Transcript for Video Clip 7.2

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Content area:	Energy transfer
STeLLA strategy:	Select content representations and models matched to the learning goal and engage students in their use (SCSL strategy D).
Context:	In this lesson on energy transfer, students use a ramp-and-marble model (content representation) of Mumford and Leroy's bike collision to develop scientific explanations of what happens to energy when objects collide.

Video Clip 2a

Time Code	Speaker	Discussion
0:00:01.6	T	Ready? What'd we find out?
0:00:03.2	SN	We found out that—
0:00:03.6	SN	[Inaudible]
0:00:05.3	SN	when they … when they crashed, Mumford and Leroy both moved, but Mumford didn't move that much.
0:00:10.9	T	Oh. Ohh.
0:00:12.5	S	And Leroy moved a lot.
0:00:13.9	SN	Collided with Leroy, and Leroy moved and stopped … and stopped after a short time.
0:00:19.8	T	You guys, that is exactly what happens. When you write your answers, though, what we want to try to remember is use words like *motion energy* and *fast* and *slow* … how that relates to energy.
0:00:32.8	S	Didn't we use—
0:00:33.4	T	What happens to the energy when objects collide?
0:00:36.7	S	Well, the energy … it kind of, like, explodes, kind of. It, like, kind of like a force field. It kind of like bounces kind of.
0:00:45.6	S	I don't know how to say it.
0:00:46.8	T	We're going to answer this question today: What happens? I didn't think … I didn't see anything explode. I'm not sure that's the word you … you want.
0:00:51.7	S	Yeah. Well, like—
0:00:53.6	T	Let me look. Let's look here real quick. Give me that block there, kid.
0:00:59:7	T	I don't want to take all your fun from you. I know you guys saw what happened. But who's at the top there? Is there Mumford?
0:01:05.8	SS	Mumford.
0:01:06.4	T	There's Leroy. Collision. Hmm. This … Leroy's got no energy … not … no motion energy at the start of this.
0:01:15.8	T	And then …
0:01:19.4	T	Explain that now, using the words *energy* [and] *motion energy*. What happens when these two collide?
0:01:25.8	SN	Well, they [inaudible].
0:01:31.1	SN	When they collide, they …

0:01:36.8	S	The … Mumford …
0:01:38.7	T	Mumford, yeah.
0:01:39.6	S	Mumford bounces kind of. The energy … some energy still remains in him.
0:01:48.2	S	But most of the energy goes to Leroy.
0:01:50.6	T	Oh, now we're getting closer.
0:01:52.2	S	And then it … so he goes … the kinetic energy goes into him, and he moves back, 'cause …
0:02:01.9	T	Now we're getting there.
0:02:03.0	S	And then Mum … Mumford …
0:02:04.4	T	I know that's what you were trying to say.
0:02:06.9	S	moves a little bit, and then he still has energy, but he doesn't move.
0:02:11.7	T	OK. Well, they … they both stop eventually, but after [the] collision, I think both look like they have energy.
0:02:18.8	T	Now look how fast he's going. He's coming down the hill, and he is moving. But he doesn't … he's not still moving, not really fast. Doesn't he slow down? Oops.
0:02:30.1	T	But he doesn't stop. He stops here, not here. You guys have the right idea. Try, try, try to explain it as best you can.

Video Clip 2b

Time Code	Speaker	Discussion
0:02:43.4	T	Set that up and make it happen. I'm going to watch you work.
0:02:45.5	SN	OK.
0:02:48.1	SN	So …
0:02:50.1	T	Which … which person's at the top there?
0:02:52.4	SN	Uh …
0:02:52.6	SS	Mumford.
0:02:53.6	T	OK.
0:02:55.2	T	Oh. That was interesting. Try it again.
0:03:05.5	SN	Oh, so—
0:03:06.3	SN	Knew it.
0:03:06.8	T	Hmm.
0:03:07.2	SN	Mumford is giving kinetic energy or motion energy to Leroy …
0:03:12.5	T	Oh.
0:03:12.8	S	to make him go farther.
0:03:14.6	T	How does that relate to your prediction?
0:03:14.7	SN	So he … he probably lost some. He probably lost some kinetic energy.
0:03:20.4	T	Did he lose all his kinetic energy?
0:03:22.1	SN	No, some. Only some.
0:03:22.3	T	Ah.
0:03:22.6	SN	No, but from the collision, and then he lost all of it when he stopped.
0:03:25.9	T	You guys nailed it. You nail— How does it compare to your prediction, I wonder?

0:03:29.3	SN	Uh …
0:03:31.3	SN	It compares to my prediction because I predicted that Mumford would bump into Leroy, and Leroy would move farther than Mumford, and Mumford will …
0:03:39.6	SN	Yeah.
0:03:40.5	SN	suddenly stop right in the middle.
0:03:42.6	T	Hm.
0:03:43.2	SN	That's exactly what I wrote too.
0:03:44.0	T	OK. Try to tell me— Record your data as best you can.

