

## Transcript for Video Clip 8.4

Teacher/video ID:	Wilde, 8.4_spcp_gr.3.forces_wilde_L5_c10
Content area:	Forces
STeLLA strategy:	Link science ideas to other science ideas (SCSL strategy G). Highlight key science ideas and focus question throughout (SCSL strategy H).
Context:	In this lesson on forces and motion, students review ideas about friction and introduce a new question about whether air can cause friction.

### Video Clip 4

Time Code	Speaker	Discussion
0:00:02	T	Jackson, what's friction?
0:00:03	SN	A force that pushes back [inaudible] moving object that makes it slow down and stop.
0:00:10	T	Excellent. I love how you read the definition exactly how it is. Does that make sense to you?
0:00:15	S/T	Yeah. / Who can give me an example of friction?
0:00:20	T	Giselle, can you give me one example?
0:00:22	SN	Um, like ...
0:00:25	S	if you're push ... like what we're gonna do today, and what you did with Makela with the chair. If you're pushing [inaudible] something else,
0:00:35	S	and someone or something else is pushing back,
0:00:40	S	that creates friction, because it's [inaudible] somewhere.
0:00:44	T	OK.
0:00:47	T	All right. Jackson, you have something to add to it?
0:00:50	SN	Um, well, if you have a pencil, or if you have a car like we did, and then you ... and then you ran it down the ramp on the carpet, it would go like that.
0:01:03	T	It would bounce?
0:01:04	S	No. It would push it. It would go down, and then it would stop.
0:01:09	T	Oh. [Inaudible]
0:01:11	T	So he's saying the friction is causing the car to stop. Is that what you're telling me?
0:01:16	S	Yes.
0:01:17	T	OK. So of the three things that we had—we had the tile, we had the sandpaper, and we had the carpet—
0:01:27	T	which one has the most friction?
0:01:31	T	Gabe, what do you think?
0:01:32	SN	Carpet.
0:01:33	T	Why the carpet?

0:01:35	S	Um, because there's, like ... there's hair in it, and the sandpaper has, like, therocks that don't stop it a lot, but it still stops it, and the tile [inaudible].
0:01:48	T	Ah. So OK. One's got the bigger things that get in the way, one's got smaller ones, and the one has very tiny ones?
0:01:57	S	Yeah, [inaudible].
0:01:58	T	OK, Lucy?
0:02:00	SN	Um ...
0:02:03	S	I forgot your question.
0:02:05	T	Which one ... How do we know which one has the most friction?
0:02:10	S	Um ...by looking at it. If it has, like, very big bumps. Like, the carpet has, like, adult-size hands, and the sandpaper has kid-size hands,
0:02:23	S	and the tile has baby-size hands.
0:02:25	T	OK.
0:02:26	S	That's how you know.
0:02:27	T	OK. Are you talking about the hands like this?
0:02:29	S/T	Yeah. / OK.
0:02:30	T	So Lucy's saying the carpet has the big hands like this, or big bumps. The sandpaper has smaller hands like this,
0:02:39	T	and then the tile has the smallest hands. Would they all still have bumps that get in the way?
0:02:44	SS	Yes.
0:02:45	T	Is there anything that wouldn't have bumps to get in the way?
0:02:48	SN	No.
0:02:50	T	Giselle?
0:02:51	SN	Air.
0:02:52	T	Air? Well, what was Robert saying about the wind yesterday?
0:02:56	S	Well, true, the wind can be ... even it can be ... kind of go here and then there and then there.
0:03:03	SN	But the wind is just air.
0:03:05	T	The wind is air, isn't it?
0:03:06	SN	But it's moving air, so it can kind of be—
0:03:07	SN	No, like, it could ... Air always moves.
0:03:09	T	OK.
0:03:10	SN/SN	[Inaudible] really fast. / No, I was saying, like, if it's windy, like really windy ... like today. Today was windy in the morning.
0:03:19	T/S/SN	Yeah. / It was really windy. / It was ... it's been windy all day.
0:03:22	T	And if I throw a ball in the wind, is it gonna go as far as I throw a ball when there's no wind?
0:03:26	SS	No.
0:03:29	SS	Yes.

0:03:30	T	Which ball is gonna go farther?
0:03:31	SN	Wind.
0:03:32	SN	The wind would—
0:03:33	T	If I throw it against the wind?
0:03:35	SN	Oh ...
0:03:36	SN	The wind [inaudible].
0:03:36	T	Eliza, which one's gonna go farther?
0:03:38	SN	The wind, because the wind is stronger than the ball.
0:03:41	T	So let's say the wind is coming at me, and I throw the ball. And then the next day there's no wind at all.
0:03:48	T	And then I throw the ball. Which ball is gonna go farther?
0:03:53	T	Hailey, what do you think?
0:03:54	SN	Um ... the no-wind [ball].
0:03:56	T	The no-wind. Why?
0:03:58	S	Be-because the wind that is blowing would push back on the ball.
0:04:03	T	Ah. So can air still have a force?
0:04:06	SS	Yes.
0:04:07	T	So would there still be a little bit of friction in the air?
0:04:10	SS	Yes.
0:04:11	T	I think so. Just because you can't necessarily see it, does that mean that there's no friction?
0:04:16	SS	No.
0:04:17	T/SN	No. / Because you always can't see friction, just like you can't see gravity.
0:04:21	T	Ah, you're right. You can't necessarily see friction. You can't see gravity, and that's a force, isn't it?
0:04:26	SN	You can't [inaudible].
0:04:28	T	Interesting.
0:04:29	T	So let's say, with the car ... we put it down the ramp, and it went, right? Eventually the car stopped. The car is going this way.
0:04:39	SN	Yes.
0:04:40	T	Which way is the force of friction going if the car is going this way?
0:04:46	T	Makela, what do you think? The car is going this way. Where is the friction going?
0:04:50	SN	[Inaudible]
0:04:51	T	You think the friction is pushing the car along?
0:04:54	T	OK.
0:04:57	T	Lucy?
0:04:58	SN	Pulling it back.
0:05:00	T	What do you mean, "pulling it back"? So is the friction grabbing the car and pulling it?

0:05:04	SN	Yes.
0:05:05	SN/T	Uh-uh. / No?
0:05:06	S	I mean, like, it's grabbing down to ...
0:05:10	S	Pulling it down to stop it.
0:05:12	T	OK. So you're thinking pulling down. OK. Storm?
0:05:16	SN	If the car's [inaudible], and, like, the friction ... it would ... since the friction's pushing on the ball, fric- pushing on the car, it'll eventually come to a stop.
0:05:26	T	So the friction is pushing on the car.
0:05:27	S	Like, like, is this going like this, and the car is going like this, the one that's longer will stop it.
0:05:34	T	Ah. So you're saying ... so this is my car, my fist is my car. It's going this way.
0:05:38	S	And then the friction ...
0:05:39	T	Are you saying the friction is going this way? It's pushing this way?
0:05:41	S	The friction is, like ... yeah, 'cause, like, it ...
0:05:44	T/S	Mm. / ... the pencil's longer than it, and ... and the ... and the ... and the bigger arrow means it's pushing harder, and since it's small, it'll push it back.
0:05:52	T	Interesting. So Storm is saying the car is going this way, [and] the friction is pushing back the opposite way on the car.