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Connected Mathematics Project,
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Transcript for November 28 - 29, 2007

"Distraction or Learning Opportunity:
Reprise of *Moving Straight Ahead*, 2.1."

The class is seen writing their own problem to replace Problem 2.1,
"Walking to Win: Finding the Point of Intersection."

The video was shot in real time and edited from,
approximately 75 minutes, to 28 minutes.

Reprise of *Moving Straight Ahead,* Problem 2.1
Class: 7th Grade , 20 students when everyone is present.
Date: November 28-9, 2007
Real Time: 75 minutes. Edited to 28 minutes.

Note: there are 4 extra video personnel in the classroom.

Chapter 1: Introduction
Time: Approximately 00:00 – 01:41 (Times from start of video)

Slide
Title

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Several students thought that the problem in the book could be improved. The teacher has to decide if following the students' lead is going to lead them to an enrichment of the learning experience, or take valuable time away from the mathematical goals.

Line 1, 00:20	Bryce: Because if he walked, if, uh, one of them walks at 2.5 meters a second and the one walks at 1 meter a second, the other one's going to catch up really fast, so it should've been closer and less of a head start so it would have been easier to make it look like a real situation.
	T: So you felt like this didn't seem real.
	Bryce: Not really, 'cause, well, I guess it did, but why would you give them a 45 head start in like a 70-meter race.
	T: So, you're just bothered by -
	Bryce: It's like so -
Line 20, 00:59	T: How big the head start was.
	Bryce: Yeah, it's so easy to tell that he's trying to make him win.
	Travis: 45 meters isn't long, if you think about it.
	Student: It's more than half the race.
	Travis: That's the whole, that's like the whole hallway down.
	Tyler: And also that would be 45 seconds.
	Bryce: He'd be -
	Travis: That's 45 seconds that he could have walked, um, in -
	Jayna: So like he'd be all the way down to the cafeteria and we'd still be up here at your classroom.
Line 30, 01:24	T: So how would you change it?
	Bryce: Maybe like 15 or something - Student: I think the walking rates should be like 2 and 2.5.
	Bryce: Yeah.

T: Do you want to talk about it with your groups and see if you guys can come up with a way to change it and make it more realistic?

Students: Yeah. Sure.

T: Why doesn't each group talk about it.   See if you can think of a different way to make it more realistic and we'll try your way.

Chapter 2: Explore phase begins
Time: Approximately 01:42 – 02:28 (Times from start of video)

Slide

Explore: Real time 26 minutes
Aaron's group wants to change the rates and make it a running race.

Line 1, 01:51	T: What are you guys thinking?
	Ricky: We're doing the running rates.
	T: Running rates. Okay.
	Logan: Uh, I don't know. Uh, 9.
	T: Okay. And any head start at all?
	Ricky: Yes, a little bit.
	T: A little bit?
	Aaron: Like 2 meters.
	Logan: No. Like 10 -
Line 10, 02:13	Ricky: Like 5 meters.
	T: So if you used your idea, could you figure out how long the race should be?
	Ricky: Yeah.
	T: So 10 and 9 - and then what kind of a head start?
	Student: 10.
	T: 10. Try it. See what kind of a race you guys
	-would have with that. Aaron: Let's say 6.

Chapter 3: Becca's Group Uses Guess and Check
Time: Approximately 02:28 – 05:24 (times from start of video)

Slide
Becca's group is using the same guess and check procedure as the day before. Today they are assuming a different walking rate for Henri, and guessing at combinations of race distance and head start.

Line 1, 02:38	Travis: So if we have the 2 and the 2.5 walking rates, he only walks a half a meter faster. So, if you get, if it's a 70-meter - okay, it's a 70-meter race and he runs it in, divided by 2 -
	Becca: So you did 70 divided by 2.
	Travis: That'd be 30 - that'd take him 35 seconds.
	Jayna: But how long-
	Becca: It takes his brother 28.
	Travis: Alright. Yeah, wait.
	Becca: So -
Line 10, 03:10	Jayna: Same thing we did with the 45 meter, 3 seconds away.
	Becca: That's 7 -
	Jayna: Well, try it here more -
	Travis: That's 7, so we should have done like 50 and minus, we'll give him like a 5-meter head start -
	Jayna: 45 -
	Travis: 45 divided by 2 equals 22.5. Jayna: 22.5.
	Travis: 18.
Line 20, 03:39	Becca: If you did - Travis: 4 second race we're getting closer.
	Jayna: What are you guys doing? I don't get this.
	T: I haven't heard. So what are you guys doing?
	Becca: We were changing, uh, Henri's walking rate to 2 meters per second.

