

*Setting: Cooper, Olivia, and Hamza had a hard time with their science homework last night. They're talking in the hallway before class.*

**Cooper:** You look half dead, Hamza. Here, take my energy bar.

**Hamza:** Thanks. I get that the bar will give me some energy, but I did *not* get last night's homework about energy. Did you?

**Olivia:** Hi guys! I thought the homework was confusing, too. It said something about energy having to do with things moving, but energy bars don't move. At least not like a ball or a wave does.

**Cooper:** Maybe they're called energy bars because they can make people move more when they eat them? I don't know, though.

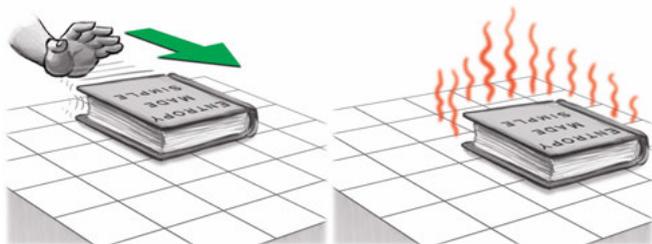
**Hamza:** I thought energy was electricity that makes stuff work, like lights.

**Olivia:** Maybe energy can do a lot of different things. But then why bother with the word "energy"? Why don't we just say "food" when we mean food and "electricity" when we mean electricity?

**Hamza:** I think that this energy bar is working. I feel better. My energy had gone on vacation, and now it's...coming home.

**Cooper:** You know, your energy might have come back, but the energy we are studying never goes away, it just changes. Look...

*He pulls out his homework and points to this graphic:*



**Cooper:** Remember how the energy of the sliding book was slowed down by **friction** so the table and the book got hotter? Well, probably just a little hotter. Anyway, that's where the energy went, into heat.

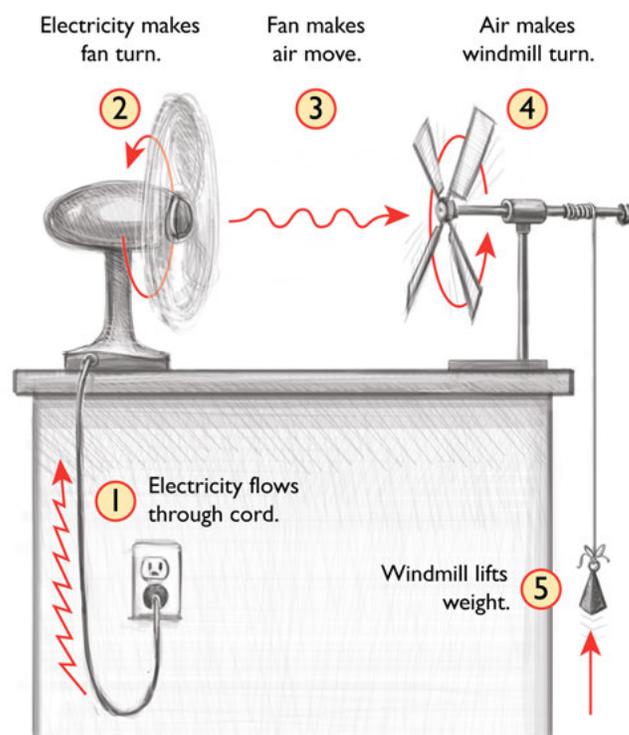
**Olivia:** Are you saying that hotter people use more energy? Well, that means that Hamza...

**Hamza:** (*cutting her off*) Don't go there, Olivia.

**Cooper:** (*changing the subject*) Look at the next picture. We're supposed to explain what's going on in terms of energy.

**Olivia:** Whoa, there's a lot going on there. It's confusing. It's like everything is all connected. How can you even keep track of what you're talking about?

**Hamza:** The fan is winding up the thing attached to the stand. When you turn the fan off the mass is going to drop back down because of **gravity**. What a crazy setup.



**Olivia:** You totally could have done your homework if you'd tried. You got that way faster than I did. So this weird energy system is storing up energy as the string gets wound up.

**Cooper:** Yeah. The **kinetic energy** involved in the winding up is getting switched over to **potential energy**.

**Hamza and Olivia:** Huh?

**Ms. Quintanilla:** Sorry, guys. I couldn't help eavesdropping because I was so impressed with your comments. Especially yours, Olivia, about the challenge of keeping track of different parts of a system.

