INTEGRATED ALGEBRA 1 SUPPLEMENTARY HANDOUT FOR LESSON 2.3A

(Translating Words into Algebra)

DISCUSSION:

- Among the statements I hear most often as a math teacher are:

  "I hate word problems!" and

  "Why do I have to learn how to solve word problems?"

  (Both are right up there with "I hate fractions!")

- What you need to realize is that calculators and computers can be used to do most math. However, one thing **calculators and computers cannot do is translate a problem situation into a form that can be solved mathematically**.
- Additionally, many of the skills you use in solving word problems can be adapted to solve real-life problems for home and work.
- Since problem solving is difficult and frustrating for most people, we will spread it out over the remainder of the course, taking only "bite-sized" pieces while doing lots of practice and review.
- In this lesson we will learn about some ***KEYWORDS*** that make it easier to translate verbal expressions into algebraic expressions.

EXAMPLES OF USING ADDITION KEYWORDS IN ALGEBRA:

- 4 **more than** a number ---------- **N + 4** or **4 + N**
- x **increased by** 11 ---------- **x + 11** or **11 + x**
- the **sum** of k and 9 ---------- **k + 9** or **9 + k**
- the **total** of 5 and D ---------- **5 + D** or **D + 5**
- p **plus** 3 ---------- **p + 3** or **3 + p**
- p **plus** 3 **in all** ---------- **p + 3** or **3 + p**
- 8 **added to** a number y ---------- **y + 8** or **8 + y**

NOTE: Because **addition is commutative**, the **order** of the terms in the expression **DOES NOT matter**. For example: 2 + 5 = 5 + 2 (because 7 = 7)

EXAMPLES OF USING SUBTRACTION KEYWORDS IN ALGEBRA:

- 4 **less than** a number ---------- **N – 4**
- x **decreased by** 11 ---------- **x – 11**
- the **difference between** k and 9 ---------- **k – 9**
- the **difference of** a number and 7 ---------- **N – 7**
- the **difference of** 7 and a number ---------- **7 – N**
- p **minus** 3 ---------- **p – 3**
- 8 **subtracted from** a number y ---------- **y – 8**

NOTE: Because **subtraction IS NOT commutative**, the **order** of the terms in the expression **DOES matter**. For example: 2 – 5 ≠ 5 – 2 (because –3 ≠ 3)

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EXAMPLES OF USING MULTIPLICATION KEYWORDS IN ALGEBRA:

- 4 **times** a number ---------- **4 • N; N • 4;** or **4N**
- x **multiplied by** 11 ---------- **x * 11; 11 * x;** or **11x**
- p **tripled** ---------- **p(3); (3)(p);** or **3p**
- the **product of** 8 and m ---------- **8 × m; m × 8;** or **8m**
- **double** D ---------- **2 • D; D • 2;** or **2D**
- p **tripled** ---------- **p(3); (3)(p);** or **3p**
- two-thirds **of** z ---------- **$(\frac{2}{3})$z; $(\frac{2}{3})$(z);** or **$\frac{2}{3}$z**

NOTES: 1. Because **multiplication is commutative**, the **order** of the terms in the expression **DOES NOT matter**. For example: 2 • 5 = 5 • 2 (because 10 = 10)

2. You have probably noticed by now that there are many different ways to indicate multiplication. For example, **"five times q"** can be written in any of the ways shown below. *(It is important that you learn to recognize these forms since we see each of them at sometime in our travels.)*

5 × q 5 * q 5 • q 5(q) (5)q (5)(q) 5q

EXAMPLES OF USING DIVISION KEYWORDS IN ALGEBRA:

- 4 **divided into** a number ---------- **N ÷ 4**
- a number **divided into** 4 ---------- $^{4}/_{N}$
- x **divided by** 11 ---------- **x ÷ 11**
- 96 **split into** q **equal parts** ---------- **96 ÷ q**
- the **quotient of** k and 9 ---------- **k ÷ 9**
- the **quotient of** 9 and k ---------- **9 ÷ k**

NOTE: Because **division IS NOT commutative,** the **order** of the terms in the expression **DOES matter**. For example: 10 ÷ 5 ≠ 5 ÷ 10 (because 2 ≠ $^{1}/_{2}$)

EXAMPLES OF USING A COMBINATION OF KEYWORDS IN ALGEBRA:

- 4 **more than** 7 **times** a number ---------- **4 + 7N** or **7N + 4**
- 4 **less than** 7 **times** a number ---------- **7N – 4**
- the **product of** k and 9, **decreased by** 25 ---------- **9k – 25**
- the **sum of** 2 and L, **divided by** 6 ---------- **2 + L ÷ 6** or **L ÷ 6 + 2**
- x **divided by** 11, **increased by** 8 ---------- **x ÷ 11 + 8** or **8 + x ÷ 11**
- the **difference of** 12 and the **product of** b and 3 ---------- **12 – 3b**

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PRACTICE PROBLEMS

Translate each phrase below into an algebraic expression.

1. 6 less than t
2. g times 85
3. z increased by 17
4. the quotient of k and 4
5. the quotient of 4 and k
6. the product of 4 and k
7. the sum of 4 and k
8. the difference of 4 and k
9. the difference of k and 4
10. 11 more than a number
11. twice L
12. 18 divided into m
13. 18 divided by m
14. 6 plus d
15. y minus 31
16. three-eighths of b
17. r quadrupled
18. x decreased by y
19. 12 added to j
20. 80 split into p equal parts
21. the product of ten and t, reduced by w
22. the sum of a and b, divided into 56
23. the difference of 7 and c, divided by 3
24. increase 34 by the product of five and u
25. four times h split into 7 equal parts
26. 11 less than quotient of f and 8
27. twice t increased by the total of 59 and z
28. $\frac{5}{8}$ of n decreased by 43
29. the quantity p minus 15, times a
30. eighteen r more than 258

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ANSWER KEY

1. $t - 6$
2. $g \bullet 85$ or $85g$
3. $z + 17$
4. $k \div 4$ or $^{k}/_{4}$
5. $4 \div {}^{4}/_{k}$
6. $4 \times k$, or $4 \bullet k$, or $(4)k$, or, $4(k)$, or $(4)(k)$, or $4k$
7. $4 + k$ or $k + 4$
8. $4 - k$
9. $k - 4$
10. $11 + n$ or $n + 11$ *(You can use any letter.)*
11. $2L$
12. $m \div 18$ or $^{m}/_{18}$
13. $18 \div m$ or $^{18}/_{m}$
14. $6 + d$
15. $y - 31$
16. $^{3}/_{8}b$ or $(^{3}/_{8})b$
17. $4r$ quadrupled
18. $x - y$
19. $12 + j$ or $j + 12$
20. $80 \div p$ or $^{80}/_{p}$
21. $10t - w$
22. $56 \div (a + b)$ or $^{56}/_{(a+b)}$
23. $(7 - c) \div 3$ or $^{(7-c)}/_{3}$
24. $34 + 5u$
25. $4h \div 7$ or $^{(4h)}/_{7}$
26. $f \div 8 - 11$ or $(f \div 8) - 11$ or $^{f}/_{8} - 11$
27. $2t + (59 + z)$
28. $(\frac{5}{8})n - 43$ or $^{5}/_{8}n - 43$
29. $(p - 15) \times a$ or $(p - 15)a$
30. $18r + 258$ or $258 + 18r$