

# GEOLOGY ON MARS

## Unit 1 - Chapter 2-2

### Using Models as Evidence

## 2 | 2.2: Modeling a Geologic Process

AmplifyScience > Geology on Mars > Chapter 2 > Lesson 2.2

SEE MORE

1 WARM-UP  
Warm-Up

2 READING  
Second Read of  
"Investigating Landforms ..."

3 HANDS-ON  
Observing the Flowing  
Water Model

T TEACHER  
Reflecting on How  
Scientists Use Models

4 HOMEWORK  
Homework





# Warm-Up – 2.2.1

HAND IN



1. Which question would a scientist be most likely to use a model to answer?

- How was this lake formed?
- What is the temperature of this lake?
- What is a rock at the bottom of this lake made of?

2. Why might a scientist use a model to answer the question you selected?





# Warm-Up – 2.2.1



1. Which question would a scientist be most likely to use a model to answer?

- How was this lake formed?
- What is the temperature of this lake?
- What is a rock at the bottom of this lake made of?

2. Why might a scientist use a model to answer the question you selected?

A scientist would use a model because the lake might have been formed a long time ago or is far





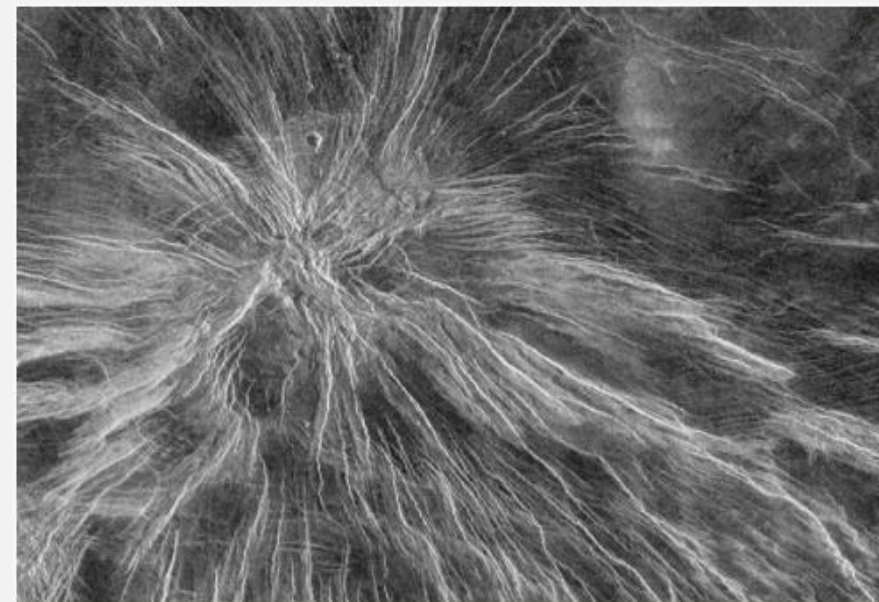
## READING WITH A PURPOSE

Gerya, the scientist from the “Investigating Landforms on Venus” article wanted to know how the novae on Venus were formed.

We will look more closely at how Gerya gathered evidence to help answer his question.

To better understand information...

- we actively read the text,
- we discuss for clarification,
- we will read a second time with an important purpose...



**INVESTIGATION  
QUESTION**

*How do models help scientists answer questions?*

...to find out how Gerya's model helped him answer a question about Venus.





# VOCABULARY

**model:** an object, diagram, or computer program that helps us understand something by making it simpler or easier to see

- Models can represent ideas about the natural world.
- Gerya's model represented his idea of how novae on Venus were formed.