Video Clip 2c

Time Code	Speaker	Discussion
0:03:52.3	T	Mm, that's going to be trouble. Let's see what we've got going on here. Where … Oh, I see your notebooks up here, OK.
0:03:58.9	SN	So what we did was we put one marble down here and then—
0:04:05.0	SN	'Cause the lower grades have more than one recess and—
0:04:06.7	T	Trent. Ready? Mm-hm.
0:04:09.5	S	Yeah. And they already had a recess.
0:04:10.3	SN	It's when you push it lighter, it makes this one go …
0:04:15.1	T	Well …
0:04:15.4	S	not as far.
0:04:16.2	T	OK.
0:04:16.6	SN	But if you push it harder, it goes farther, 'cause more energy comes from that [inaudible].
0:04:19.9	SN	The one that has that energy at the beginning gives the energy to the other one, and that one …
0:04:23.6	SN	Yeah.
0:04:23.9	SN	goes to the other one …
0:04:24.3	SN	Yeah, kinetic energy.
0:04:24.9	SN	and it has more energy.
0:04:25.8	SN	Like the one down here—
0:04:26.7	T	What do you mean by— That sounds smart! What do you mean by "gives energy"?
0:04:31.5	SN	Like, transfers energy.
0:04:32.7	T	*Transfers* … a nice science word.
0:04:34.3	SN	'Cause if it's going fast at it …
0:04:35.9	T	Uh-huh.
0:04:37.1	S	it stop … it make … it causes the one that was … that had the energy to stop and the other one to—
0:04:41.5	T	But look. Here's the one. Rane, look, here's the one that has the energy. This is Mumford, right? He's at the top.
0:04:45.7	SN	Yeah.
0:04:46.9	T	If you said it stopped, I would expect this marble to come down and stop right there,

		and then this one goes this way.
0:04:52.9	SN	And that one will go …
0:04:54.3	T	But …
0:04:54.6	S	That one still has a little bit more energy.
0:04:57.3	T	Watch what happens.
0:04:58.1	S	Yeah.
0:04:58.7	SN	They both go.
0:04:59.6	T	It doesn't stop right there.
0:05:01.1	S	Yeah, they both go a little bit more.
0:05:03.5	T	So this one has a bunch of energy. It collides. This one has no energy.
0:05:07.6	S	It transfers …
0:05:08.8	T	What happens after the collision?
0:05:09.3	S	some in that, but it still has more energy.
0:05:11.6	SN	It … it gives some energy. Like, it transfers some energy, but it keeps some.
0:05:15.7	T	That … Ooh. Can you record that in your notebook?
0:05:20.2	S	Yes.
0:05:20.4	SN	What did you say?
0:05:20.7	T	Yeah. Tell 'em what you said. That sounds scientific.
0:05:25.1	SN	It … it transfers some energy, but it keeps some energy.

Video Clip 2d

Time Code	Speaker	Discussion
0:05:34.1	T	How we doing?
0:05:35.0	SN	We need to—
0:05:35.6	SN	We need to draw a picture, and I'm still writing your science [inaudible].
0:05:38.7	T	You guys haven't diagrammed yet?
0:05:40.0	SN	No.
0:05:40.4	SN	No, we're almost done.
0:05:40.6	T	OK. Well, let's get going. How are you going to … Well, here's your model right here. What are you going to do with the marbles?
0:05:49.7	SN	Oh, we were—
0:05:50.1	SS	We already did it.
0:05:51.6	T	You … you … Did your … Oh, so you've collected your data. OK, that's fine. Draw me a diagram of your model, though.
0:06:03.9	T	Your before says "I think Mumford …" That sounds like a prediction.
0:06:10.4	T	We know that before … right … Here's the start of the story, right? Cole?

0:06:17.3	T	Here's the start of the story. In fact, I left you guys off at the story where Mumford is … has all this motion energy coming down the hill.
0:06:27.0	T	What I want to know is what happens—bang—at collision time?
0:06:33.9	T	So it's not about predicting. Now it's about observing. And what happens to the energy when objects collide?
0:06:41.3	T	That's what I need to know from you. You should be diagramming this. Let me see.
0:06:45.1	SN	No, I … like, I'm on my … not all … I'm not done with it. I'm almost done.
0:06:49.1	T	I see.
0:06:51.5	SN	This right here, Mr. Knight, [inaudible].
0:06:55.3	T	OK, it says you wrote here that the mar … the marble moving down the hill, it stopped.
0:07:01.3	S	And I think they just …
0:07:02.3	T	Right?
0:07:02.5	S	like, go down to—
0:07:04.4	T	The marble moving down the hill, that's Mumford, right?
0:07:08.1	SN	Mm-hm.
0:07:08.7	T	If we roll this down the hill, just like it does in the story. Let's have a look.
0:07:16.4	T	It's … it stops, but did it stop where they collided?
0:07:21.6	SN	Mm …
0:07:22.2	T	Well, look. The marble's right here.
0:07:24.4	S	Oh. It didn't.
0:07:26.4	T	This is what you need to be observing.
0:07:31.2	T	You guys need to look carefully and think about what's happening to energy.
0:07:35.2	T	There's no energy there, not mo … not movement energy. There's no kinetic energy here. All the kinetic energy's here.
0:07:40.8	SN	'Cause it transfers energy to [inaudible].
0:07:42.8	T	Keep working. That sounds good. Tris …