T: Okay.

 Becca: Yeah. And so now we're just trying - we're doing guess and check again when we do the different, um -

 Travis: 'Cause we, I, I got to like a 4. - 4 and a half in the second race. If I took the 15 and gave him a 5-meter head start and then we did the, oops, I did something wrong.

 T: So you're changing the little guy's walking rate but keeping the big guy's rate the same.

 Travis: Yeah, I just made it a 2.2 race, 2.5 race, so -

 Becca: Wait. A 2.5-meter race?

 Travis: No. Two - it's a - the race I just did would be a 45 for the little guy at a walking rate of 2, and 50 for the big guy for, at 2.5, and then the, um, Henri, runs it in 22.5 seconds while Emile runs it in 20.

 T: So you're keeping the same head start.

 Travis: Well, I, I changed it to a 5-meter head start.

T: Oh, you changed it to a 5.

 That's what I didn't see.
Travis: 'Cause now it makes it less obvious and they're closer together so it's easier to make it less obvious.

 Jayna: Well, so how long is the meter race going to be?

 Travis: This one, this one's a 50.

 Becca: Wait. To get it so you did the, you did, wait, how many - long is the meter race?

 Travis: Henri was a 45, 'cause I subtracted the 5-meter head start, and then it would be a 50-meter race for Emile.

Becca: Oh, okay. Now I gotcha.

 Travis: In a 5-meters, that's not that long though, I mean, that's a little head start.

 Becca: That's like probably from here down to that cabinet.

Chapter 4: Kelsey's Group Decides on a Strategy
Time: Approximately 05:24 – 07:48 (times from start of video)

Slide
Kelsey's group seems to be using the same procedure as yesterday.

Line 1, 05:34   T: So they're, they're guessing and checking some different head starts. And you're saying you'd rather have it be a landmark number.

Lily: I'm not sure, like I just like - I don't know -

Jocelyn: Okay, it works.   It's, it's like less than a second.   It's less than a second.

T: If you have what for a head start?

Joycelyn: If we, for a head start it, it was 30, and it was like, it'd be like 73.5.   He, he'd, I goofed, so when the one, one makes -

T: So can you take them through how you came up with that?

Line 10, 06:08   Joycelyn: It really - he wouldn't even win by a second, it would be so -

Melanie: Jocelyn, where'd you guys get 27?

Joycelyn: Twenty-seven? Where's 27? I don't have 27 on here.

T: They're now saying 30.

Kelsey: Thirty is the head start.
Lily: But how did you get 27 when you guessed?

Kelsey: We're just guessing and checking.

T: Can you take them through how you used your equations, because you're now saying 30.

Joycelyn: Yeah.

Line 20, 06:27   T: Okay. So take them through your equations with 30.

Kelsey: Yesterday our equation was D for - um, Emile was D equals, uh -

Joycelyn: 2.5
Kelsey: 2.5 times S, and then for Henri it was D equals 1 times S.   But now it will be 1.5 times S plus the head start.

Joycelyn: It'd be 30.

Kelsey: That's where our 30 comes in.

Kelsey: And then we did all that and then -

Joycelyn: And we got 73.5 for Henri and -

Line 30, 06:54   Kelsey: 72.5 for Emile.
Joycelyn: 72.5 for Emile, so it'd be like so close, it wouldn't even be a second.

Melanie: And how long is the race?

Joycelyn: Um, 73.5. It's like .5 smaller than our other race, but it works. It's like really, really, really close. It's like neck and neck.   But Henri still wins.

T: So I think she's confused on now what do you do with those equations to get what you did.

Kelsey: You substitute the S for a guess.

Line 40, 07:21   Joycelyn: Yeah, like, okay, I put like 29 times -

Kelsey: For a guess -
Joycelyn: 2.5 plus 30 and I got 73.5.   And then I went 29 times 2.5 and that's 72.5.

