The Pop Ups. Stay seated. Three, two, one, ignition. Get ready for an adventure of magnificent proportion.

The Pop Ups. (Singing.) I don't know what you've been told, but we're in a golden age - so many discoveries that are jumping off the page. Wow in the world. Wow in the world. Wow in the world. Wow in the world. Wow in the world. Wow in the world. Wow in the world. Wow in the world.

The Pop Ups. With Guy and Mindy. We're on our way, Houston.

(Soundbite of machine woosh).

Mindy Thomas. Hey, Guy Raz. I thought I'd find you in your greenhouse today.

Guy Raz. Well...

Mindy. Oh, man, it is so hot in here. Is it just me, or is it the Pepper X pie I ate for dessert? Phew!

Guy. Well, I guess my greenhouse might be a little warm for us, but it's perfect for my tomatoes, Mindy.

Mindy. I don't know. They look pretty red to me. Maybe they've got sunburn.

Guy. Well, this time of year, the sunlight isn't strong enough to make the air outside warm. But when the sun comes through the glass in my greenhouse, it heats up the plants and the soil, which is why it's warm in here.

(Soundbite of sizzling).

Mindy. The soil? Wait a minute, the dirt is warm, too? Let me just see. Ooh, nice.

(Soundbite of rummaging through dirt).

Guy. Yeah, who knew warm dirt could feel so good, right?

Mindy. Yeah. If only there was a way we could trap all of this heat in.

Guy. Well, the glass sides of the greenhouse keep the heat from getting out as well.

(Soundbite of knocking on glass).

Mindy. Are these glass?

Guy. Yes, and please don't knock so hard.

(Soundbite of knocking on glass).

Guy. You're going to break...

(Soundbite of glass shattering).

Mindy. Oops.

Guy. You're going to break it.

Mindy. Sorry.

Guy. (Groaning). Anyway, like I was saying, Mindy, these glass windows double as the walls of the greenhouse, and they keep the plants warm without having to use any extra energy.

Mindy. Oh, so you mean like all the extra energy you would have to use if you had, say, electric heat lamps or a furnace or something to keep things warm.

Guy. Exactly.

Mindy. And so the way this greenhouse works is actually pretty good for the environment.

Guy. Right, because even though I have a greenhouse, I'm not creating any greenhouse gases.

Mindy. Oh, I could fill your greenhouse with gases, Guy Raz.

(Soundbite of farting noise).

Mindy. Excuse me.

Guy. Mindy, that's not what I meant by greenhouse gases. I have to tell you about this incredible scientific study I was just reading about.

Mindy. Oh, you know I love a good scientific study, Guy Raz. But first, can we get out of here? It's so crazy hot even my sweat is starting to sweat.

Guy. Well, if you think it's warm in here right now, Mindy, just you wait until the end of the century.

Mindy. Wait until the end of the century? That's the year 2100. I don't have that kind of time to wait.

Guy. Well, I know you've got a busy schedule, Mindy, but I think you need to hear me out. This is important.These researchers from the University of Southampton in the United Kingdom have just discovered that by the year 2100, the average temperature on planet Earth might be...

Mindy. What?

Guy. ...Drumroll, please...

(Soundbite of drumroll).

Guy. ...As hot as...

Mindy. What?

Guy. ...As hot as it was....

Mindy. As hot as it was what?

Guy. ...As hot as it was fifty million years ago.

(Soundbite of cymbal crash).

Guy. Well, fifty million years ago, the Earth was about eighty-six degrees Fahrenheit on average.

Mindy. On average, so meaning that it was hotter on some days and colder on others?

Guy. That's right. And for comparison, in July of 2017, the Earth's average temperature was sixty-two degrees Fahrenheit.

Mindy. Whoa, and July is one of the hottest months of the year in some places.

Guy. That's right. And while eighty-six degrees Fahrenheit might not sound too scorching hot, well, fifty million years ago, it was hot enough that crocodiles were swimming in the Arctic, and there were palm trees in Alaska.

Mindy. What? That's hotter than a Carolina Reaper mixed with a ghost pepper, mixed with a Pepper X, mixed with a peppermint…

Guy. Yeah, yeah, yeah, I get it. I get it.

Mindy. But you said that the year 2100 might be as hot. So why isn't it for sure?

Guy. Well, it all comes back to those greenhouse gases we were talking about before you filled my greenhouse with your other kind of gases.

Mindy. I said excuse me!

Guy. Well, that's true. You did.

Mindy. Yeah, I know all about greenhouse gases. They're created when we drive our cars and heat our houses and every time a cow toots.

