Subtracting Integers by Generalizing Patterns

The idea of subtraction can show up in different ways in real-world situations. We can think about subtraction using the "take away" model. If I have $47 and spend $19, then it is like taking away $19 from my $47. On the other hand, the problem situation could be that I have $47 and you have $19. How much more money do I have than you? We are making an additive comparison between these two quantities and to answer this question, one could subtract. In this activity, we will look at subtraction from a comparison point of view.

Part 1 – Using a Number Line

1. Place the number 5 and the number 3 on the number line.

2. We can think of the arithmetic situation 5 – 3 as an additive comparison between 5 and 3. That is, how far from 3 is 5 on the number line? Would you classify this distance as positive or negative?

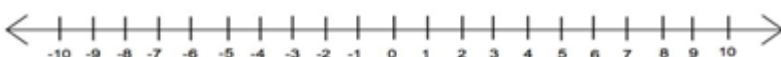**3.** Place the number –5 and the number –3 on the number line.

4. Let's compare –5 and –3 by thinking of the arithmetic situation –5 – (–3). That is, how far from –3 is –5 on the number line? Would you classify this distance as positive or negative?

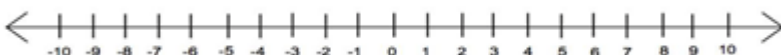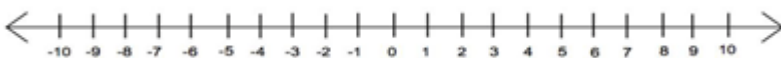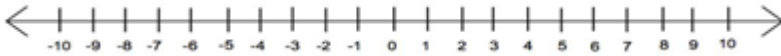**5.** Place the number 5 and the number –3 on the number line.

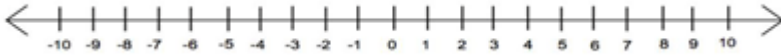**6.** Let's compare 5 and –3 by thinking of the arithmetic situation 5 – (–3). That is, how far from –3 is 5 on the number line? Would you classify this distance as positive or negative?

7. Continue to explore by comparing other numbers of your choosing. Consider comparing, for example, 5 – 3 and 3 – 5. Record any observations you can make based on your explorations.

Part 2 – Exploring Number Patterns

1. Complete the table by subtracting. Enter the answer in the right column.

$5 - 3 =$	
$5 - 2 =$	
$5 - 1 =$	
$5 - 0 =$	

2. Describe the pattern in the left column of the table.

3. Describe the pattern in the right column of the table.

4. Extend the pattern by completing the table.

$5 - 3 =$	
$5 - 2 =$	
$5 - 1 =$	
$5 - 0 =$	
$5 - (-1) =$	
$5 - (-2) =$	
$5 - (-3) =$	

5. Complete the table by subtracting. Enter the answer in the right column.

8 – 6 =	
8 – 4 =	
8 – 2 =	
8 – 0 =	

6. Describe the pattern in the left column of the table.

7. Describe the pattern in the right column of the table.

8. Extend the pattern by completing the table.

8 – 6 =	
8 – 4 =	
8 – 2 =	
8 – 0 =	
8 – (–2) =	
8 – (–4) =	
8 – (–6) =	

9. In general, what happens when you subtract a negative number?

Find each of the following. Be prepare to explain how you know your result is correct.

10. $5 - (-5) =$

11. $8 - (-10) =$

12. $2 - (-7) =$

13. $9 - (-6) =$