MARCH 22, 2016

UNIT 6: LINEAR RELATIONS

4.1: WRITING EQUATIONS TO DESCRIBE PATTERNS

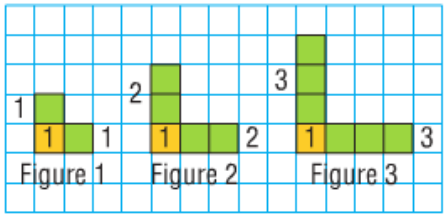
M. MALTBY INGERSOLL
MATH 9

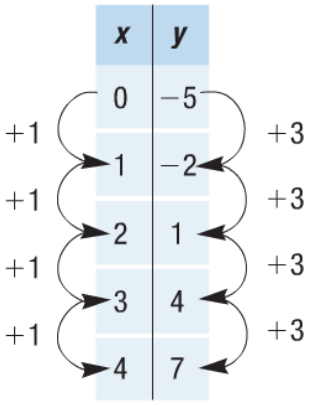
WHAT'S THE POINT OF TODAY'S LESSON?

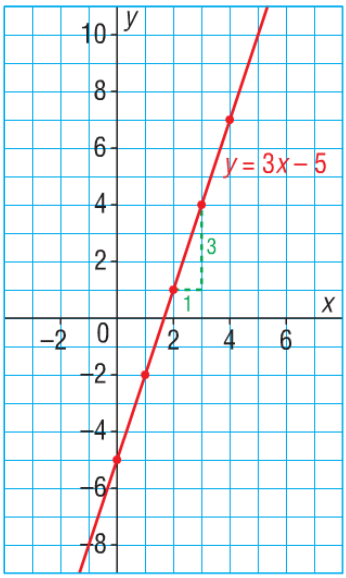
We will begin working on the Math 9 Specific Curriculum Outcome (SCO) "Patterns and Relations 1" OR "PR1" which states:

"Generalize a pattern arising from a problem-solving context using linear equations and verify by substitution."

CHAPTER 4: LINEAR RELATIONS



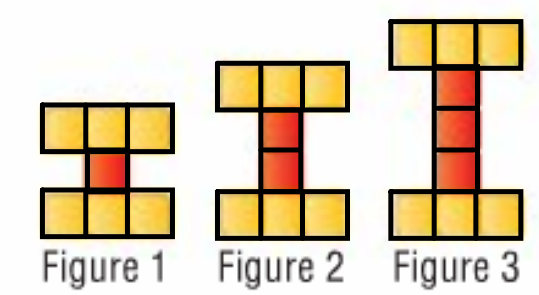




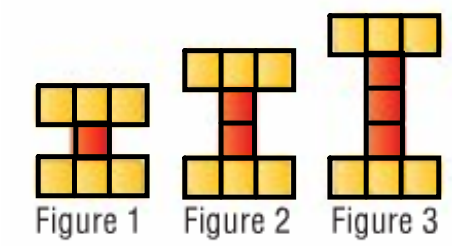
PLEASE TURN TO PAGE 150 IN *MMS9*.

SECTION 4.1: WRITING EQUATIONS TO DESCRIBE PATTERNS

Here is a pattern made from square tiles:



1. **What stays the same in each figure?**
2. **What changes?**



3. **How can we determine the number of square tiles in any figure in the pattern?** $t = f + 6$

4. **How many tiles would there be in figure 15?**

$t = f + 6$

$t = 15 + 6$

$t = 21$

5. **Suppose there are 33 tiles in a figure. What is its figure number?**

$t = f + 6$

$33 = f + 6$

$33 - 6 = f + 6 - 6$

$27 = f$

A banquet hall has small square tables that seat 1 person on each side. The tables can be pushed together to form longer tables.

1. **Sketch the next 2 arrangements in the pattern.**

2. **What stays the same in each arrangement? What changes?**

1.

4 tables

5 tables

2. What stays the same in each arrangement? What changes?

+2 people each time a table is added

2 men at the ends

3. What strategies can you use to determine the number of people at 6 tables? 10? 25?

$p = 2t + 2$

$p = 2(6) + 2$

$p = 12 + 2$

$p = 14$

$p = 2t + 2$

$p = 2(10) + 2$

$p = 20 + 2$

$p = 22$

$p = 2t + 2$

$p = 2(25) + 2$

$p = 50 + 2$

$p = 52$

EQUATION: $p = 2t + 2$

Use this equation to determine:

a) the number of people at 30 tables

b) the number of tables needed to seat 30 people

a) the number of people at 30 tables

$$
\begin{aligned}
p &= 2t + 2 \\
p &= 2(30) + 2 \\
p &= 60 + 2 \\
p &= 62
\end{aligned}
$$

There are 62 people at 30 tables.

b) the number of tables needed to seat 30 people

$$
\begin{aligned}
p &= 2t + 2 \\
30 &= 2t + 2 \\
30 - 2 &= 2t + 2 - 2 \\
\frac{28}{2} &= \frac{2t}{2} \\
14 &= t
\end{aligned}
$$

14 tables are needed to seat 30 people.

A landscape designer uses wooden boards as edging for the plots in an herb garden.

The number of boards ("b") is related to the number of plots ("p"). This relationship can be represented in different ways:

* **using pictures**
* **using a table of values**
* **using an equation**

Let's determine the equation using a table of values:

Number of Plots, p	Number of Boards, b
1	4
2	7
3	10
4	13

Repeated addition of 3 is the same as multiplication by 3. Maybe $b = 3p$ is a good place to start to determine the equation.

EQUATION: $b = 3p + 1$

Number of Plots, p	Number of Boards, b
1	$3(1) + 1 = 4$
2	$3(2) + 1 = 7$
3	$3(3) + 1 = 10$
4	$3(4) + 1 = 13$

Since the left side equals the right side of the equation each time, the equation is correct. Please turn to page 156 in *MMS9* to see how this equation also ties into the pattern in the pictures of the herb garden plots.

CONCEPT REINFORCEMENT:

MMS9:
PAGE 159: #4, #5, #8 & #10
PAGE 160: #13