T: Do you have your calculator?   Take her through it at her calculator.

Melanie: But then our race is 74.5?

Kelsey: No, it's 73.5, 'cause that's where Henri is finishing.

Joycelyn: Yeah. It's only, it's only one different.   It's like one meter different. It's not even a second.
Melanie: Oh, I get it.

Chapter 5: Aaron's Group Has a Solution
Time: Approximately 07:48 – 09:01 (times from start of video)

Slide
Aaron's group has a solution from a table again.

Line 1, 07:59	Ricky: Alright. We gave him a 6 meter head start -
	Ricky: So at zero seconds he's got - Taylor: Okay.
	Logan: He's got six. Ricky: Six. And then at one second he's got five -
	Student: Given at one second he's got five and he's got ten. Ricky: He's got ten.
	Taylor: Okay.
	Ricky: Two, at 2, um, seconds -
Line 10, 08:14	Logan: He has 10, he has 14 meters. So he's still ahead. Three, 15 and 18, and at four, 20 and 22.
	Ricky: But then at - Logan: But then at 5 he passes him -
	Ricky: Well he's -
	Logan: Here. Ricky: It's really close. We just wanted to make it close. He's still in the lead.
	Taylor: Okay.
	Logan: Yeah. But he is close.
Line 20, 08:33	Ricky: Yea. He's really close so that'd be a really close race. Aaron: But who ends up winning the race?
	Ricky: The little - Henri did. And he has only has to have 6-meter head start.
	Ricky: But, um, then if we made the whole, then the one dude would pass Henri.
	Logan: Yeah.
	Taylor: If the guys kept going.

Logan: Yeah.

Ricky: Then Henri would be second if we kept going -

Line 30, 08:56   Ricky: Yea. Because he's got-   cause its 5 and 4

Taylor: Yea cause he's bigger.

Ricky: You get it?
Taylor: Yes, I get it.

Chapter 6: Becca's Group Runs into a Problem
Time: Approximately 09:02 – 13:11 (times from start of video)

Slide
Becca's group has several solutions and is planning to compare these.

Line 1, 09:13	Travis: Like, what was your total seconds that you won by?
	Becca: .5, the first 1.5.
	Travis: And mine, yours was -
	Jayna: 1
	Travis: And mine was 2. So we came up with a 1, 1-1/2, 2-meter, I mean one, second difference. So if we compare these by how much we used as a head start -
	Travis: Like, so how much did you use for a head start? Becca: I used 7.
Line 10, 9:37	Travis: And you came up with 1? I used - Becca: I got, no -
	Travis: She can't use Becca: I used 7 and got them [unintelligible] 1.5
	Jayna: And I did, I did the six and I got 1.
	Travis: And I did 5 and I got 2. So there must be something -
	Becca: I think the lower -
	Jayna: Ok so 5, 6, 7 -
	Travis: And we came up with- Becca: But you got the least and you have the middle number.
Line 20, 9:55	Travis: We, we came up with something weird but usually it doesn't work out.
	Travis: Like when I did come up with - Becca: What I did was- Because like I used-
	Travis: She used the 7-meter head start and she got 1.5 second race close -
	T: Difference between them. Travis: Yeah. Okay. Okay.
	Becca: She used 6 and got 1.

Travis: And I used 5 and got 2. So -

Line 30, 10:14   Becca: But it wouldn't - 'cause see, I thought it would do the lower, the like number that you have for the head start, the higher the number you have in the timing of difference, but it doesn't make sense -
Jayna: Mine was the middle and mine's the lowest.
Becca: Then because hers is the middle and hers is the lowest.

T: What if you tried three other numbers and see what happens.

Travis: Okay.

Jayna: Okay, you do, let's do, like 8, 9, 10.

Becca: Okay.

Slide
Late Becca's group finds an error when they have to explain their solutions to other students.

Line 40, 10:47   Jayna: Well, we figured out the one difference is that that guy who got the head start is still losing. Look.   'Cause you got the 17 seconds to get to the end and then the first one's got 16 seconds to get there and -

Becca: Oh, yeah.

Jayna: So he's really losing still by one second.