**Olivia:** I said that? Uh, I mean thanks, Ms. Q!

**Ms. Quintanilla:** System is a great word in science because it's flexible. It's like drawing an imaginary boundary around a portion of the real world and studying how the parts within it work together. Let's look at the last part of your homework with that hillside problem.

Hamza: That was hard!

Ms. Quintanilla: It's supposed to be hard. When things are easy you're not really learning, you're just performing. Remember that these exercises were supposed to help you begin thinking about energy. If you're struggling, that means you're thinking! We'll discuss them right now in class.

Hamza: Oh good. I'm glad. I didn't understand what you meant by **potential** and **kinetic**, either.

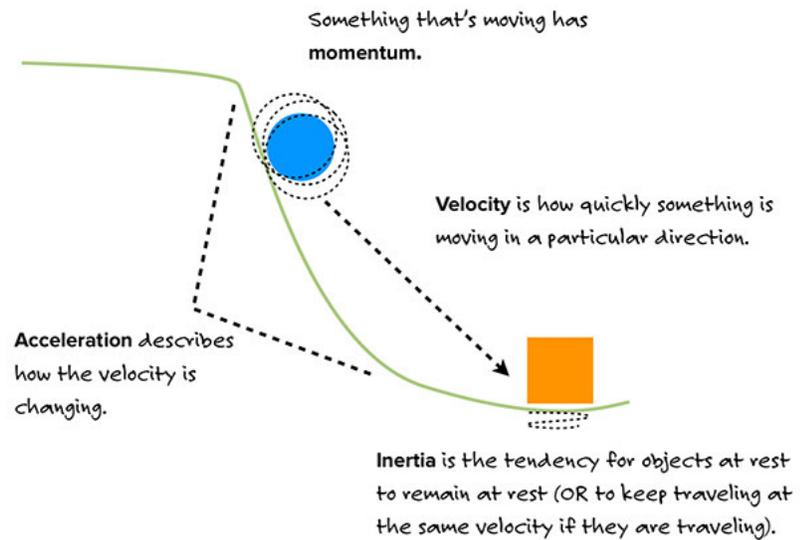
Ms. Quintanilla: Excellent question. We'll go over that as well.

They all walk into the classroom. Ms. Q asks the class to look at five images of the hillside (part of their homework). She tells the members of each table group to compare answers and to discuss their thinking. Cooper, Hamza, and Olivia are sitting at the same table, and they all have different answers to the problem. Here's how the problem looked on their worksheet:

Ms. Quintanilla: In fact, we can use these little pictures to help us with a few more helpful terms we need to learn: **momentum**, **acceleration**, **velocity**, and **inertia**.

Olivia: I hear the first two of those words all the time. Our

Ms. Q draws on the whiteboard:



Cooper: (under his breath) I'm glad she's our science teacher and not our art teacher...

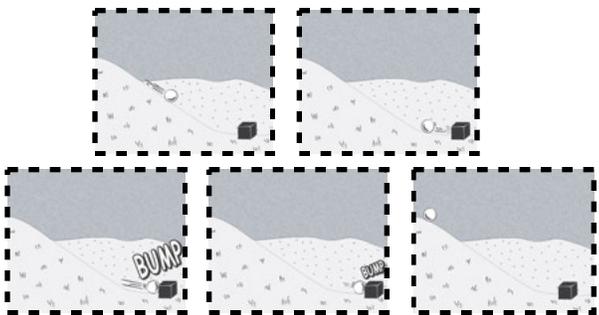
Ms. Quintanilla: (to the entire class) My extra credit starter challenge for you all today is to look at the last problem of your homework, the one with the hillside, and to add a caption that describes what's happening in the sequence. But try to use the terms I've written on the whiteboard correctly as you write.

Hamza: Extra credit? Awesome. This will help make up for the other times when I didn't have the energy to do my homework.

Olivia: I say again Hamza, not an energy problem...an attitude problem.

Hamza: Whatever.

The five illustrations show an energy system but they aren't in the correct order. Think through how the energy would move through this system. Then cut out the the images and tape them on another piece of paper in the correct order.



lacrosse coach talks about **momentum** a lot.

Hamza: And you hear about **acceleration** in car commercials.

Ms. Quintanilla: Great! Well, let's talk about the science so you can see why coaches and advertisers like the terms so much.