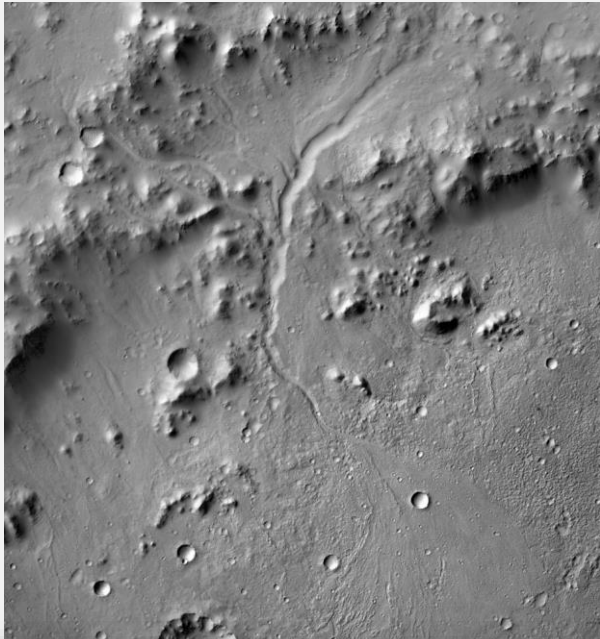




## READING WITH A PURPOSE

You will read with a specific focus.

You will only read the last three paragraphs of the article.



We need to understand how Gerya's model helped him answer his question about how the novae on Venus were formed. (OUR FOCUS AND PURPOSE).

Learning more about how Gerya used his model to answer his question will help us determine how we can gather more evidence about what formed the channel on Mars.





# Second Read of "Investigating Landforms on Venus"

Gerya and his team wanted to answer the question: What formed the novae on Venus?

Their idea was that the higher surface temperature and thinner crust of Venus caused the novae to form.

- Reread the final three paragraphs of the "Investigating Landforms on Venus" article.
- Then, highlight or add annotations to parts of the text that relate to the questions next to the article.
- Using your annotations, answer the questions below.

1. How were the novae on Venus similar to the landforms in Gerya's computer model?
2. How did the results of Gerya's model provide evidence for what formed the novae on Venus?





# Second Read of "Investigating Landforms on Venus"

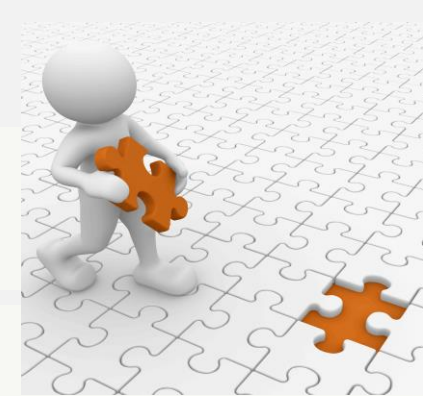
- 1. How were the novae on Venus similar to the landforms in Gerya's computer model?
- 2. How did the results of Gerya's model provide evidence for what formed the novae on Venus?

How were the novae on Venus similar to the landforms in Gerya's computer model?

How did the results of Gerya's model provide evidence for what formed the novae on Venus?







## Second Read of "Investigating Landforms on Venus"

1. How were the novae on Venus similar to the landforms in Gerya's computer model?
2. How did the results of Gerya's model provide evidence for what formed the novae on Venus?

How were the novae on Venus similar to the landforms in Gerya's computer model?

**Both looked like domes.**

How did the results of Gerya's model provide evidence for what formed the novae on Venus?

**Gerya set up his model with a high temperature and a thin crust, and the novae formed, so that gave him evidence that supported his idea.**



