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Segment 1 - Frogs

EH: Middle school kids will want to be engaged. They have to—they have difficulty with anything that is an abstract concept. And so we want them to be engaged in doing as much math as they can. Hands-on activities also put things into a very concrete way as opposed to the kids having to visualize things. The research shows us that kids that are doing math will tend to remember more. And we've also found that minds on helps the kids to focus better. They want things that are going to be authentic.

One of the things that we have found with doing all of this by having the kids be involved we found that students are active. We like them to be active. We know that 7th graders and eight graders and 9th graders if they're not active in your way they will be active in their own. They have to form relationships between what they're doing with math and what they're actually working. And of course we also want them to make connections because I think one of the things that kids always think about the most is how am I ever gonna use this? And if you... I'm asked that question time and time again by students, and I think it's important that we have those answers.

GM: The next question for us is well what about effective methods for teaching. First of all the use of models, manipulatives, drawings, those kinds of things which are very prevalent in grades K-6 so I thought well that's gotta be something that we really need to do. That interaction and discussion absolutely. We want kids to talk about their ideas, reflect on strategies that they use, learn from others. Of course cooperative groups real natural for that sort of thing. Self-validation—understanding

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that your ways are right and that there are other ways to think about getting to the right place.

Not everybody has to go the same direction. I look at the world really as a big problem. The point here is that we solve thousands of problems every day, and so what we want our kids to do is think of not only math but life as situations where they've gotta come up with ideas and be creative, be problem solvers. Then of course active listening. While we talked about lots of different strategies that we can use to help kids listen to us better, we think that one of the best strategies is give them something interesting to listen to.

So when we talk about linear equations, just by way of definition—constant rate of change, got two variables, X and Y--it is represented by a straight line hence the word linear. The coordinate grid which you can see right over here. As we said it's gotta be something that they can really understand. How does it apply to me personally? Well, one of the best examples is just distance traveled over time. And then of course when it comes to the fact that our kids more and more are becoming consumers. How many can you buy? if you've got five dollars in your pocket you and two friends are at the taco shop and you want to get some burritos they cost \$1.69. Can you all have one or not? What is it that actually makes a linear equation? As we said before, relationship, a constant rate of change between two variables, X and Y. We call X the independent variable here. We call Y the dependent variable. And we use this equation: $Y = MX + B$. We want to form some understanding, give them something to build from.

EH: Alright. Why did I choose to do the activity with the hopping frogs? Well, kids have geometry, and any time that I can go back and review in a fun way with the students

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I always think it's better than saying we're having a review today and hand them a worksheet or something. Then we had also done some data collection, and it never hurts to drive home mean, median, mode and range and all of those types of things with the students. I wanted them to see that there are different variables that will go in with the frog, and then I also wanted them to be able to develop a graph, an equation, a table and from that information put it into what we were going to be starting. And that's what my students did.

Today we're going to be making the frog, fold it making triangles. What kind of triangle do we have?

FS: Right.

EH: A right triangle, and it is also...?

FS: Sides are the same, isosceles.

EH: It is also isosceles. Open your square and now you're gonna fold on that diagonal until you have made another diagonal. Alright, now I tell the kids be sure you watch me before you do this. You're gonna put your hands on two corners that are parallel and just push in. We're gonna tell this little frog to push in. So we're going to tell him to shut and fold over and make it up. You want to try to put your little point up there at the top as much as you can, match up your corners, set it down on your table and push down so that you have lines down. Crease those parts that have just been folded in. With the angle that is the ninety degree angle pointing across the table we're gonna set it down, and on the right-hand side you should—there should be a flap and there should be triangles on the inside. So you're going to fold those over and crease and fold it back.

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And then we have a rule in math what you do to the left you do to the right. So we're going to flip it over, and we're going to do the same thing. If you have done yours right it should look something like this. So that's how you can tell if you're right. Then you're just gonna push two of the triangles together and then lay it back down on the table again with the ninety degree angle pointing to the person across from you. We're gonna take the right-hand corner. We're gonna take it up to the top of the ninety degree angle. So you're going to be folding a square. What you do on the right-hand side you must do on the left-hand side. And the kids... we talk about how this is nice to do with an equation but you only—you're gonna only have the square on the top.

