Concept: Patterns, Formulas, Substitution

Name:

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Algebra > Patterns, Formulas, Substitution

Work through all Sub Lessons of the following Lessons **in order**:

- *Introduction ... Math is Patterns*
- *Expressions, Terms, Variables*
- *Substitution is ... Math Scrabble*
- *All Patterns…Examples*
- *Substitution Examples*

For Extension:

- *Patterns…Magic Billiard Table (Templates available at the end of this Support Sheet)*
- *Patterns…Tower of Hanoi*

As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

SUMMARY

1. Write an example for the following mathematical words:

WORD	EXAMPLE
Algebraic Expression	***4x - 2y + 5***
Term	***x***
Variable	***x***
Coefficient	***3x***
Monomial	***7y***

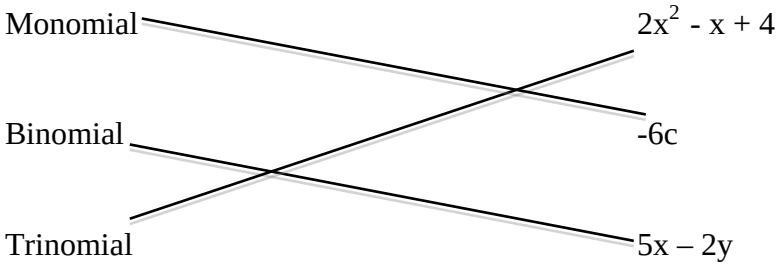
Binomial	***x+ 2***
Trinomial	***x^2 + 3x – 2***

OFF COMPUTER EXERCISES

1. Complete the following chart by identifying the Terms, Variables and Coefficients in each Expression.

Expression	Terms	Variables	Coefficients
4x - 2y + 5	***3***	***x, y***	***4, -2***
$2x^2$ - x + 4	***3***	***x***	***2, -1***
a - 6	***2***	***a***	***1***
4pq - 2p + 5q	***3***	***p,q***	***4,-2, 5***

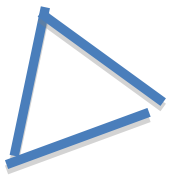
2. Use a ruler to connect the expression to the correct example.



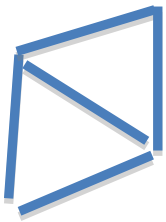
3. ***Totally Triangular***

If you continue the pattern shown to build a row of 50 triangles, how many toothpicks will you need?

For one triangle, you need three toothpicks.



For two triangles, you need five toothpicks.



How many toothpicks do you need for three triangles? Four? Five? Complete the chart to help you organize your thinking.

# of Triangles	# of Toothpicks	Picture	Explanation
1	**3**		**Start with 3**
2	**5**		**Add 2**
3	**7**		**Add 2**
4	**9**		**Add 2**
5	**11**		**Add 2**
6	**13**		**Add 2**
7	**15**		**Add 2**

Is it necessary for you to continue the chart for 50 triangles? Did you notice a pattern? What can you do to be more efficient?

It is not necessary for you to continue the chart for 50 triangles. There is a pattern. You start with 3 toothpicks and add 2 each time to build an additional triangle. To be more efficient, you can employ this rule:

(Number of triangles × 2) + 1 = number of toothpicks required.
or
(n × 2) + 1= number of triangles required.

For 50 triangles…(50 × 2) + 1= 101 toothpicks

4. In hockey standings, two points are given for a win and one point in given for a tie.

(a) The Slammer hockey team has 3 wins and 4 ties. How many points does the team have in total?

$$2(w) + 1(t) = 2(3) + 1(4) = 6 + 4 = 10 \text{ points}$$

(b) If the Sticks hockey team has 5 wins and 0 ties, how many points does the team have in total?

$$2(w) + 1(t) = 2(5) + 1(0) = 10 + 0 = 10 \text{ point}$$

(c) If *w* represents the number of wins and *t* represents the number of ties, then the total of the points scored (which we represent with a T) is given by

$$T = 2(w) + 1(t) \text{ or } T = 2w + t$$

5. Given that **x = 2, y = -3 and z = -1**, evaluate the following.

(a) $3x^2 - 2x + 1 =$ ***3(2^2) – 2(2) +1 = 12 -4 + 1 = 9***

(b) $2x + 5y =$ ***2(2) + 5(-3) = 4 – 15 = -11***

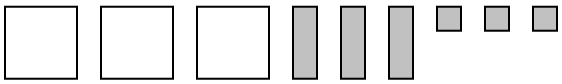
(c) $-4x - 7y =$ ***-4(2) – 7(-3) = -8 + 21 = 13***

