

## Observations

Hi! My name is Glynis, and I am an educator at the Natural History Museum of Utah in Salt Lake City at the University of Utah, and today for Museum on the Move we are being scientists and making **observations**. Let's get started!

Now the first thing we'll need is something to investigate. Scientists find what they want to study by **exploring**, all over the place. Paleontologists will explore and find fossils to investigate, geologists will go find places where they can observe the forces that shape our earth. A biologist will travel to go find animals and study their behavior in their natural habitats.

But did you know we can also explore right where we are? Whether you're in your classroom or at home, you can find things to study right there!

So that's the first thing we're gonna need, we're gonna need something for you to investigate. Maybe you find something from nature in your backyard, something in your classroom, just something that makes you wonder, something that makes you go "hm, I want to learn more about that." You're also welcome to use pictures of something from our museum, we've got some pictures that we picked out down below we thought you might like.

I'm going to use something from the museum, I'm going to use this fossil that I really like because I noticed that it has this spiral shape and that reminded me of something that I see in my backyard, so I wanted to learn more about it.

In addition to your object you'll just need a writing utensil and a piece of paper for recording, so take whatever time you need to get those things together and explore, and when you're ready we'll get started!

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Did you find what you want to investigate? Awesome! So the first thing we're going to do as scientists is make **observations**. When a scientist makes observations, the scientist looks really closely and notices all these details.

So let's do that first all together with my object here. Just by looking with our eyes, we can see that it's got a spiral shape, we can see the colors going on in there. We can also use other senses, too! Like we might feel it, I feel that it's smooth, that other parts of it are rough, I feel that it's hard instead of squishy, I feel that it's pretty heavy.

What other senses can we use? We can listen to it! When I tap on it I can hear that it's hard, and that it's solid, it's not hollow inside. We can use a few other senses, we can smell it if we want. This fossil doesn't have much of a smell, and that's still an observation.

What about our last sense, what about tasting? What do you think, do scientists ever taste things? I'd say it depends on what type of scientist you're being. Paleontologists sometimes lick fossils to see if they're porous, geologists might lick a minerals to see if they're halite, or some biologists might find plants that are edible. But you really have to be an expert to know what's going to be safe to lick, so today we're not licking anything, we'll save tasting for lunch time.

Now I've got all of these observations, and I want to make sure I don't forget any of them, so I'm going to **record**. When we record, we make sure that we remember and that we share with another scientist. Sometimes that means drawing pictures, sometimes that means writing things down, it's totally up to you.

So if I want to record what I notice about this fossil, I will draw that it has this big spiral shape, it's broken up into all of these segments. I'm not going to switch between a bunch of different colors, but you can if you want! I'm going to add that I see it's gray, and parts of it are darker gray. Now I'll spend some time adding in all of those things we noticed, but then it will be your turn!

Take your time with your object and figure out, what do you **observe**? What details can you find on it? And then, **record** them on your paper. You can draw a picture like I did, or you can write about it, it's totally up to you. Take as much time as you need, and then come on back to the video when you're ready!

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Did you make lots of great observations? Did you notice more details when you were recording? Nice job! Now that you have all of this information, it will be easier to find out new things and make some guesses about your object.

Great job making those observations! Thanks for joining us for Museum on the Move. Stay curious!

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## Questions

Hi! My name is Glynis, and I am an educator at the Natural History Museum of Utah in Salt Lake City at the University of Utah, and today for Museum on the Move we are being scientists and **asking questions**.

Now before we get started, you are going to need something to investigate. This can be something from nature, from your backyard, your home, or something in your classroom, or if you'd like you can use pictures of things from the museum.

Now, I'm going to be using this fossil because I've already got some observations and some things that I noticed about it, and now I want some answers! I'm really wondering about what's going on with this fossil.

So that's what we're going to be doing today we're going to be asking questions! Now first off, let's talk about science questions. Do scientists ask questions? Absolutely, that's one of the most important parts about being a scientist. If we didn't ask questions, we'd never learn anything new. Over time we've learned a lot more about the world around us but there used to be so much we didn't understand. People would observe strange things and ask questions, like "When I drop something, why does it fall?" or "Where do all the birds go in the winter?" Because we asked these questions, we were able to figure out the answers. We figured out about gravity making things fall and we figured out birds migrate and go other places.

That's why science questions are so important! Are all questions science questions? Not necessarily. A good science question is going to be something you can investigate and you can measure to find out your answer.

So I have this fossil here, that I've got some questions about. We're going to work together on this one first, and then it's going to be your turn.

Now when we made observations, I noticed some interesting things. I noticed that my fossil has this unique spiral structure, and I'm wondering, why does it have that structure? What's the function? How would that help this fossil?