Okay. We do not do on this side though what we did on the other side. So we're gonna put our frog with the square side down. So we're gonna take the hypotenuse side of your triangle, and we're gonna lay it next to the leg that is down the middle that connects the two triangles. Then we're gonna crease that. What you do to the one on the right you have to also do to the one on the left. We talk about as we're going through this that this is also the same thing with equations. What you do to one side of an equation you must do on the other. So this is what your little frog should now look like.

So we're gonna take the hypotenuse side, and this is the hard part. Take the hypotenuse side and we want to fold it back next to the edge of the triangle that you just folded into. So you fold it, actually you're just cutting that one in half that you just folded. You do... what you do on the left you do to the right. So you have a triangle that's in the middle. It's a nice isosceles triangle. Then you have two triangles on the side and you have your little pointed legs down here at the bottom.

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Isn't he cute? But now comes the good part because we want the frog to be able to hop. So we're going to imagine the frog having the points of the square, and imagine a line that is dividing that in half.

Fold the frog in half, and I always tell the kid ouch because whoever wants to put their legs clear up over their head? But we have to crease down here so you can see what I've done. I've actually just folded everything in half. But then I take the part here with his legs and I think of another line that cuts that part in half and I fold it back. Then when you put your frog down on the table mine is not—mine's a dud. He just does somersaults or flip flops, just kind of up and over. So mine's just kind of a real dud. But if you press on the little behind of your little frog he should take off across the table. Okay, alright. Your legs are—there we go.

I'm gonna ask you to take out the tape measure that you have, and everybody takes a turn at seeing how far their frog will jump.

So record that on page 15. You should have a table. Okay. After you've gathered this, I have the kids record their information. After you have gotten your shortest jump, after they have done their hops and they've recorded all their information, I want you just to fill in the one on the shortest length. Then I tell them to imagine that your frog is going to be jumping every single time the same distance. So if you jumped ten inches on the first jump by the end of two jumps how far would you be if you jumped ten inches the first one, the second one you would be.....twenty and then thirty, and then forty.

So you're creating that line that I showed you over here, this one right over here. This is what you're actually creating with those points. Then we connected them. Then the students went on and we talked about—this is one of the things that we

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talked a lot about. What goes on the independent axis, and the kids did come up with it. It's the jumps. Then we talk about the dependent which is your Y axis. We make a reference to the fact that the scale for everybody will not be the same. Because they're graphing more than one graph on their charts they can't just count by the number of the distance of their jumps. So we talk about are you gonna count by tens? Are you gonna count by twenties?

Do you want to count by fifties? What do you want to do? How far did your frog jump on the first jump, and then you would tell me that and then how—and then I ask you okay, so after seven jumps how far did your frog go? How did you get that answer? Again we're talking about the idea of what are we actually changing? We're changing the variables every time. The variable we're changing is the number of jumps that I ask about. But everybody gave me a different number for the lengths that they jumped the first time.

This is the first time they've been introduced to the word coefficient. So I introduce that, that the coefficient is the number that goes to the left of the variable, and that that's going to be different for everybody in the room unless your frog happened to jump the same distance as the person that you're working with. After they have done all of their things then the kids put together their posters, and these are some of the posters that the kids had. And they represent a wide range of our students. There is a grading rubric in your handout that I use with the kids. I give it to them ahead of time. I like the grading rubric because it is very teacher friendly. Yes or no, either you have it or you don't.

So that makes it a little bit easier. The interesting thing is where I look at the computation you're thinking oh my word, do I have to go through and check if they

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did all their computations? No, you don't because I made it very teacher friendly. You have to do ten. So if you do ten only one of my students last year who said oh well, if my first number was twenty-five then my last one has to be two-fifty which made it very interesting for them then. So I just checked down, and if they had the ones there I assumed that the ones in the middle were right because they couldn't use a calculator. So they had to do their calculations okay.

After we had done this I referred back to this activity numerous times when the kids were working with them.

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Segment 2 – Balloons, part one

GM: Is it possible for you to build a flying machine that would rival the Wright brothers? If you look at the flight of the Wright brothers and the balloon activity that you're going to do, they both have a very definite starting and ending point. And that kind of made sense to me. That was one of the things I wanted to bring to the—to the kids. Then, of course, pre-Algebra and Algebra, all about variables, things that change, that produce different outcomes.

And so we start brainstorming about well, what about the Wright brothers? What did they do that changed their flights? Or what could you do when you're building yours, your airship, to make it a better flight than the ones before? Now while there are different variables, certainly when you get a classroom of 25 or 30 kids, they come up with all sorts of ideas, all sorts of design methods. And you'll get a little bit of a chance to experiment with that.