Becca: Yeah. But mine's not, 'cause -

T: What do you mean?

Becca: Like, mine's the different one, 'cause mine's the 7, and mine's - he - he's still losing in mine.

Jayna: I told you. Travis.

Becca: And- now that I look at mine, my guy's losing by 1.5.

Line 50, 11:22   Lily: I think you need an example of a bigger head start.

Melanie: Try like -
Lily: Try like -

T: A head start of 6 wasn't enough, 7 wasn't enough.

Jayna: Eight. He tried 8 and it wasn't enough.

T: And 10 -
Melanie: And 10 was a tie.

Becca: I found one though where it'll , yeah, for, and then if you did the 12-meter head start, he, he would win that way.

Jayna: But see -

Line 60, 11:43   Becca: So maybe it has to be over 10, because if you think about it, 10's the tie, and then 'cause if you think about it like -

Jayna: I did mine as a 10 and mine turned out to be 16 and 15 and he's winning now. Now he's winning and I did the 10 difference.

Slide
Eventually Becca figures out that they have all benn using different race distances. Travis used a 45 meter race and a 5 meter head start. Jayna used a 40 meter race and a 6 meter head start. Becca used a 50 meter race anda 7 meter head start.

Becca:I always make my races as 50 meters.

T: And they were doing 40.
Becca: And that -

Becca: Caps did 50, but -
Jayna: Mine is 1.5 now -

Becca: so maybe like 10, if it's over 10 it'll cross.

Line 70, 12:25   Jayna: Well, I just got nine -
Becca: Like if you put it on a graph -

T: Why do you want them to cross?

Becca: Well, not really like cross, but like -

Jayna: Come to each other's -

Becca: Yeah, like when they finally meet, 'cause there's - when two numbers are going they - yeah - they tend to normally to meet at this point and then keep, like one will start going lower, like when we did the CD's, or whatever - I think that was in another, the other book, but when we did the CD's, it was low until you got to a certain number and
Line 80, 12:51   then it shot up.

T: And then it shot up.

Becca: And if you think about it maybe it's like that. There's a certain point for each meter race when you get to the numbers that's when it'll change.

Jayna: Well, 9, when we did 9 it was 1.5 to 10 and it was only 1. Maybe we could do 11 -

Becca: But you're doing a different meter race than I am, so maybe we should try doing the same meter race to see if we -

Chapter 7: The Summary Starts: Jayna Shares Her Group's Idea.
Time: Approximately 13:12 – 15:16 (times from start of video)

Slide
The Summary starts.
Real time: 15 minutes on this day and 14 minutes on the next day.

Jayna shares her group's idea. They fix walking rates of 2 and 2.5 meters/second; they choose a distance of 40 meters and guess at head starts.

Line 1, 13:22	Jayna: Um, I'm going to start out with what I messed up on first and then show you what I had fixed.
	T: Okay.
	Jayna: Forty was the meter race, and then two - we divided by 2.5 'cause that was his walking rate, and then we - it was 16. It takes him 16 seconds for the end. And then we did, we tried to give him a 6, um, meter head start, so we did 34 divided by 2 for his walking rate. Then that equals 17, which is only a one second, but he still lost by one second. So then we changed it to -
Line 10, 14:23	T: So - can I just ask a question real quick? Um, the 2 and the 2.5, that's what you changed the walking rates to?
	Jayna: That's their, yeah, walking rates.
	T: Okay. So you kept the 2 and a half for the big guy and changed the little guy to 2, and you said you wanted it to be a 40-meter race -
	Jayna: And gave him a 6-meter head start.
	T: Okay. I'm with you now.
Line20, 14:47	Jayna: Then we did - then we - it's still 40 divided by 2.5 which equals 16 still. Then we did, then when we gave him a, we gave him 10 head start - 10-meter head start with his walking rate and that equaled 15. Now he's winning, instead of being the 17, the 15.

Chapter 8: Tyler Shares His Group's Idea
Time: Approximately 15:16 – 18:54 (times from start of video)

Slide
Tyler share s his group's idea.