Now we know this is a fossil, so it must have once been a living thing. I'm wondering, was this a plant or was this an animal? Either way, what habitat did it live in? I'm hoping that I can use my observations to help figure out those answers.

And of course, we need to record! We want to make sure we remember. We can write down, “what is it?” plant or animal? What’s up with that spiral, why is that there? What habitat?

So now it’s your turn! Take a look at your object, and figure out what are you wondering about it? What do you want to know more about? Then record those questions, try to write them out in full sentences. What is it? Where did it come from?

So take as long as you need writing down your questions, and when you’re ready you can come on back to the video.

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Did you come up with some good, investigatable science questions? Nice job! Now, the last thing we want to do right now is think about how we might begin to answer those questions. What information do you need to answer them? Are you going to be able to answer them just with your observations? Do you need to do some more research? Or maybe you already have some ideas about the answers! Now that you have those questions, you can start working on what those answers might be.

Thanks so much for following along and asking questions today, and thanks for joining us for Museum on the Move. Stay curious!

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## Inferences

Hi! My name is Glynis, and I am an educator at the Natural History Museum of Utah in Salt Lake City at the University of Utah, and today for Museum on the Move we are being scientists and learning about making **inferences**.

First off, we're gonna need something to investigate, so if you don't have it already, take a moment to find something. It can be something from nature, from your backyard or your classroom, or it can be a picture of something from the museum. Whatever it is, it's something that you have questions about, something you're wondering about. Then you also need a writing utensil and a piece of paper for recording your ideas. So if you need to you can take a moment to go get those, and then we'll get started.

I am using this fossil because I had some questions about it. I was wondering, what's the function of this spiral shape? I was wondering, what is it and what habitat it came from? So we're going to spend some time figuring out the answers to those questions, and your questions as well!

Now, I have a question for you: Is having all of these unanswered questions really bothering you? I know it's bothering me.

Let's think for a second about if you were a paleontologist and you had just discovered a brand new fossil, a brand new species never before seen, would you be able to look up all the answers about that species in a book or on the internet? No, it's brand new!

Instead, you would use your observations to help you figure out these guesses, what was going on with that fossil.

And so we have a special science word for our sciences guesses, we call those **inferences**.

When you make an inference, you use your observations to make a guess.

This is a little bit different from a different science guess, this is different from a hypothesis.

When you make a hypothesis you're doing an experiment, and you make a guess about how the experiment will turn out.

An inference is based on our observations and our **evidence**. Evidence is proof that it could be true. Most of our evidence today is going to come from our observations, but evidence can also be the things that you already know, because you are super smart and we know lots of things about the world around us.

So our inference is our guess based on our observations and the things that we already know. Let's work together to make some guesses about my fossil. Remember, I was wondering what habitat it might have come from. When I look at that spiral shape, that gives me an idea.

So my inference is: I think this fossil came from the ocean, because it has a spiral shape like a seashell.

And so I've got my guess, I said I think blank, that it's from the ocean, and then I had my evidence, I said because and I filled it in with my evidence from my observations about that shape.

Now it's your turn! Take a look at your object and use your observations to come up with a guess, your inference. I want to challenge you to write it out in the full sentence, that "I think because." Take as long as you need, and when you're finished come back to the video and we'll talk about evaluating our evidence.

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Did you write down your inference? Nice job! Now, I want you to think about the evidence that you used. Was it based on your observations? Was it based on things that you already know? Was it strong evidence that supported just one idea?

Because I realized, I don't think my evidence from my fossil was that strong. I said I think it's from the ocean because it has a spiral shape like a snail, but then I remembered that snails live in different habitats, I see them in my garden all the time. So that evidence supports more than one answer. I want to see if I can come up with some stronger evidence.

I see that my fossil has that spiral shell, and also it's flat, and it's pretty big. Now I know a little bit about fossils already, I know that we had animals called ammonites that lived here millions of years ago that had this big spiral shape. So here's my new inference: I still think this is from the ocean, but now I think it's because it has that spiral shape, and it's large, like an ammonite. Is that stronger evidence than my first guess? I think so.

So if you need to you can update your idea now that you have some more ideas. As scientists, we're always allowed to update our ideas when we get new evidence. That's how we come up with new ideas!

So take the time you need to update your evidence, and then when you're done come back to the video and we'll wrap up.

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Does your inference have good, strong evidence now? Nice job! As we're wrapping up, I just want to tell you that today, when you made your observations and answered your questions, you were being a real scientist! We know that scientists can go out and explore all around the world, but we can also be scientists right at home.

You did a fantastic job! Thank you so much for joining us for Museum on the Move. Stay curious!