Description: Finding a rule to give the amount for any number and an inverse rule to find the number **Parent Tape: Early algebra, investigating linear functions, Series 6 of 7** **Date: 2005-12-15** **Location: Hubbard School** **Researcher: Professor Carolyn Maher**	**Transcriber(s): Baldev, Prashant** **Verifier(s): DeLeon, Christina** **Date Transcribed: Spring 2008** **Page: 1 of 4**

R3 Do you remember the ladder problem?
Ariel The who?
R3 The ladder problem.
R3 [pointing to the table where they had worked on the ladder problem] The ladder problem we were doing just now.
Ariel Yeah.
R3 I asked you to if I gave you like a number of steps for you to tell me a rule, how you would go about finding the total number of rods you will need to build a ladder for that many steps?
R3 [giving Ariel a sheet of paper] Can you also give me a rule for this one? Like if I go in and buy items and come out, is there any way, what will be the rule? How would you describe that rule that would allow me to sort of like compute the amount of money I spend by going into the museum and buying a number of items?
Ariel Umm?
R3 You understand what I am trying to say?
Ariel Yeah.
R3 So how would it work for a problem like this? [pointing to the paper]
Ariel You could do like for one item three plus two items like six plus two like, just keep going like multiply three count by threes plus the entrance fee.
R3 So if I wanted like five hundred items, how will I do that?
Ariel Five hundred items, man.
R3 How would I do that, if I wanted to buy five hundred items? How I am going to know?
There is an announcement over the PA system.
Ariel [writing in the sheet] Sixteen thousand.
R3 How did you do?
Ariel One hundred items, three hundred twenty. Three hundred twenty times this, times five is one thousand six hundred.
R3 You are sort of like saying you have to know how much, you have to know some, right?
Ariel Yeah.
R3 Can you …?
Ariel You have to know some of a certain like the numbers you can multiply to get any.
R3 Is there a way you can know how much without knowing some of them?
Ariel Yeah.

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R3 Is there a way you can just work it out without having to know how much number of …

Ariel What?

S3 Without knowing some of them, just directly knowing it. All I know say is I bought, let's say X amount of items and I know that the entrance cost is like what two dollars, right and each item costs three dollars, how am I going to know, I don't want to know, is there, can you just computer without having to compute how much you spent for another amount?

Ariel Ummm.

R3 Is there any way you could do it like that. All the information I have is that this person you spend, bought X amount of items and each item cost three, right? Is there any way from that information tell us exactly how much?

Ariel I guess… Juice, can I get one? I didn't get one.

Ariel I didn't get one.

R3 Is there a way you could do that directly? Because this is like you went back three twenty, how much you spend it for? [pointing to the paper]

R3 You will have some. You want some of them? [goes away from the camera]

Ariel I want juice

R3 [in the background] We have orange juice?

Ariel The video sequence breaks off and starts again with Ariel drinking juice.

R3 … basically suggesting that if I wanted to know for five hundred, I have to find for one, two, ohhh, that's a long time.

Ariel Just you have to know for like one hundred items, like on a sign they can have one item is three, ten items is thirty, hundred items is …

R3 No, they don't have that. Suppose that museum doesn't have that, it only gives you the price, they don't do that.

Ariel Then you can do your own math and multiply by ten.

R3 What do you mean multiply by ten?

Ariel Multiply the regular one by ten.

R3 Regular items by ten?

Ariel Yeah.

R3 What is regular one?

Ariel Yeah, one item is three dollars. That is the only thing they tell you, right?

R3 Yes.

Ariel So you can multiply that by ten, it will give you ten thirty … ten items is thirty dollars and then you multiply that by ten will give you one hundred that is the three hundred dollars plus the sales entrance that is three hundred and

twenty and then three hundred and twenty times five is because hundred times five is five hundred and you do that is one thousand six hundred and that is your total spending [holds the pen in his hand and bangs it on the table]

R3 So if I tell you I am not going to tell you an exact number now, right? But you know it is a number like I am going to say I am going to buy X amount of items, how I am going to compute the amount? You know that each one costs three and the fee is two dollars, the entrance fee, I am not telling you the exactly like I told you five hundred, right? Right now I am just only telling you the amount is called X, so what would you do that?

Ariel X?

R3 Yeah.

Ariel What?

R3 I mean X means a certain amount. What do I do that? I know that I bought a certain amount and each one item in that amount costs three and the entrance fee was two

Ariel So, well?

R3 What would I do? How would you do, how would you go about it?

Ariel I don't know, uhh, because you will really need to know … if you knew like the price then you would just …

R3 The price I know is three.

Ariel Yeah, but I mean like of X you really just have the X and you don't have the price then you can't really…

R3 What you mean by price?

Ariel The price of all the items you bought then you could divide that number by three and you get whatever.

R3 So if I know that each item costs three and I bought X items how do I get the amount of price?

Ariel If I know the amount of like you knew the amount of the X items you bought then you could do it but if you then divide that by three but if you do not know the amount of those X items then you can't really …

R3 Suppose you make believe that you know the amount that you bought, right, so how you would go about computing the, uh?

Ariel I would divide it by three.

R3 Why divide by three?

Ariel Because each item costs three dollars and then I would know how many items because that will …

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R3 No, No I know how many items are bought and I know how much each item costs so what do I do?

Ariel You multiply your items by three.

R3 And that gives me all of I spent? That's what I spent?

Ariel [drinking juice] And you got to add your entrance fee [again drinking juice]

R3 Can you write that down what you are saying?

[Ariel says as he writes 'multiply X by 3 and add entrance fee $2'.]

R3 Then I am going to get, so …

[The video sequence breaks off.]

Ariel has written the following in his paper:

Multiply by 3 and add entrance fee for $2

$A \div 3 =$ items

$A \div 3 - 2 =$ items

$X \times 3 + 2 =$ Total A

$X \times 3 + 2 = A$

R3 So here … Are you sure this is about this? Let's think a little bit about that part.

Ariel No. This? That's not it. [cancels with his pen $A \div 3 =$ items]

R3 So let's see very carefully. So what you are doing that?

Ariel A is the total fee. Divide that by three [taps with his pen where he has written $A \div 3 - 2 =$ items] This is it.

R3 But the total includes the fee or not?

Ariel Exactly. That is what I am saying. No, no, no. First, no. Switch that around.

R3 Oh, oh, oh.

Ariel [cancels $A \div 3 - 2 =$ items and writes $A - 2 \div 3 = X$] A minus two divided by three equals X.

R3 Ahhhh.

Ariel I have got to go.

R3 You have to go?