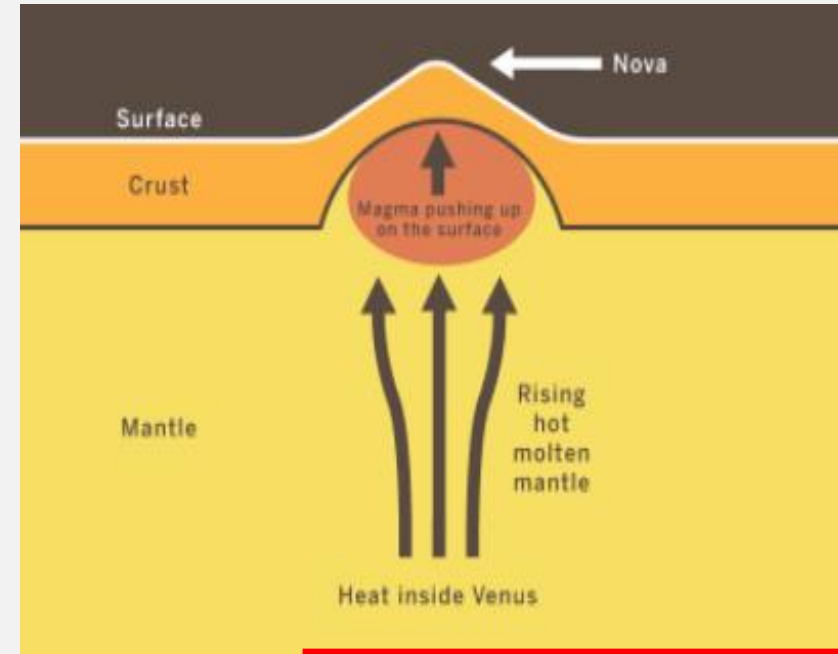


# CLASS DISCUSSION

Gerya's idea was that the higher surface temperature and thinner crust might have caused the novae to form.

*How did the results of Gerya's model provide evidence for what formed the novae on Venus?*

- The model results matched the novae on Venus.
- This provided evidence that Gerya's idea that a thinner crust and higher surface temperature might allow melted rock to push up toward the surface, forming novae.
- This helps explain why there are novae on Venus, but not on Earth.





## CLASS DISCUSSION

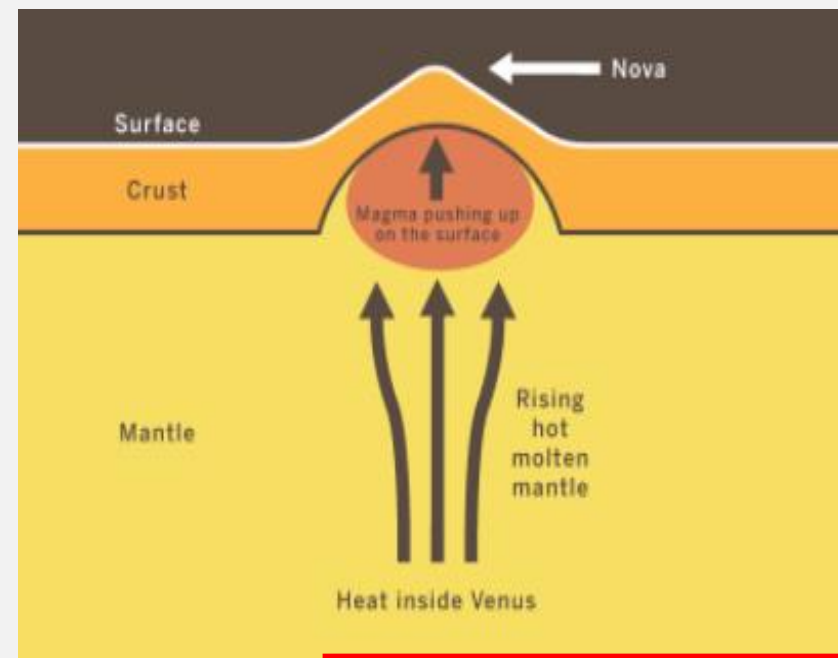
Gerya set up his model based on his ideas.

Before he ran his model, he knew that if the results of his model matched the novae on Venus, then he could be more confident about his ideas.

He found shapes that were very similar to novae formed in the model, and this provided evidence that his ideas were accurate.

What would Gerya expect to see if his ideas were not accurate?

- The model results would not match the landforms on Venus.





Scientists can use models to test their ideas and get evidence about processes in the natural world that are difficult to observe.

Gerya's Venus model helped him to get evidence about how landforms on Venus were formed.

