

<b>Description: James' rule and the order of operations</b> <b>Parent Tape: Early algebra: Investigating linear functions, Series 1 of 7: Guess My Rule introduction and Ariel and James with problems 1-3</b> <b>Location: Frank J. Hubbard Middle School – Plainfield, NJ</b> <b>Researcher: Carolyn Maher</b>	<b>Transcriber(s): DeLeon, Christina</b> <b>Verifier(s): Yedman, Madeline</b> <b>Date Transcribed: Spring 2009</b> <b>Page: 1 of 3</b>
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G4 [pointing to the table that James has created] So what's the rule for this one?

James About the rule?

G4 Hmm, hmm.

James X you plus three and then times ...

G4 Wait, what you do first to the X? You add three and then you multiply by three? Can you show if that works for these values?

James I want to write down. [starts writing on another paper]

G4 Yeah, you can use one of that.

James Zero plus three is three times three is nine.  
[James has written:  $0 + 3 = 3 \times 3 = 9$ ]

James One plus three is four times three is twelve. Two plus three equals five times three is eighteen.  
[James has written:  $1 + 3 = 4 \times 3 = 12$   
 $2 + 3 = 5 \times 3 = 18$ ]

G4 Five times three? What is five times three?

James Fifteen. [corrects the 18 to 15]

G4 Let's see. Is that what they have here? So is this the table given to you? To guess the rule or you started with the rule.

James [mumbling some numbers] Yeah, this is right.

G4 So this is the rule that you invented?

James Yeah.

G4 Oh. So is this something that they asked you yesterday or you just thought of?

James I just thought of.

G4 Oh, very nice.

G4 [pointing to what James had written] Can you think of a way of writing this rule in a more general form? If you want to tell someone without giving specific examples how would you tell what the rule is?

James Plus three times three.  
[James has written:  $+ 3 \times 3$ ]

G4 But if you think about the order of operations, do you need any kind of parentheses here? How would I know what to do first? Would you do addition first or ...

James X plus three  
[James has written:  $X + 3 \times 3 = Y$ .]

G4 X is the number that you start with?

James Yeah.

G4 OK.

James X plus three times three equals Y.

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- G4 So if I see it written this way, then you think I would do first I would add three and then I would multiply the result by three?
- James Yeah.
- G4 Is this, how about this? [writes '5 + 2 × 3'] Five plus two times three. Just like this. How would you work on this? What would you do?
- James Why is it two?
- G4 Huh?
- James Why is it two?
- G4 Oh, this is a different rule, I just gave an example. What would you do for that?  
[James writes: = 21.]
- G4 You say it is twenty-one, how did you go about it?
- James Five plus two is seven, seven times three is twenty-one.
- G4 OK, so you did the operations in this order [pointing her pen from left to right] the order in which they were written? OK.
- G4 But conventionally, do you think this is the way how everybody interprets? Let's ask him (Ariel).  
[James writes something and mumbles.]
- G4 So is that another way you could do? So [inaudible]. Let's check with him, if he interprets the way.
- G4 How about you? [pointing to Ariel] If I gave you this to preform, how would you go about it? To find the answer for this expression?
- Ariel Twenty-one. Five plus two is seven times three is twenty-one.
- G4 OK.
- G4 [looking at T1] So he [Ariel] interpreted the same way as he [James] did.
- T1 Two times three is six and that is five, so I would say the answer is eleven.
- Ariel Oh, I know what you do. You put this in parentheses [puts parentheses (5 + 2) × 3.]
- T1 Why you put parentheses?
- Ariel That shows that you should do that first [pointing with his pen to the parentheses] before you do anything else. That's what our teacher did.
- T1 So you need that to avoid confusion here? You think we should put the parentheses here?  
[Ariel nods.]
- T1 [to James] Do you agree with him?  
[James nods.]
- G4 Ok, so then going back to your rule here [pointing to the paper] would you leave it this way or what would you do, would you do anything else to it? Would you leave this rule the same way?
- James [pointing to the paper] This rule?
- G4 No, this. This is your rule, right? This is yours.

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James            He said [inaudible]  
G4                OK, just because people will not form the equation [inaudible]