Guy. Gases like carbon dioxide are released into the atmosphere. And over time, they heat up the Earth.

Mindy. Oh, and these gases do that by forming a see-through wall around the Earth, kind of like the glass walls in your greenhouse here.

Guy. Yes. And just like with my greenhouse, the sun shines through those gases onto the Earth and heats us up.

Mindy. And just like your greenhouse here, the heat gets locked in.

Guy. That's right. All those greenhouse gases act like those glass panels in my greenhouse, keeping all of the heat close to the Earth.

Mindy. Wow, we really gave that metaphor a workout.

Guy. And, in fact, Mindy, the greenhouse gases are turning our Earth into a real greenhouse. And if we don't take care of this, things could really start to warm up over the next eighty years.

Mindy. Ugh! So we need to do something about it before it's too late.

Guy. That's right.

Mindy. I'm on it.

Guy. Are you thinking what I'm thinking?

Mindy. Guy Raz, it's time for us to go back fifty million years ago.

Guy. OK, well, I guess - let's go.

Mindy. Sounds good. Time machine's parked right outside. Come on, we're going to be late.

Guy. Late? Considering we're already fifty million years late, I think it's going to be OK.

(Soundbite of machine whoosh).

Mindy. Made it. Man, all right, let me just open the hatch here. Whoa, man, I forgot how crazy hot it is back then, or back now - fifty million years ago. How did ancient Earth get so hot? I mean, I'm looking around, and there aren't any humans yet. I don't see any of these animals driving cars or heating houses or building things.

Guy. That is an excellent question, Mindy, because I know that there was naturally more carbon dioxide in the atmosphere millions of years ago...

Mindy. Yeah.

Guy. ...But I'm not really sure why. So maybe we should consult an expert.

Mindy. An expert? Ah, Reggie!

Guy. Reggie?

Mindy. Yeah, he's taking a college class on environmental science.

Guy. Wow. Between taekwondo and selling shoes at Foot Locker, Reggie never ceases to amaze me. I guess no one should call him a birdbrain.

Mindy. Why not? Birds have amazing brains. OK, I'm going to give him a call.

(Soundbite of phone dialing).

Mindy. Hey, Reg.

(Soundbite of bird cooing).

Mindy. Yeah, it's Mindy.

(Soundbite of bird cooing).

Mindy. Yup, Guy Raz is here, too.

(Soundbite of bird cooing).

Mindy. What?

(Soundbite of bird cooing).

Mindy. Yeah, I think we should be back in time for dinner.

(Soundbite of bird cooing).

Mindy. Yeah, except for the fact that we are fifty million years in the past, and it's really hot here. The reason we're calling is because we need your environmental expertise.

(Soundbite of bird cooing).

Mindy. OK, so what we want to know is how the Earth got so hot fifty million years ago if there were no humans around to do all that stuff that junks it up, putting carbon dioxide into the atmosphere?

(Soundbite of bird cooing).

Mindy. Oh.

(Soundbite of bird cooing).

Mindy. Huh. Well, thanks, Reg.

(Soundbite of bird cooing).

Mindy. See you in fifty million years.

(Soundbite of bird cooing).

Guy. So what'd he say?

Mindy. OK, so Reggie says the reason there used to be so much carbon dioxide in the atmosphere is because of natural causes - natural events like volcanoes.

Guy. Yeah, that makes sense because I know that there used to be a lot more volcanoes when the Earth was first formed. And I bet those volcanoes release carbon dioxide when THEY erupt.

Mindy. You got it. You must be a real birdbrain, too, Guy Raz.

Guy. Thanks?

Mindy. And Reggie also said that our Earth cooled down from natural causes, as well.

Guy. Natural causes, huh. Well, what were they?

Mindy. So apparently, over millions and millions of years, giant rocks on Earth naturally started to break down into tiny pieces.

(Soundbite of rocks smashing).

Guy. Go on.

Mindy. And those tiny pieces of rock became dirt.

Guy. Like the dirt in my garden.

Mindy. Yup. And so this dirt started to suck up or absorb a lot of the carbon dioxide in the atmosphere.

Guy. OK.

Mindy. And that process started to remove the carbon dioxide from the atmosphere. And as a result, the Earth cooled down.

Guy. Of course. Now it's starting to make sense. So more dirt means more plants could grow. And plants breathe in carbon dioxide and breathe out oxygen.

Mindy. You got it, Guy Raz. So all of these different natural things happening are why the Earth has heated up and cooled down so many times over millions and millions of years. And I read that our sun, in the present day, is hotter than it was millions of years ago.

Guy. Well, here we are millions of years ago, and it feels pretty hot to me.