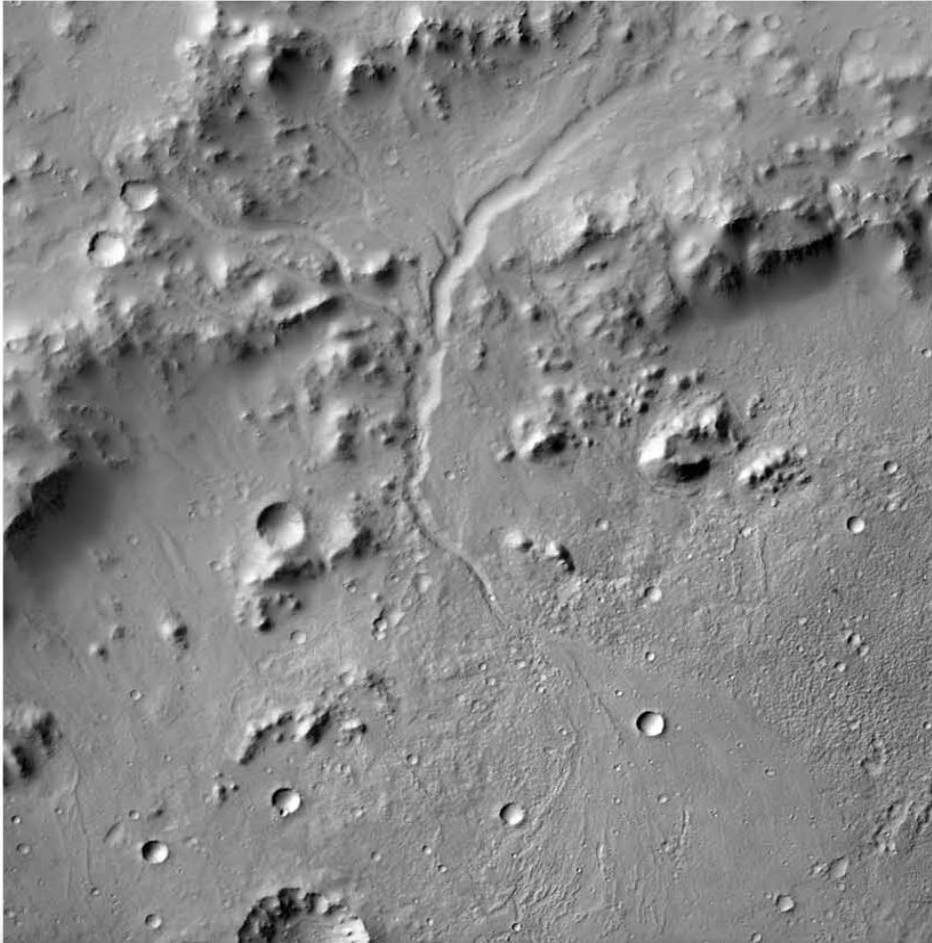
He could not have gathered this evidence without using a model.





## CHAPTER 2 QUESTION

***How can we gather more evidence about whether lava or water formed the channel on Mars?***



Gerya was trying to get evidence about the geologic process that formed novae on Venus.

We are trying to get evidence about the geologic process that formed the channel on Mars.

We will use a model to get evidence about whether water could have formed the channel.





## DO LANDFORMS REMAIN?



We have already compared the shape of the channel to channels on Earth where there is currently flowing water.

Comparing the dry channel on Mars to current water-filled channels on Earth is only helpful if the landforms that flowing water creates remain after the water stops flowing.

We are going to use a physical model to help test the idea that landforms remain after the flowing water that formed them stops flowing.





# FLOWING WATER MODEL

## Stream Table Overview

The stream table is a simple system that includes water and sand.

We will pour water down the tables and you will observe what happens to the sand.

What parts of the Flowing Water Model are represented on Earth?



Water is a river or stream (Hydrosphere)

Sand is the land (geosphere)





# FLOWING WATER MODEL

We are using the stream tables to learn more about whether landforms remain after the flowing water stops.

## Making Predictions:

1. Do you think the landforms remain after the water stops flowing?
2. What would you expect to see in the stream table if landforms remain?
3. What would you expect to see if landforms do not remain?







# FLOWING WATER MODEL

## Observing a Model

Record your observations about the Flowing Water Model on the Stream Table Observations: Do Landforms Remain? student sheet.

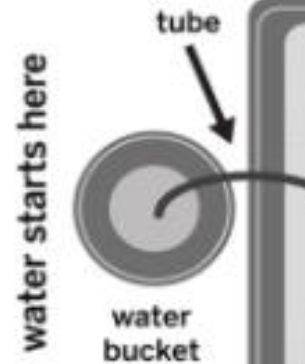
You can use the Word Bank to help you describe what you see.

