Mathematics Lesson: Building on Addition

Grade 3 Quarter 1 Understanding Equal Groups: Lesson 4

State Standard(s)

Student Outcome(s)

Students will be able to identify patterns in the addition chart and expand thinking to see the relationship between repeated addition and multiplication.

Standards for Mathematical Practice

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

Standard 8: Look for and express regularity in repeated reasoning

Math Language

Patterns, Repeated Addition

Materials

- Teacher Only- *"Analysis Questions"*
- Blackline Master- *"Addition Chart"*, *"Analyze a 99 Chart"*
- Chart Paper
- Sticky Notes

4C Integration

Communication: Class Debate & Student Conversations *(Discuss)*

Creativity: Writing of True/False Questions *(Additional Activities)*

Homework

Blackline Master- *"Patterns in Addition and Multiplication Journal Prompt"*

Mathematics Lesson
Building on Addition

Launch: Analyze Addition Patterns

- Have students turn and talk to a partner and answer the following question, *"What is a pattern?"* Allow students to share and discuss their responses using Math Discourse.
- Tell students we are going to start at 0 and add 2 each time. As we do this, we will write down the sums to 20. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20.
- Ask students what patterns they see in these sums. Help students see that it increases by 2 and that each sum is even. Ask students to conjecture about why each sum in even.

Explore: Analyze Addition Patterns

- Explain to students that we are now going to look for patterns in an addition chart. Display/distribute Blackline Master, *"Addition Chart"* and allow students about 5-7 minutes to work with a partner and record patterns they see in the addition table. They can write their observations below the chart in the space labeled "observations"
- Let students share their observations about patterns in the addition chart.
  ***Teachers note**: students should focus on looking for repeated addition patterns of the following factors: 2's, 5's, and 10's.

Questions Stems

- *What do you notice happening in the ones place?*
- *What do you notice happening in the tens place?*
- *What do you notice about the sums?*
- *What patterns in addition are related to multiplication?*

Lesson Continued on Next Page

Source: Teacher Created

Mathematics Lesson
Building on Addition- Continued

Example Responses to the question stems

What do you notice happening in the ones place?
2's- the numbers in the 1's place are all even, all divisible by 2, the pattern 2,4,6,8, etc continues.
5's- the numbers in the 1's place follow an odd, even, odd, even pattern, the pattern 5,0,5,0, etc continues.
10's- the numbers in the 1's place all end in 0.

What do you notice happening in the tens place?
2's,5's, and 10's- the numbers in the 10's place increases by groups of 10.

What do you notice about the sums?
2's- all multiples of 2, all even
5's- all multiples of 5, follow an even, odd pattern.
10's- all multiples of 10, all even

What patterns in addition are related to multiplication?

2's- *All of the shaded numbers are multiples of two. I can figure that out because if I start at 2 and count over 2, I land on 4. That's like 2+ 2. If I go over three more, that's 6 or 2 + 2+ 2. I can keep adding two, or I can write multiplication problems instead like 2 x 2 or 2x 3.*

5's- All of the shaded numbers are multiples of five. I can figure that out because if I start at 5 and count over 5, I land on 10. That's like 5+ 5. If I go over three more, that's 15 or 5 + 5+ 5. I can keep adding five, or I can write multiplication problems instead like 5 x 2 or 5 x 3.

10's- All of the shaded numbers are multiples of ten. I can figure that out because if I start at 10 and count over 10, I land on 20. That's like 10+ 10. If I go over three more, that's 30 or 10 + 10 + 10. I can keep adding 10, or I can write multiplication problems instead like 10 x 2 or 10 x 3.

Lesson Continued on the Next Page…

Source: Teacher Created

Mathematics Lesson
Building on Addition- Continued

Discuss

- Explain to students that we are now going to analyze the addition chart. Display Teacher Only, *"Analysis Chart"*. ***(First question only)***, *"The sum of 2 even numbers is always even."* Allow student partners time to determine if it is true or not. When it is time, have students give a thumbs up if they think it is true and thumbs down if they think it is false.
- Allow student's time to debate this question and have them give examples or proof for their thoughts.
- Repeat with question #2, *"The sum of two odd numbers is always odd."* Debate this question with examples and non-examples.
- Repeat with question #3, *"The sum of an odd and an even number is always even."* Debate this question with examples and non-examples.

