

Students will hand in so that the teacher can check for understanding.

**Homework:** Math Makes Sense pg. 394 #10

- Find the value of \( n \) that makes each equation true.
  - a) \( 3n = 27 \quad n = 9 \)
  - b) \( 2n + 3 = 27 \quad n = 12 \)
  - c) \( 2n - 3 = 27 \quad n = 15 \)
  - d) \( \frac{n}{3} = 27 \quad n = 81 \)
  - e) \( \frac{n}{2} + 3 = 27 \quad n = 48 \)
  - f) \( \frac{3n}{2} = 27 \quad n = 18 \)
## Subtask 7: Constant Rates & Graphing (TIPS4RM, Grade 7, Unit 5, Subtask 5 “Getting to the Heart of Math”)

### Math Learning Goal:
- I can explain an algebraic expression using patterns, tables, and graphs.

### Big Ideas:
- Algebra is a way to represent and explain mathematical relationships and to describe and analyze change.
- Using variables is a way to efficiently and generally describe relationships that can also be described using words.

### Curriculum Expectations:
- model real-life relationships involving constant rates where the initial condition starts at 0, through investigation using tables of values and graphs
- make connections between evaluating algebraic expressions and determine the term in a pattern using the general term
- solve linear equations of the form $ax = c$ or $c = ax$ and $ax + b = c$ or variations

### Materials

#### Minds On: Think, Pair, Share

**Part One: Mind’s On**
- 5 min.
- Brainstorm a list of everyday relationships that involve a constant rate
- Examples may include: a person’s heart rate, speed limit, rate of pay, etc

#### Parallel Task: In Pairs

**Part 2: Action!**
- 35 min.
- see subtask 5 from TIPS4RM below.
- Instructions also included in Smart Board File.
- **Question for students who finish early:**
  After one minute of vigorous exercise (e.g. running on the spot) take your pulse to determine your heart rate after exercise. Complete a table of values for your increased heart rate and graph the relationship. What do you notice about the two graphs? What is similar? Different?

#### Materials

- copy of question on smart board or handout
- copy of TIPS4RM BLM 5.4.1 “Getting to the Heart of Math”
<table>
<thead>
<tr>
<th>Part 3: Consolidate/Debrief</th>
<th>Math Congress: Whole Group</th>
<th>Practice Activity</th>
</tr>
</thead>
</table>
| 20 min                      | • students explain how they came up with their algebraic expressions and how they evaluated their expressions  
  • they also explain how they graphed their information.  
  **Questions during Bansho:**  
  • How did you develop your equation?  
  • How did you decide on intervals for the x and y axis of your graph?  
  • How did you use your equation to help you answer part e?  
  • What was the initial condition?  
  • What was the constant rate of change?  
  • What do you notice about your graph?  
  • Even though everyone has different number of beats per minute, why do all the graphs look similar?  
  **Highlights & Summary**  
  • algebraic expressions can be shown as a table of values of a graph | **copy of TIPS4RM BLM 5.4.1 “Getting to the Heart of Math”** |
Getting to the Heart of Math

1. a) Determine your heart rate for 1 minute at rest:
   ____ beats per minute.

   b) Complete a table of values to display the number of heartbeats, \( H \), for \( t \) minutes.

<table>
<thead>
<tr>
<th>Number of Minutes</th>
<th>Number of Heartbeats</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
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<tr>
<td>2</td>
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<td>7</td>
<td></td>
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<tr>
<td>8</td>
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</tr>
</tbody>
</table>

   c) Graph the relationship. Choose suitable intervals for each axis.

   d) Write an algebraic expression for the relationship:

   e) How many times will your heart beat during:
      i. 30 minutes:
      ii. 45 minutes?
      iii. 1 hour?
      iv. 90 minutes?