And then, of course, the point that we're trying to make here is that we're asking a question. Can you do it? Can you build a—an airship that will fly faster than the Wright brothers? We're gonna answer that question. We're just gonna have three different ways of answering it. One of those is a table, one of those is an equation, and then one of those is a graph. And we'll be able to prove from each of those different sources whether you did or not. With the Wright brothers we're gonna be concerned about the time of each of their flights and then the distance of each one. Those are the two things that we're gonna focus on. And you have all the information in your packets, so you can kind of start thinking about this. What made the difference? Why did their flights change? All right, so two things that we were going to pay attention to, what were they?

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FS: Time and distance.

GM: Okay. Because those are going to be our independent and dependent variables as a result of this. So as we look at the video, then you gotta ask yourself, when I'm thinking about time and distance of the flights, and as you see those, what changed from the first flight to the last flight? What was the difference in them? Thinking of time and distance, how'd they change? There you go. Longer time. Each flight was longer. Well, actually, the first two were...

Yeah, the first two were the same time but each of them increased in distance. So there were, as you look at them here, 12 seconds – 120 feet; 12 and so on. So here's what you wanna look at. As you turn to the next page, what we're concerned with here is that we develop the idea of the rate of speed because that's gonna be the coefficient in your equation. Four flights. What we want is this idea. A rate is a combination of two things – distance and time put together.

And when you put those together you get feet per second or miles per hour or whatever the case might happen to be. It's a combination of two variables. So here's what we have here. If you use this formula, distance = rate x time, we can use that to solve any of these rate problems that we have. And we're getting some fairly complicated... Not today but, we get into some fairly complicated equations in our unit. So what do you do here? If you wanna know what the rate is, because we don't know the coefficient...

We know X and Y in this case. What we don't know is what's the coefficient or what is the rate. So we're gonna be concerned today with just this first equation. This is your goal. You have to try to fly faster than the Wright brothers and here's the ones you're gonna use: $120 = R \times 12$. How do you solve that or how do—how do you

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have your kids solve an equation like that? Cause we've done some of this before we even get to here.

FS: Solve samples.

GM: Yeah. You use direct instruction. You're just gonna tell em, hey, look here. I've got 120 on this side. I've got $R \times 12$ over here. In order to get rid of that 12, I have to do the inverse operation. And because I've got two sides of an equation, keep it balanced. Whatever you do to one side, do to the other. So I'm gonna divide both sides by 12. And the practical side is it's 120 divided by 12. Gives us 10 feet per second. That's your goal. So now, skeptical person, do you think you can fly this airship faster than 10 feet per seconds?

MS: Possibly.

GM: Okay. Having known what your goal is helps a little bit. All right? So here we go. Notice that their speed changes – 14.5, 13.3, 14.4. Their speed changes, they get faster each time, their distance increases as well. All right? So how do we then relate that to algebra? Well, here's what we're going to do. We're gonna write equations using the slope intercept form which is $Y = MX + B$. And, again, this is going to come later. I'm not gonna teach the kids that today. We've got enough stuff going on already.

And here it is. For the Wright brothers, their flight, that first one, is this simple. $Y = 10X$. Where... What does Y—or what is Y in this equation? What does it represent? Distance = rate x times. So what is this Y?

FS: Distance.

GM: It's the distance. All right? What is X?

FS: Length of time.

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GM: It's gonna be the length of time in seconds, for our example, that they are in the air. And then 10 is the coefficient, and that's the combination of those two that makes it a rate. They were flying that first flight at 10 feet per second. So knowing that, we look at their other equations and leads you to the question then, what's different? How does that change as their flights went along? What changed in there? Leslie, what do you see as being different from just focusing on their equations? Cause they look real similar.

FS: The distance.

GM: Not the distance. We know that from watching the video, but looking just at the equation what's different? What is 10, 14.6, 13.3?

ALL: (shouting answers).

GM: The rate is different. The coefficient is different. So we'll get different lengths of travel, we'll get different lengths of time. All right? So it changes in numbers that will be multiplied times X. And coefficient, it's a great word. You gotta keep using that one. All right? So here you go. If you'll look at page 12, this is where the real fun starts. You have been given a challenge and now the question is can you meet that challenge or not. I want you to take just a moment or two to review page 12. Your airship is made up of three parts. And what are those parts? Have you got that?

ALL: A balloon.