Additional Activities

- Have students work with a partner to write 1-2 true/false questions about the addition chart- similar to the ones just discussed.
- Students will then partner up and share their questions. They should prove each statement with examples and non-examples. Have students rewrite any false statements to be true.
- Explain to students that we are now going to think about repeated addition. Have students start at zero and add 5 each time to 45. Record answers by including the +5 above it (see below). Write them on the board.

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  +5  +5  +5  +5  +5  +5  +5  +5  +5  +5
0   5   10  15  20  25  30  35  40  45
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- Ask students to discuss what patterns they see in these sums. Discuss as a class- be sure students notice that it increases by the same amount each time (5 in this case). Student partners should then think of scenario where one would use repeated addition with 5s (ex. time). Share responses.
- Repeat with +3 and discuss these patterns as well up to a sum of 27.
- Again, have students add context to this repeated addition by brainstorming situations where someone would need to repeatedly add 3. Share responses.
- Have students work with a partner and MathBoards. Ask them to choose the amount they want to increase by each time. Students can then share their repeated addition with the class. Make sure that students know this is called repeated addition.
- Explain to students that repeated addition is the basis for multiplication (Equal Groups) which they have
- been practicing and that they will talk about more in our next math class. Using sticky notes, have students brainstorm questions they have about multiplication and post them on a piece of chart paper title, "Questions We Have About Multiplication"

7. Assign Blackline Master, *"Patterns in Addition and Multiplication Journal Prompt"* for homework.

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	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

Observations:

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Analysis Questions

1. True or False: The sum of 2 even numbers is always even.

2. True or False: The sum of 2 odd numbers is always odd.

3. True or False: The sum of an odd and an even number is always even.

My Questions:

1. True or False:

2. True or False:

Answer Key

Analyze Addition Patterns

2's: Sums increase by 2 and each sum is even. The multiples are even because they can all be decomposed into two equal groups. All of the shaded numbers are multiples of two. I can figure that out because if I start at 2 and count over two, I land on 4. That's like 2 + 2. If I go over three more, that's 6 or 2 + 2 + 2. I can keep adding two, or I can write multiplication problems instead like 2 x 2 or 2 x 3.

5's: Sums increase by 5 and sums follow an odd, even, odd, even pattern. All of the shaded numbers are multiples of five. I can figure that out because if I start at 5 and count over two, I land on 10. That's like 5 + 5. If I go over three more, that's 15 or 5 + 5 + 5. I can keep adding five, or I can write multiplication problems instead like 5 x 2 or 5 x 3.

10's: Sums increase by 10 and each sum is even. The multiples are even because they can all be decomposed into two equal groups. All of the shaded numbers are multiples of ten. I can figure that out because if I start at 10 and count over two, I land on 20. That's like 10 + 10. If I go over three more, that's 30 or 10 + 10 + 10. I can keep adding two, or I can write multiplication problems instead like 10 x 2 or 10 x 3.

Answer Key

Analysis Questions

1. **True** or False: The sum of 2 even numbers is always even.

2. True or **False**: The sum of 2 odd numbers is always odd.

3. True or **False**: The sum of an odd and an even number is always even

Name _____ Date _____

Analyze a 99 Chart

Directions: Analyze the 99 chart and record your observations in the box below. With a partner, discuss the guiding questions.

99 Chart

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	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

Observations:

*

*

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Name:_____
Date: _____

Patterns with Addition and Multiplication
Journal Prompt

What is repeated addition?

Start at 0 and add 10 each time until you get to 100. Write the sums below in the box and describe what patterns you see.

Describe one of the patterns you saw today in the addition chart.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	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