Scene: Surf's Up (and Down, and Up Again)

Setting: Shani, Journey, and Luisa are at the beach trying to watch their friend Georgia surf.

Shani: Can you see her?

Journey: Who? Georgia? No, not really. I think she's out there in that pack of other surfers. Looks like they're all just sitting on their boards, waiting to catch a wave.

Luisa: You guys know there's this whole thing about whose turn it is right? It's called the "lineup." There's a place on the wave where it's the best spot to try to catch the wave. The surfers all stay off to the side and wait their turn to catch a wave. It's a little more complicated than that, but that's the general idea.

Shani: There she is! I see Georgia! Oh wait, now I don't anymore. (pause) There she is again! She's kind of just going up and down. All the surfers are–just sort of bobbing up and down. Georgia's got the green board. Do you guys see her?

Journey: I see her now. She's still just sitting on her board. When will it be her turn, already?

Luisa: That depends on the frequency of the waves.

Journey: You mean like how often they're coming?

Luisa: Yeah, pretty much. Some days it might be high frequency–just one wave right after the other. Other days, you might be waiting longer between waves. That would be lower frequency, and on those days surfers get real snippy about whose turn it is 'cause there aren't as many good waves to catch.

Shani: Why is Georgia just bobbing up and down? Why don't the waves push her towards us on the shore? She's just going up and down. Look there she is again!

Journey: I'm sure Luisa knows. She seems to know a lot about waves! (eye roll)

Luisa: So those surfers are just bobbing up and down because of the wave's energy. How far Georgia rises up with the crest of a wave or how far she drops down in its trough is the waves' amplitude. Oh, and how far it is from one crest to the next, or from one trough to the next, is called the wavelength.

Shani: OK I think I get that, but then what does my dad mean when he says I'm on my own wavelength?

Journey: Um... well we're not on his—or yours—so how should we know?

Luisa: (refocusing conversation) Anyway... the waves we're watching are all energy. They look like they are made of water, but they're not, not really! They just move through water. Water is the medium.

Journey: Medium water? It looks like extra large water to me.

Luisa: Not that kind of medium! I mean something energy can move through. Energy can move through anything: air, or land, or a wire... lots of different stuff. But here the medium is water.

Shani: I get it! The waves are using their energy to bring in water from way out in the ocean...

Luisa: Nope! Really the water here near the shore is just going up and down, and maybe a little back and forth.

Journey: Hmm. So when I say I see a wave, I'm really just seeing energy traveling? And the water isn't going anywhere?

Luisa: It's moving a little, but hardly at all compared to the wave energy.

(continued...)

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Journey: Compared to wave what? I can't hear you. The waves have gotten a lot bigger!

Shani: Hold on: it's Georgia's turn!

The friends shout as Georgia tears through a perfect, large swell, but they can barely hear each others' voices in the noise of the pounding waves and howling wind. They take shelter from the wind next to a beach hut.

Journey: What were we talking about? Oh right, sound!

Shani: I thought we were talking about waves.

Journey: Same, same! Luisa says energy travels through water in waves, and I know it does that with sound too. I can tell you all about it. Audio is my thing. Sound waves are basically little air compressions in a pattern that travel out and then get picked up by our ears.

Shani: Sounds about right to me.

Luisa: Your dad might say we're all on the same wavelength now!

Comprehension Questions

What happens when waves come at a high frequency?

How did Luisa suggest her friends think about the wave's amplitude?

How can you measure a wavelength?

What are some examples of a medium that waves can travel through?

How are sound waves and ocean waves the same? How are they different?

Discussion

Shani says, "There she is! I see Georgia! Oh wait, now I don't anymore. (pause) There she is again! She's kinda just going up and down. All the surfers are–just sort of bobbing up and down."

How would you explain why the surfers are in and out of view from the beach? Use a sketch if it helps you explain.

During the "lineup," Georgia and the other surfers were waiting their turns in the water just bobbing up and down with their boards.

Why weren't the surfers getting pushed toward the shore by the waves? Why did Georgia go in and out of the view of her friends watching from the shore?

Try cupping your ears with your hands to see if you notice an increase the sound energy you are receiving. Your partner can help by talking to you while you test.

Based on the description above of how sound waves work, why did it get harder for Journey to hear the others' voices when it got windy?

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