GM: A balloon, which I like to call in this case "propulsion". It's not a balloon; it's your propulsion system. All right? And then what else are you gonna put in your airship?

ALL: Straw.

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GM: Straw, which I call the guidance system. You've gotta have that. And then what's the third thing?

ALL: Tape

GM: Okay. So you've got tape, a balloon... And how many balloons are you gonna get, by the way?

ALL: (Inaud.).

GM: Yeah. Yeah. So your balloon and straw and tape are going to create an air machine. Now the guidance system, that straw, is going to be threaded onto some fishing line out here in the hall, and it's gonna sit on that fishing line. And then when you launch, it's gonna take off and go along that line. So your straw has to be open on both ends and it has to be attached to the balloon. Your straw is guidance system. And I'm gonna give you a couple of clues here that I probably would not give the kids.

And that is, first of all, you can change your straw any way you want to. You can cut it if you want to, make it shorter, longer. If you think one system's gonna work better than another, go for it. But it's gotta stay on the balloon the entire time, so you gotta tape it on there. And the other thing that I'll tell you is that it works much better to blow up the balloon and then attach the straw and then hold it. Please do not tie your balloon closed.

Believe it or not last week... You know, I love those folks down in Tampa but they tied their closed and I thought, "Okay, but how's the air gonna get out". So didn't work quite as well. So I'll give you those two hints right now. Take about two minutes. You and your partner talk about design and how you're gonna get this done. Just remember, that balloon and straw and tape are gonna move together

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along that line. And you want to get... A goal... Your goal is to fly faster than 10 feet per second.

It's gonna go in there and come out there.

I think you're on to it.

MS: I was going to say we left out a part, but does this need to be re-useable?

GM: No.

MS: Oh, okay.

GM: You... In fact, if you read your directions, you get one shot at it.

MS: Oh, okay.

GM: So it's not reusable. Uh uh.

Hey, that could work. You might just be surprised.

How much fuel you put in your propulsion system, of course once again, is up to you. The key is, though, you get one shot at it. So good, bad or otherwise, that's what you're gonna get.

This looks pretty good down here. That might just work. We'll see.

If you've got your airship ready, here's the next thing that you wanna do. And that is, one of the people in your group needs to bring a piece of paper and a pencil because there are two pieces of information that you have to write down about your flight. And what do you suppose those are?

FS: Distance.

GM: And?

FS: Time.

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GM: There you go. We're back to time and distance again. Cause we don't know the rate. We're going to decide what that is. But, first of all, we have to know how long it flies and then we have to know how far it flies.

Now, you know, I'm not gonna tell you anything about this but I have not seen anyone use that particular design before.

FS: (Inaud.).

GM: Well, you can try it if you want to. See what happens.

Okay, do you feel pretty confident that you've got what you want?

I think you guys are right on it.

Yeah. See, it's who you work with sometimes. No, you don't have to know everything. Just have to know who to sit by. That's all.

Okay. All right. Don't over-analyze this thing.

All right. If you are fairly confident that you've got what you want, then we're gonna slip out here in the hallway and right outside the door you're going to see a tape measure and there is a piece of fishing line on the floor that you probably can't see.

So don't step on the tape measure cause if you do, you might just kind of re-route our flights here. Okay? Paper and pencil. You've got two things to write down while we're out there.

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Segment 3 –Balloons, part two

- GM: All right, you're threaded on there and ready to go?
- MS: I think so.
- GM: On three you're going to launch. All right? And nobody makes fun of anybody else's balloons, okay?
- FS: Sure we do.
- GM: Cause you don't know where yours will be yet. All right, on three. One, two, three.
- FS: Oh, that's pretty good.
- GM: Hey! 31 feet in 3 seconds. Not too bad. We've got a standard to shoot for now. On three. One... Runway problem. All right, one, two, three. 26 feet in 3 seconds. All right, on three. One...
- FS: Is this the starting point?
- GM: You're perfect. One, two, three. (laughter) Ewww, the brake system works. All right 16 feet, 2 seconds. (chatter) On three. One, two, three. I have less confidence now than I did before. Yeah, that's 4 feet in 3 seconds.
- FS: Oh, my gosh!
- GM: Um, um, um, um, um, um. Yep.
- FS: That was sad. You wanna take your sad, little balloon.
- GM: All right now. Various kinds of results, right? Different design methods that were used. Really some very different results. But here's the question that we asked before: does... do you have the ability to build an air machine that will fly faster than the Wright brothers? We're going to be able to prove that, starting off with the equation. First of all I want you to notice this. The Wright Brothers' equation, we're

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only considering their first flight by the way, is right here. $Y = 10X$. That's their equation. What equation did you write? Let's look at yours. And you can round off to the nearest foot per second. You don't have to... no decimals necessary here. What did you find out?

