

Task: Aisha's Rule

1st Grade

Aisha made a rule. She would not tell Booker what her rule was but she told him, "You can guess my rule. You give me a number and I will use my rule."

Booker's Number	Aisha's Number
3	7
4	8
6	10
10	14
8	12

a. What if Booker's number is 9? What would Aisha's number be?

b. What do you think Aisha's rule is?

Explain your answer in words.

Teacher Comments:

- This activity is designed to allow students the opportunity to use structure to find patterns.
- Students' understanding of addition enhances when they have opportunities to think about and model it in various ways.
- Although it is easy to show students how we picture a situation, we learn a great deal about how they understand the quantities and operations involved in the situation when they create their own representations of problems (Quintera, 1986).

Common Core State Standards for Mathematical Content

1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations $8 + ? = 11$, $5 = _ - 3$, $6 + 6 = _$.*

1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Common Core State Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct a viable argument and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Essential Understandings/NCTM Resources	
<ul style="list-style-type: none"> • Subtraction has an inverse relationship with addition. • Many different problem situations can be represented by part-part-whole relationships and addition or subtraction. • Part-part-whole relationships can be expressed by using number sentences like $a + b = c$ or $c - b = a$, where a and b are the parts and c is the whole. • The commutative and associative properties for addition of whole numbers allow computations to be performed flexibly. 	
Explore Phase	
Possible Solution Paths	Assessing and Advancing Questions
<p>If Booker's number was 9 then Aisha's number would be 13, because Aisha adds 4 to every number Booker gives her.</p>	<p>Assessing Questions:</p> <ul style="list-style-type: none"> • Tell me about your thinking. • How do you know Aisha is adding 4 to every number? <p>Advancing Questions:</p> <ul style="list-style-type: none"> • Can you use these numbers in a different way to see if you get the same answer? • Can you show your thinking using a number line, or a part, part, whole diagram? • What if Booker gives her the number 20? • What if Aisha changes her rule to minus 2 each time, how would that change the answers she gave Booker?
<p>I see if you subtract Booker's number from Aisha's number you always get 4, so I was thinking what number minus 4 will get me 9 and I found 13.</p>	<p>Assessing Questions:</p> <ul style="list-style-type: none"> • Tell me about your thinking. • I see your thinking. So what is Aisha's rule? <p>Advancing Questions:</p> <ul style="list-style-type: none"> • Can you use these numbers in a different way to see if you get the same answer? • Can you show your thinking using a number line, or a part, part, whole diagram? • What if Booker gives her the number 20? • What if Aisha changes her rule to minus 2 each time, how would that change the answers she gave Booker?
Possible Student Misconceptions	
<p>$3 + ? = 7$ $4 + ? = 8$ $6 + ? = 10$ $10 + ? = 14$</p>	<p>Assessing Questions:</p> <ul style="list-style-type: none"> • Tell me more about your thinking. • I see your pattern. So what is Aisha's rule? <p>Advancing Questions:</p>

<p> $8 + ? = 12$ $9 + ? = 13$ I see a pattern in her answers. When he gave her 3, she said 7, then he said 4 which is one more and she said 8 which is one more, so when he said 8, she said 12, so I know that if he says 9 which is one more, she'll say 13 which is one more. </p>	<ul style="list-style-type: none"> • How will you decide what Aisha will say when Booker gives her a number like 15?
<p>Entry/Extensions</p>	<p>Assessing and Advancing Questions</p>
<p>If students can't get started...</p>	<p>Assessing Questions:</p> <ul style="list-style-type: none"> • What do the numbers in the problem represent? • What is the problem asking you to find? • Who can give me an idea of how to start our thinking? <p>Advancing Questions:</p> <ul style="list-style-type: none"> • Can you draw a model to represent your thinking?
<p>If students finish early...</p>	<p>Extension:</p> <ul style="list-style-type: none"> • Tell me what you found. • What problems did you have during your work? • What if Booker gives her the number 20? • What if Aisha changes her rule to minus 2 each time, how would that change the answers she gave Booker?
<p>Discuss/Analyze</p>	
<p>Whole Group Questions</p>	
<ul style="list-style-type: none"> • Some of us used addition and some of use used subtraction to solve this task. How can that be? • Tell us about the relationship between addition and subtraction. • Was anyone able to use a part, part, whole relationship to solve this task? Can you tell us about it? • We didn't all use the same thinking to solve this task. Can you tell me why? How did we all get the correct answer using different thinking? • Did anyone decompose the numbers to solve this task? Tell us how you decomposed the numbers and why you chose that way? • How can we check to see if our calculations are correct? 	

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