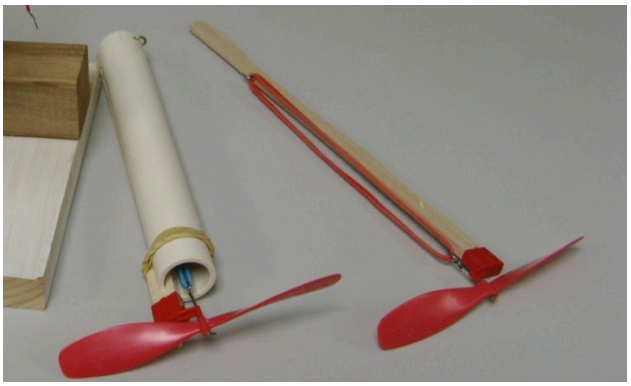
Focus on Energy

Transcript

Motion Energy, Classroom Activity 4

Make Meaning Discussion: Students have explored what happens to a rubber band and propeller when they twist the rubber band different amounts. In an all class discussion, they use energy cubes to reason about energy forms and flow in the rubber band/propeller system.



So we've got a lot of energy in the rubber band, a lot of elastic energy in the rubber band, and none in the propeller. Watch and I'm going to ask one of you to come up and move the cubes. Ready? This is what's going to happen. You're going to move the cubes to represent this. Who wants to move the cubes?

Me.

Go ahead and move the cubes. Leave your blanket behind. Move the cubes. Where do they go?

Well, it's just goes from [INAUDIBLE].

She's doing two things. Can somebody who can see what she's doing describe? Go ahead.

She's moving the cubes over [INAUDIBLE].

She's moving them from the rubber band to the propeller, and what do we call that? We call that energy transfer. She's transferring the energy. Is that you were going to say?

Yes.

I bet it was.

And also, I would've done it a different way.

All right, you can do it a different way in a minute. Are you done?

I'm just saying that after a while there, it just keeps on going.

It keeps on going until all of the elastic energy of the elastic rubber band has been transferred to the propeller. But something else happened. She moved them from one place to another, but she did one other thing to the cubes. Who can tell me one other thing that happened to the cubes, to that energy cubes, as they went moving from the rubber band to the propeller? Yes.

She turns them from elastic energy to motion energy.

She turns them from elastic energy to motion energy. And we have a word for that, which she says is, transformed. It's changed forms. And just as you said so beautifully, it's going from elastic energy to motion energy. All right, are you ready for something hard? This is really hard, actually.

Wait, did anybody have another way?

Oh yes, you had another way. Go ahead.

In [INAUDIBLE] energy, I would move it so a little bit of it was [INAUDIBLE]. If it's all this, it turned into movement energy because it was moving. And then the rest turned into [INAUDIBLE] energy here. And then eventually it [INAUDIBLE].

Interesting!

Very interesting. Very interesting.

That's slightly longer and more complicated.

I know!

Why do you think that's interesting? It really is, [INAUDIBLE] tell me why you thought that was interesting?

Because it was exactly like that, and she moved all of them to the rubber band circle, and she said the rubber band was untwisting itself, all the energy, all the motion energy, went to the propeller.

And she also said that some of the elastic energy turned into motion energy right in the rubber band. Isn't that what you said?

Yeah.

Watch it. Tell me. We've got elastic here. Tell me that as this thing unwinds, before the propeller stops, tell me if there's any motion in the elastic band. Ready? You see the elastic band moving?

Yeah.

Was that your idea?

I wonder if there's even any more story. The story I saw was that she had it like this was the in-between step, and then like this. I wonder if there's even any other way that someone might think of it?

You want to start it with 'E's?

With 'E's. I'm going to go up to all 'E's. Anybody have even a different way yet? Go ahead.

[INAUDIBLE].

Come on up, you come too. Because you've got a way too. Both of you can come.

I have [INAUDIBLE], and then it comes over so you--

[INTERPOSING VOICES]

[INAUDIBLE] and then the propeller, this has a motion energy while the propeller is spinning.

So how would you show that? Yep.

[INAUDIBLE] but when it stops, there's not energy.

Very interesting!

Very interesting is right. So when everything stops, I'm going to get us in that state, Is there any motion energy in either place?

Yes. Yes. The rubber band is still balancing.

Well, it's still, yeah. Let's look at the propeller. Any motion energy in the propeller?

No.

Oh, so where is that motion energy now?

In the rubber band.

It didn't go back to the rubber band.

So I'm going to make another circle, because it seems to not be in the rubber band or the propeller.

So where--

And I'm going to put a big question mark.

Where does it go?

Into the air.

Into the air. We've got an idea that in that circle it might be air. Anybody have another idea?

What would be the indicator? How do you know there is energy in the air? He said that.

Because you feel it.

What would you feel?

Let's see if there's any evidence that some of the energy went to the air.

Yeah--

Can you feel it? We have some evidence we can feel the air moving over here.

So what kind of energy would that be?

[INTERPOSING VOICES]

Now, you want to show your way?

So--

Nice.

When [INAUDIBLE] when it gives some here, but it has some motion energy too, but it also has elastic energy while it's unwound.

So when it's halfway unwound, are you saying that there's both motion and elastic in this rubber band?

Interesting.

How many people buy that explanation? Watch it again, watch. I'm going to start it off, and halfway through this untwisting, would you say there's evidence that the rubber band has both elastic and some motion energy? Ready?

I wonder--

What would you say?

[INAUDIBLE] because it's still twisted up a little bit, but it's still moving and unwinding.

But the evidence is, it's got both, because it's still twisted a little bit and it's moving, unwinding.

So you mean the same thing can have two forms of energy at once?

What do you think?

Yeah.

Are you just saying the same object can have two kinds of energy at the same time?

Yes.

I guess that's what I heard. We showed it down here in our cube thing. Yep, we have.