ALL: (giving answers)

GM: What did you get?

FS: $Y = 9X$.

GM: $Y = 9X$, okay good. So you're traveling at nine feet per second. Do we have anybody that... okay, we've got $Y = 9X$... Kevin what did you guys get?

MS: We got 10.

GM: Oooo! 10. Alright, good. $Y = 10X$. Does anybody, I know you don't but does anybody have anything higher than $Y = 10X$?

FS: (inaud. and laughter)

GM: No, you don't. So here's what happens.

FS: We're the winner.

GM: Yeah, they win the prize which is... I don't know (laughter)... yes, the self-confidence that you are an engineering genius. Alright... you can look at... yeah, you get to keep the balloon and the straw. Here's what you've got, though. $Y = 10X$. Prove to me from the equation, Mark, that you flew as fast or faster than the Wright Brothers.

MS: We flew on our first attempt... their first attempt...

GM: ...compared to yours...

MS: ...was exactly the same.

GM: And how do you know that, looking at your equation?

MS: We have the exact same equation.

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GM: The same coefficient, right? Their rate is identical. 10 feet per second. So, congratulations gentlemen. You know, the Wright brothers were pretty smart guys. So, you're right there. Uh, the rest of the class, however (laughter) well, you know. Alright, $Y=...$

FS: (inaud.)

GM: Alright. How do you know? Folks, look at your equations and tell me this: based on yours, and you don't have to say it out loud, but based on yours... how do you know, based on your equations, how do you know that you did not fly as fast as the Wright Brothers? You don't have to use numbers...

MS: The coefficient was smaller.

GM: A smaller coefficient. That's how you know. They had ten, what did you guys have?

FS: Ha!

MS: Three.

GM: Three's uh respectable. Alright, so... you can look at the equation and tell. Let's do this, so... the next thing you're going to do... So, there's evidence number one. Two is going to come in the form of a table: x and y . X represents the length of the flight. So you're gonna build a T chart just like this one, x and y , And put it on the graph paper, would you please? I know you're probably not done with that, but uh, get a piece of graph paper and put it on there because we're going to put your graph on there too.

Allright, so based on that T chart, where x is the number of seconds traveled, uh, at zero seconds traveled what is the distance going to be? So, zero and zero. The Wright brothers flew at ten feet per second so at ten seconds how far had they gone?

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ALL: (responding)

GM: Yeah, we're going to take that ten and replace the independent variable x with that, so it's going to be ten times ten is ... a hundred feet. And this is the nice part. The Wright brothers were very... very nice to uh give us some nice easy numbers to work with: powers of ten. What about twenty seconds? How far?

FS: Are we doing ours or theirs?

GM: You're doing theirs first. 200, 300. Yeah, okay. So you're gonna fill up that chart because, what we're doing, we're building ordered pairs, and they've heard that before. They know what... they know there's a value for x and y and you put those two together. (popping sound) It creates a point on the coordinate grid. Well now, take a look at your equation and you're going to make a T chart for it also using 0, 10, and so on, through 60. You're going to use a different coefficient, so you'll get slightly different numbers for y . and since I remember that, uh let's see, you guys were 9... $Y = 9X$ over here, Trish?

FS: Yeah

GM: Okay, so if you put... using 9 as the coefficient, what do we get for zero? Trish? What do you get for zero?

FS: You get zero.

GM: What do you have for 10?

FS: 90.

GM: 90, 180, 270 and so on. Right? So, go ahead and fill out that chart for your flight also. So if you'll compare the two T charts, and this is an important point, I want you to have this, for sure. If you're only basing it on the table at any point along there, if you compare the same amount of time, their distance is always greater than

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yours, which means that their rate of speed must also have been greater. You know, we're building here. We started off with the equation. We converted that into a T chart. Now's the last leg, you might say of this and that is: let's build a graph out of this. And tell me this, using those coordinate points that you have... looking at the coordinate grid right here... What have we got here? Quadrant one, two, three, four. Which one are we going to be working in?

FS: One

GM: Why?

FS: Because it's all positive.