Mindy. The air is hot because of the extra carbon dioxide in the atmosphere. But the sun itself is kind of like a lightbulb.

Guy. How so?

(Soundbite of lightbulb turning on).

Mindy. Well, you know how a lightbulb is cool when you first turn it on?

Guy. Yes.

Mindy. But if you try to hug it after it's been on for a couple of hours, it'll burn you.

(Soundbite of sizzling).

Guy. Yeah. I take it you learned that the hard way?

Mindy. The sun gets hotter and hotter over time, too, even if we can't really feel it heating up.

Guy. And so that's another thing speeding up the Earth's rising temperatures.

Mindy. Yup. But what I want to know is if the dirt and the plants absorbed the carbon dioxide and cooled down the Earth a long time ago, then why can't the Earth just do that again?

Guy. Well, because right now, Mindy, it's just getting too hot too fast. And the Earth's cool-down process and warmup process are like two turtles in a race.

Mindy. Ooh, I love a good turtle race. So how does it work?

Guy. Well, when nature is in charge, the cooling turtle and the warming turtle sometimes pass each other. But eventually, they end up evening out the score at the finish line.

Mindy. But now with greenhouse gases, it's like we put the global warming turtle on a rocket-powered skateboard or something.

Guy. Exactly. So we're going to have to speed up that cooling turtle or slow down the warming turtle so they can even out again.

Mindy. And we can help do this by doing things like walking or riding a bike instead of driving a car or maybe just stop wasting so much stuff and creating a bunch of garbage and trash.

Guy. That's right, and by switching out our lightbulbs for energy-efficient LED lightbulbs.

Mindy. Take that, warming turtle. So what else can we do?

Guy. Well, you might be surprised, but one of the best things we can do is to compost our food waste.

Mindy. Oh, yeah, composting, that beautiful process of worms eating our old food and pooping it out into warm, lovely dirt.

Guy. Indeed.

Mindy. But how does it help the Earth?

Guy. Well, the average American family produces twenty pounds of food waste every month.

Mindy. Wow, must be a lot of work to deal with all that.

Guy. It is. And garbage trucks have to burn fossil fuels to take that garbage to landfills. And in some cities, it's a five hundred mile drive.

Mindy. That must make so many greenhouse gases.

Guy. It sure does. And even worse, when that food sits in the landfill and decomposes or breaks down, it produces methane, which is another very super strong greenhouse gas.

Mindy. Not to mention, a very stinky gas.

Guy. And that's why it's our responsibility, as humans, to help slow down the warming turtle or find a way to speed up the cooling turtle and make sure the Earth is a good place for all living things.

Mindy. Oh, just think of Reggie's great-great-great-great-great-great-great-grandpigeons. We can help make the future of this planet better for them, too.

Guy. Hey, I just got an idea. Why don't we go back to our own time and get started?

Mindy. Good idea, Guy Raz. We got to get back to the time machine. Let me just - (imitating Southern accent) all right now, time to saddle up, partner.

Guy. Mindy, I thought you weren't going to talk like a cowboy anymore.

Mindy. I'm not. (Imitating Southern accent) I'm talking like a cowgirl.

Guy. No, I...

Mindy. Here we go.

(Soundbite of music).

Mindy. Oh, man.

Guy. That was a tough landing. You OK, Mindy?

Mindy. Yeah, I think so.

Guy. All right, well, let's get back inside the greenhouse.

Mindy. Actually, Guy Raz, I think I'm going to meet up with you later. Now that I've got my time machine key to the future, I've got a quick errand to run.

Guy. OK, but please be careful in the future. And bring your ice helmet just in case.

Mindy. See you soon.

Guy. Well, I guess I better go back to the greenhouse and start harvesting my kale. (Whistling). What?

Mindy. Incoming.

Guy. Is she back already?

(Soundbite of crash).

Mindy. Greetings, Guy Raz. I'm back from the year 2100.

Guy. The year 2100 - what was it like?

Mindy. I met an old man and an old woman who were really famous.

Guy. OK.

Mindy. And they were famous because they had worked together to invent a new way to create energy to use for almost everything, from our lights to our cars, to our waffle makers, to our electric skateboards for cats.

Guy. The future has cat skateboards?

Mindy. Whoops. Shhh, I didn't mean to give that one away.

Guy. Cat skateboards.

Mindy. Anywho, this little team and their friends created a new way for us to make energy, a kind of energy that didn't add any more carbon dioxide to the atmosphere.

Guy. Wow. Our climate change heroes are really out there, Mindy.

Mindy. Yup, they sure are, Guy Raz, and they may not even know it yet.