**12 DAYS OF CHRISTMAS BOLLENBACHER**

**Intro: Sing together the first three verses of “12 Days of Christmas”.**

 **(*Partridge in a pear tree; two turtle doves; three French hens…..)***

**During the 12 days of Christmas, how many total gifts did my true love give to me?**

**1 + 3 + 6 + 10 + 15 + 21 + 28 + 36 + 45 + 55 + 66 + 78 = 364**

**OR**

 1x12 + 2x11 + 3x10 + 4x9 + 5x8 + 6x7 + 7x6 + 8x5 + … AHA!!

 12 + 22 + 30 + 36 + 40 + 42 +…… = 364

**WHICH METHOD IS CORRECT? WHICH METHOD IS BETTER?**

**Possible activity:**

**GRAPH** as a set of order pairs:

 1,12; 2,22; 3,30; 4,36; 5,40; 6,42; 7,42; 8,40; 9,36; 10,30; 11,22; 12,12;

 Y = -1X2 + 13X

**INSERT: Basic and SPECIAL Patterns**

 **After discussing and sharing ideas about Triangular Numbers, come back to this page:**

 **Triangular number: T = n(n+ 1)/2**

**COMPARE TO HANDSHAKES:**

 **IN A GROUP OF 12 PEOPLE, IF EACH PERSON SHAKES HANDS WITH EVERY OTHER PERSON, HOW MANY TOTAL HANDSHAKES WILL THERE BE? H = n(n-1)/2**

**Share Pascal’s Triangle**

 **Triangular Numbers**

 **Fibonacci Numbers**

**MATHEMATICAL PRACTICES**

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

**OHIO’S LEARNING STANDARDS**

 ***Grade 6***

***Critical Area 3: Writing, interpreting, and using expressions and equations***

**EXPRESSIONS AND EQUATIONS 6.EE**

 **Apply and extend previous understandings of arithmetic to algebraic expressions.**

 **6.EE.2** Write, read, and evaluate expressions in which letters stand for numbers.

 **a.** Write expressions that record operations with numbers and with letters standing for numbers.

 **b.** Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.

 **6.EE.3** Apply the properties of operations to generate equivalent expressions*.*

 **6.EE.4** Identify when two expressions are equivalent, i.e., when the two expressions name the same number regardless of which value is substituted into them. Reason about and solve one-variable equations and inequalities.

 **6.EE.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

***Grade 7***

***Critical Area 2: Developing understanding of operations with rational numbers and working with expressions and linear equations***

**EXPRESSIONS AND EQUATIONS**

• Use properties of operations to generate equivalent expressions.

• Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

**7.EE.2** In a problem context, understand that rewriting an expression in an equivalent form can reveal and explain properties of the quantities represented by the expression and can reveal how those quantities are related.

**7.EE.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

***Grade 8***

***Critical Area 1: Formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations***

**NCTM Principles and Standards—2000**

 **Algebra Standard—grades 6-8**

 **All students should**

* **represent, analyze, and generalize a variety of patterns with tables, graphs, words, and when possible, symbolic rules**
* **relate and compare different forms of representation for a relationship**
* **recognize and generate equivalent forms of simple algebraic expressions**