GM: Yeah. Yeah. All of our numbers are positive, and in the coordinate grid, quadrant one everything's positive. So that's a good spot to be. Alright, so what we want to do then is draw that coordinate grid. And you can make it take up your whole graph if you want to. So based on that now, let's think about that x, the horizontal axis here, your x. What numbers are we going to put along the x axis? Yes. Time is always going to be an independent variable for us. How should we label the x axis? What would we call that? Time in what, minutes, hours years?

ALL: (inaud.)

GM: Seconds; alright. so now we know. So our x axis is going to be labeled 'time in seconds'. How about y? It's going to be on the vertical axis, and what should we call it? What would be a good label for that?

MS: I'd call it distance.

GM: Okay, distance in feet, because we're talking about the independent variable, or excuse me the dependent variable and the distance they traveled in this case is the

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result of the length of the flight. Tell me this - what is the greatest number of feet that you have to consider here, because we need a range...

ALL: (responding)

GM: Roland? 500? You should have a little bit higher than that. Yeah, the Wright brothers, 60 seconds, yeah we're putting both of them together. So the Wright brothers is going to go up to 600 feet. So what would seem like a pretty good interval to use along the y axis? Starting down there at zero...

FS: Hundreds.

GM: Yeah, we could do hundreds. You could probably do fifties, right? Okay, so you're going to start at the bottom, you're going to go up that y axis, and you're going to go: 50, 100, 150, and so on. Take those coordinate points from your... from the Wright brother's equation, and you're going to plot those on your point... and the first one - okay the second one how about? - 0, 0's the first one, but the second one is 10 on the x axis, to to 100 on the y axis. And that's your first point. And then you'll graph the others like that. Connect those points. Now, one thing that you should do, whether you have a key on your graph or whether you actually write the equation on the line itself, you should label the line with the equation that goes with it. How are you going to be able to tell from the graph, only from the graph, whether you flew as fast, or not as fast as the Wright Brothers? The slope of the line in their case is identical because they were the exact same speed. But how about yours?

FS: We were not as steep.

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GM: Okay, the slope of your line is not as steep so therefore... your rate of speed was slightly less. So tell me this, quick review, how could you tell from the equation that you didn't fly, or did fly, as fast as the Wright Brothers? Just the equation.

FS: The coefficient.

GM: The coefficient. Yours was either larger, the same as, or smaller than the Wright Brothers. In most of the cases it was smaller. What about with the table? Check it for time, compare the distances. If your distance was shorter at the same amount of time, I'm, sorry, you didn't quite make it. And then looking at the graph, how did you do there? If your slope was less than theirs, then your rate of speed was also less than theirs. So what we've done is we've answered the question three different ways, and this is, um, introductory activities that we use. And then we're going to go from here. The kids are gonna take this information home with them, and then they're gonna—I'll give them a piece of paper, poster, whatever, and say I want you to display and to be able to explain how you answered that question. So this is going to be an assessment tool for us. I can get—Beth and I both - get that back just the next day generally. So we know right away, hey, where are these guys at? Did they really get this or not? And as an introductory activity it's always kind of encouraging to me to see that yeah, they do.

They may not have that whole connection yet, but they can—they can do those three things, and that's what we're interested in.

GM: Allright, so if we want to talk about variables in each situation, there are variables in the flights, there are variables in the frog hopping, that change the outcome. And that's critical to understanding pre-Algebra, and Algebra. And then, equations for

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each activity. Ultimately we have to ask the questions... question, are these examples of linear equations. And then your answer is...

ALL: Yes.

GM: Yes, they are. Allright, so we've got that. We've kind of discussed the assessment. The idea is that we want to see at the very beginning of this unit that they've got those three things that they understand. Those three things accomplish the same thing for us. Allright, and then Beth, what about this? What are we working our way up to?

EH: We're hoping that eventually the students will get to the point where they're going to understand that there is a definite relationship between graphs, tables and equations. And I tell the kids it kind of forms an equilateral triangle because an equilateral triangle makes all points the same. And that's why I stress to them that if you have a graph it can tell you the same thing as a table, and an equation. It's a matter of how you want to look at the material and what it will do with that. And by the time we get to the point that we're actually talking about the equation y equals mx plus b , They have worked with the equation so many times that they are beginning to make those connections, and most of the time the kids will tell us what it is rather than us having to tell them.

And we thank you so much for coming today.

GM: Yes, thanks for coming. (applause)