(d) $2x^2 - 2xy + y =$ ***2(2^2) - 2(2)(-3) + -3 = 8 + 12 - 3 = 17***

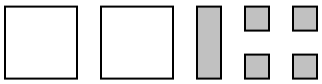
(e) $4x^2y^2 =$ ***4(2^2)(-3^2) = 4 (4) (9) = 144***

(f) $2x^2 - xy - z + z^2 =$ ***2(^{2} 2) – 2(-3) – (-1) + (-1^2) = 8 +6 +1 +1 = 16***

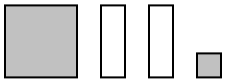
6. If the following set of algebra tiles represents the trinomial $-3x^2 + 3x + 3$



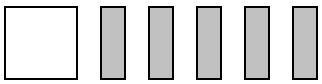
then complete each of the following.



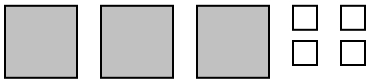
represents ***-2x2 + x + 4***



represents ***x ^{2}-2x + 1***



represents ***-x^2 + 5x***

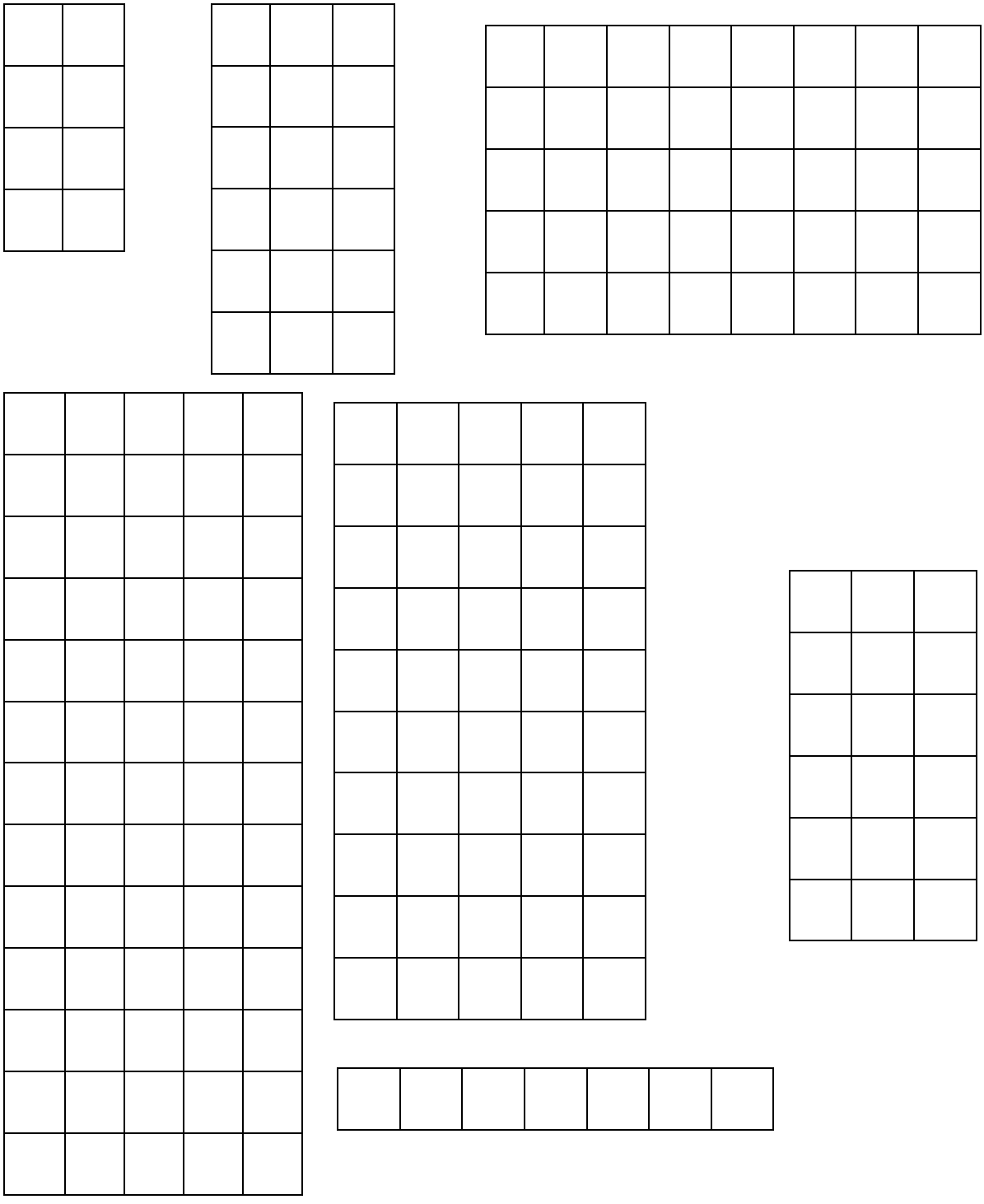


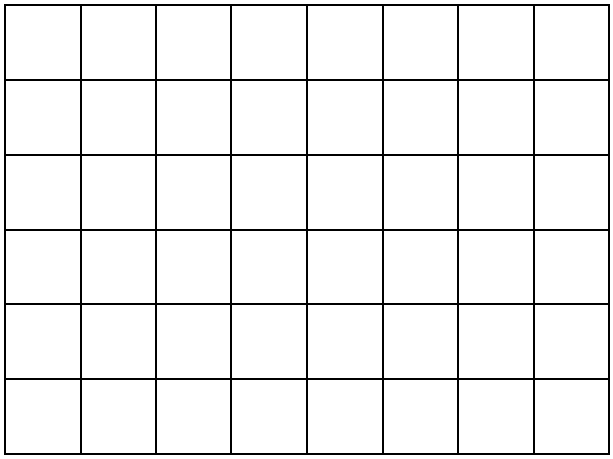
represents ***3x^2 – 4x***

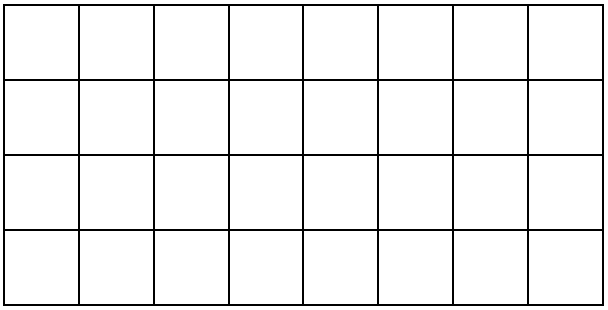
Magic Billiard Table- Investigation 1: This investigation simulates the action of a billiard ball on a magic table…

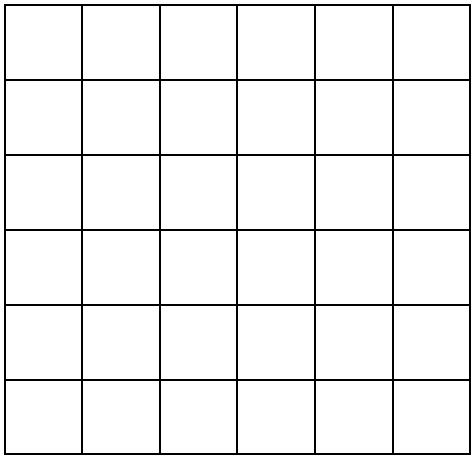
Rules:

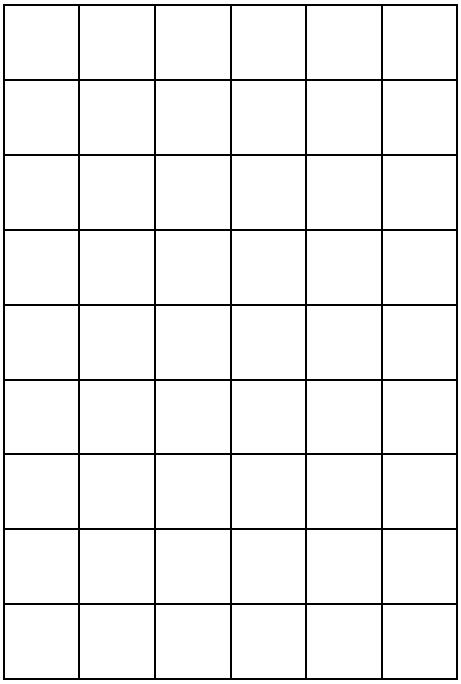
- The ball always starts from the lower left hand corner.
- There is no friction on the table; therefore the ball will continue to roll until it comes to a corner.
- The ball always rolls across the table at an angle of 45°.
- There are no pockets on a billiard table.

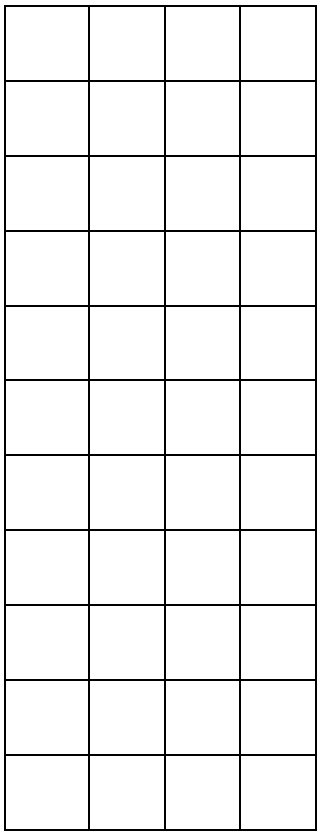


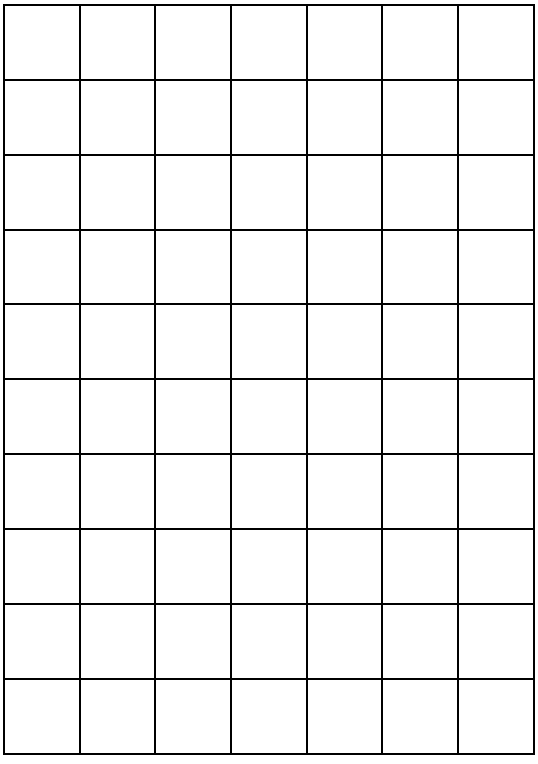


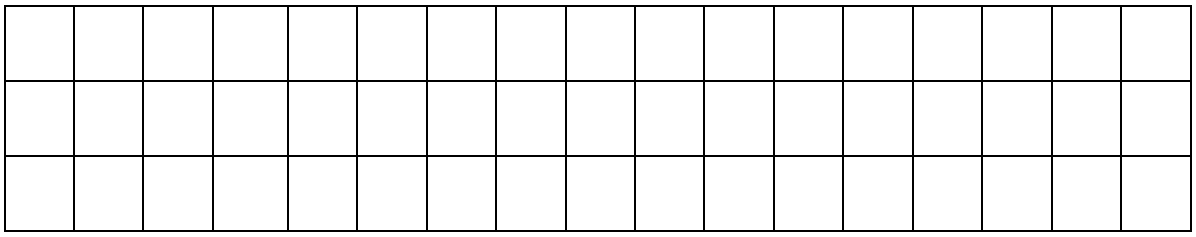












Magic Billiard Table-Investigation 2- '*One* variable and *One* constant'