Line 1, 15:26	Tyler: What we did is we gave the boy a 10-meter head start and we changed his walking rate to 2 meters, and it's going to be a 19.5-second race or a, er, a 49-meter race. And this is for the, um, little person. I don't know what his name is. And for the other person - um, and that's where we got and what we, what, um, what I did is I took 49 and subtracted 48.75 and, and what we figured out is that there's only a quarter of a meter in between, in between them.
	T: Questions for Tyler's group. Jayna.
	Jayna: What's the 2 and the 10 and the 19.5? Where'd they come from?
Line 10, 17:00	Tyler: Um, the 10 is the head start, and we changed the little boy's walking rate to 2 meters, and we were trying to figure out like what numbers would get to like a certain numbers, and like one of us typed in 19.5 and, well, well, first it was 19 and then we typed in 19.5 and then we got 49 and then we tried the same thing for the other person and he got 48.75. Becca.
	Becca: I didn't think you were supposed to be adding your walking rate because you don't really, yeah, 'cause like -
	Emmett [off-screen]: You're not really adding the walking rate, you're adding the -
Line 20, 17:49	Tyler: You're adding the head start. Emmett: You're adding the head start to the walking rate.
	Becca: Then - never mind.
	T: So is the question about that plus there?
	Class: Yeah. T: What's being added?
	Student: Yeah.
	T: So maybe you can help us with that, Tyler.
Line 30, 18:13	Tyler: this plus sign right here, it's saying you're adding the head start to the regular walking rate. So he's still walking 2 meters but you're just adding 10 more meters on to it.
	Becca: Wait. So you're adding meters, so you're adding 10 more meters than the older guy has to walk? I'm really confused.

Tyler: No, you're - no, this is the little person.

Becca: I know, but you just said you're adding   those 10 other meters that he has to walk.

Student: Yeah, to the little guy.
Becca: But really he's not walking those 10 meters.

Jayna: He's not walking those 10 meters. He's starting 10 meters -
Becca: Oh, okay.

Line 40, 18:41   T: And you're not really adding 10 plus 2, are you?

Tyler: No.
T: If I'm understanding it, you're taking 2 times your 19 and a half seconds -

Tyler: And -
T: And adding your 10 head start in.

Travis: Yeah. That makes sense.

Becca: Oh, I know that.

Chapter 9: Ricky Explains His Group's Table
Time: Approximately 18:54 – 21:47 (times from start of video)

Slide
Ricky shares his group's idea.

Line 1, 19:04   Ricky: Our group's walking rates was - we made them like running rates, so it was, for, um, Emile   it was 5 and then for that Henri kid we made it 4, and then we just made a graph and we found when we, um - well actually then we thought we needed to give him a head start so we gave Henri a 6-meter head start, so then we just made a graph to see when they'd come together.   There.   And then, um, then for zero meters Emile would, er, wait, Henri would already be like 6, 'cause he gets a head start, and then he'll have zero, and then he'll have 10 because you have to add the 4 from his walking rate,   and then 5, 10 -

Line 10, 20:22   and then eventually they got really close at 5 seconds and Henri would beat him by one second, so right here we stopped because it was really close and Henri won by one second and it was 5-second race and it was 25 meters long.

        Jayna: What if you kept going on?   What happened at, what happened at 6?

        Ricky: Um, they were tied at 6.   It'd be 30 and 30, and then the next one would be 35 and 34, and then Emile would be faster.

        T: So you set up a table, and it was important to you to find out when they were exactly the same?

Line 20, 21:15   Becca: [inaudible]

        T: Becca, say that again.

        Becca: Okay, 'cause when I figured out that when the two people tie, then the other person that was losing will come in first now.

        T: So knowing where they tie, whether you found it on a table, or you guys found it through using the numbers, or they found it by using, um, inserting numbers into like an equation.   Somehow you needed to know when they tied.

Chapter 10: The Summary Continues. Bryce and Kristen Use a Graph.
Time: Approximately 21:47 – 24:35 (times from start of video)

Slide
The Summary continues the next day.

Bryce and Kristen have used the graphing calculator.

Line 1, 21:57   Kristen: Well, um, for Henri, which is the little guy, um, we gave him only a 10-meter head start. And then we, we made his walking rate 2 per second. And then we had Emile's rate 2.5.

Bryce: We went to the y and typed these two in and then we went to the window and made it so you could see all that go that far. And then we just got this.

