Students use the four operations to identify and explain patterns in arithmetic

Standard 3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that four times a number is always even, and explain why four times a number can be decomposed into two equal addends.

Key Elements: Use tables to find the patterns in multiplication and division. Understanding these patterns and properties will be helpful when students begin multiplying multi-digit numbers in the upper grades.

Addition Patterns: Give students a copy of the addition chart (attached) and review patterns in addition. Students can use these strategies at any time, especially when using mental math. Make an anchor chart of the patterns students notice in the table and identify the property that belongs with each pattern. Review the patterns in addition using the attached powerpoint.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	10	11	12	13	14	15	16	17	18	19	20

Multiplication Patterns: It would be good to start with identifying patterns with smaller numbers, like starting with 2. They can identify the even and odd numbers. Then when the patterns get more complex, their background knowledge will build on the simpler patterns. For example, counting by 4s, is like counting by 2s in that all of the numbers are even. When counting by 3s, every other number is odd, and the others are even. Identifying the simpler patterns can eventually help them discover and identify more complex patterns.

Give students a copy of the hundred chart and review the patterns in multiplication. Students can get in a rut when they view learning multiplication as memorizing their 2's, 3's, and 5's. Instead of teaching multiplication by number, consider using multiplication strategies to supplement teaching.
Mastering multiplication within 100 is much easier to tackle when students have a visual of the facts they have already mastered.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Some strategies include:
- Doubles
- Doubles plus or minus one group
- Squares