Packet 2: Expressions and Balance

Dear Parents/Guardians,

In Expressions and Equations: Packet 2, students explore important algebraic ideas involving variables, expressions and equations in nontraditional ways. In Lesson 1, students apply the distributive property to write and simplify expressions using the cups and counters manipulative before using traditional algebraic procedures. In Lesson 2, students explore the idea of balance to solve equations using cups and counters. In Lesson 3, students use a puzzle context to build and solve equations.

The Distributive Property

The <u>distributive property</u> states that a(b + c) = ab + ac and (a + b)c = ac + bc for any numbers a, b, and c.

Simplify using Order of Operations	Simplify using Distributive Property				
$\frac{1}{2}(4+6)$	$\frac{1}{2}(4+6)$				
$=\frac{1}{2}(10)$	$=\frac{1}{2}(4)+\frac{1}{2}(6)$				
= 5	= 4+6=5				
-3(2x+1) We cannot simplify using order of operations since we do not know the value of x.	= -3(2x+1) = -3(2x)-3(1) = -6x-3				
Students use the distributive property to simplify algebraic expressions.					

2(-3x+1)+8x-5 = -6x+2+8x-5 = -6x+8x+2-5 = 2x-3

Cups and Counters

Students solve for the unknown (the "cup," sketched as a \mathbf{V} , as in the word "variable") in equations while recording their steps using algebraic notation and in words. The goal is to figure out what each cup holds (all cups must hold the same amount for a particular problem). Below is an example.

Visual Repi	resentation	Symbolic Notation		
2x + 4	-2 -2	→ 2x + 4 = -2		
V V + + + +		2x + 4 = -2		
		<u>-4</u> <u>-4</u> Add -4 (or subtract 4)		
VV		2x = -6		
V		$\frac{2x}{2} = \frac{-6}{2}$ Take half (or divide by 2)		
V		x = -3		

Exploring Patterns in a Hundred Chart

Students explore different portions of a hundred chart. They write algebraic expressions to represent different positions on a hundred chart and use them to solve for missing values.

1	2	3	4	5	6	7	8	9	10	
11	12	13	1	15	16	17	18	19	20	
21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35	36	37	38	39	40	
41	42	43	44	45	46	47	48	49	50	
51	52	53	54	55	56	57	58	59	60	
61	62	63	64	65	66	67	68	69	70	
71	72	73	74	75	76	77	78	79	80	
81	82	83	84	85	86	87	88	89	90	
91	92	93	94	95	96	97	98	99	100	

Specified Numbers		Algebraic Expressions (representing any values in this configuration on the chart)			
2	3	n	n + 1		
12	13	n + 10	(n + 1) + 10 = n + 11		



EXPRESSIONS AND EQUATIONS PACKET 2

By the end of the packet, your student should know...

- How to write, evaluate and simplify expressions Lessons 2.1 and 2.2
- How to describe geometric patterns in different ways using algebraic notation Lesson 2.1
- How to write and solve equations Lessons 2.2 and 2.3

Additional Resources

- For definitions and additional notes, please refer to section 1.5.
- Distributive Property:
 <u>http://youtu.be/v-6MShC82ow</u>
- Simplify algebraic expressions using the distributive property: <u>http://youtu.be/gl_-E6iVAg4</u> <u>http://youtu.be/3NHSwiv_pSE</u>