Kristen: That's our table. And they just keep going until they meet at -

Student, off-camera: Nineteen.

Student, off-camera: Well, they meet at 20.

Line 10, 22:41   Kristen: It'd be 48 meters long and Henri would win by half a meter, so it'd be really close.

Bryce: And it'd be realistic and not like half the race is a head start.

T: So it looks like the table strategy that we saw - several of you - the other day was helpful to you because you can see where they were the same, then you backed it up like other people did. How did this help you guys, this graph?

Bryce: Um, so we could figure out, like when they met and stuff….Right where they met, like here, I think, so we know how long the race should be and how many seconds, 19 seconds, and about 49

Line 20, 22:32   meters.

T: Can you got back to your equations? Tell us how those equations relate to what Kristen said for each person.

Bryce: Um, here's the 10 meter head start and here's the constant rate afterwards, and here's just the constant rate of the other guy.

T: You know I was thinking when I was asking if there are any questions. Becca, this reminds me of what you said yesterday, about how they, they meet and then split apart. I can see that on here. 'Cause what happens after they meet and they're equal?

Becca: The other person wins, the person that was losing starts to win.

Line 30, 24:15   T: So the person that was losing, down in the bottom at the corner, eventually wins and, and is always going to win. Why is that person always going to win then, after they meet?

Kristen: He has a faster walking rate than the little guy.

T: So if he has a faster walking rate, why wasn't he winning at the beginning?

Class: Because he had a head start.

Chapter 11: Kelsey's Group Shares Their Strategy.
Time: Approximately 24:35 – 27:48 (times from start of video)

Slide
Kelsey's group shares their strategy.

Line 1, 24:45   T: Now before you guys say anything, could the rest of us try to figure out what the walking rate is and any head start they have. Who thinks they know what this group was thinking in terms of walking rates and any head start? Becca, you have an idea?

Becca: That the, for the Y, like the first one, his walking rate was 2.5, and I think his, and then the second one was 1.5 for the walking rate.

T: And did anybody get a head start in this one?

Becca: Yeah, the second one, which I think is Henri, got a 30-meter head start.

Line 10, 25:22   T: Is that what you guys were thinking? Was Becca right?

Kelsey: Yeah.

T: Alright. Now, I'm sorry. Go ahead.

Kelsey: So then, uh, yesterday we were doing, the day before yesterday, we figured out that 29 seconds worked good so we tried to do that one again, so we went down to 29, and then that was one meter, and then we went down again and it was the tie, so the one above it was the one we used.

                     T: You guys did this on the day before. Do you remember what you did there? (*Teacher showing the group's poster.*) And while they take a look
Line 20, 26:01   at their poster for just a minute, the reason I'm asking them this -here's what I see a lot of. I see tables that we're finding to be very powerful. If we had a table, we're looking for where are they the same. And then you guys were going backwards from there to decide how long the race would be. So I'm seeing a lot of power in tables as a strategy. But I'm also seeing that you're writing the equations but using the equations to make the table, or using the equations so that we can make the graph and see where they're meeting. Which are all great strategies, but I noticed on the first day this group, they had the equations, but they never made a table or a graph. So I'm just wondering how did you guys just use the
Line 30, 26:41   equations without a table or a graph? I know it's taking you back a couple of days, but see if you can remember.

Kelsey: Um, we first wrote this equation, and then we used substitutes, like for seconds. We put in 15, and then we figured out that it was like really far apart, Emile was winning. So we just kept guessing. And then we got, then we substituted 18 and they were getting closer, so we kept

getting higher, and then so we got to 29 and they were really close we went with that.

Line 40, 27:17

T: Um, so I see, what I see from what you were saying, is you like changing the walking rates to make them a little more realistic. You like changing the head starts, so you made a little tighter race that made it a little more realistic feeling. Whether you had huge head starts or small head starts or walking rates that were close or walking rates that were far apart, you found tables to be very valuable strategy, and looking at where they were saying and then going from there. Graphs seemed to be a good strategy also, looking at where they meet and knowing what happens before and after that, and now this idea of maybe using the equations and substituting values into the equations.

Chapter 12: The Teacher Reflects
Time: Approximately 27:49 – XXX (times from start of the video)

No transcript available.