### Word Bank

straight	wide	branching	triangular
curved	narrow	merging	square
gnarled	spread out	loopy	circular

You will record your observations as the water is flowing through the stream table (use the word bank to think of words that describe what you see) here.

Stream Table After Water Has Stopped Flowing



Draw what you observe in the stream table after the water stops flowing (a bird's-eye view) here.

3. Record your observations about the landform(s) that the flowing water formed.

Record your observations about the landforms that the flowing water formed here.





# FLOWING WATER MODEL - SHARE YOUR IDEAS

Share what you noticed about the landform after the water is no longer flowing.

1. Was your initial predictions supported or not supported?

### Word Bank

straight	wide	branching	triangular
curved	narrow	merging	square
gnarled	spread out	loopy	circular

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Stream Table After Water Has Stopped Flowing



3. Record your observations about the landform(s) that the flowing water formed.

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# FLOWING WATER MODEL – POSSIBLE ANSWERS

## Stream Table Observations: Do Landforms Remain?

### Stream Table Observations

1. During the Flowing Water Model demonstration, observe the stream table while water is flowing through it. What do you notice? Record your observations on the lines below. You can use the Word Bank to help you describe what you see.

#### Word Bank

straight	wide	branching	triangular
curved	narrow	merging	square
gnarled	spread out	loopy	circular

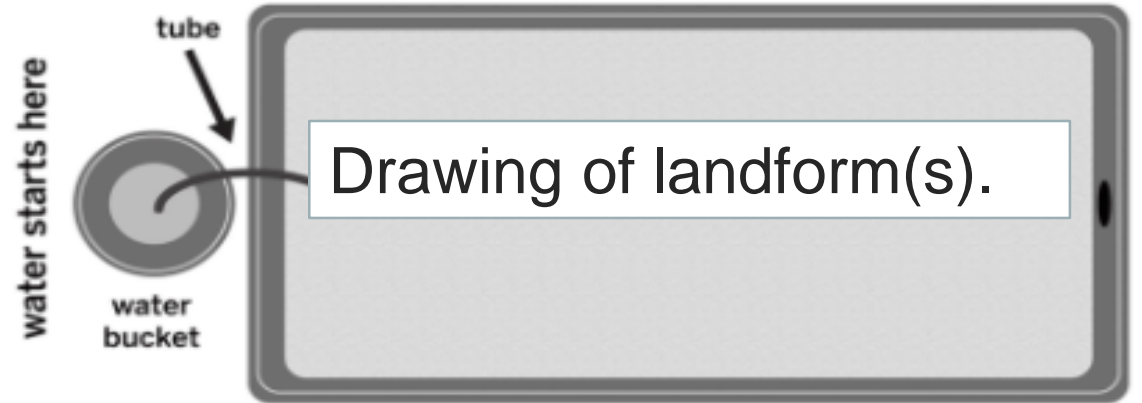
As the water started moving down the table, it changed the shape of the sand. A channel was being made, with lots of branches coming off the main channel.

## Stream Table Observations: Do Landforms Remain? (continued)

### Landform Observations

2. In the stream table diagram below, draw what you see in the stream table once the water has stopped flowing through it. Make sure to draw any landforms that the flowing water formed. Remember, you are looking at the stream table from above (bird's-eye view).

#### Stream Table After Water Has Stopped Flowing



3. Record your observations about the landform(s) that the flowing water formed.

After the water stopped flowing, some of the smaller branches went away, but the long main channel stayed.





# FLOWING WATER MODEL

## Flowing Water Model Summary

The landforms formed by the flowing water remained even after the water stopped flowing.

This model provides evidence that landforms can remain after the flowing water that formed them stops flowing.



### Key Concept

Landforms can provide evidence about the past because they remain after the geologic processes that formed them stop happening.





## INVESTIGATION QUESTION

*How do models help scientists answer questions?*

You now have experience using a model as scientists would.

**How did we use the Flowing Water Model to test our ideas.**

Before you observed the Flowing Water Model, you discussed whether you thought landforms would remain after water stops flowing, and you discussed what you might expect to see when we ran water through the model.

We used the model to test your ideas about whether landforms remain after water stops flowing.

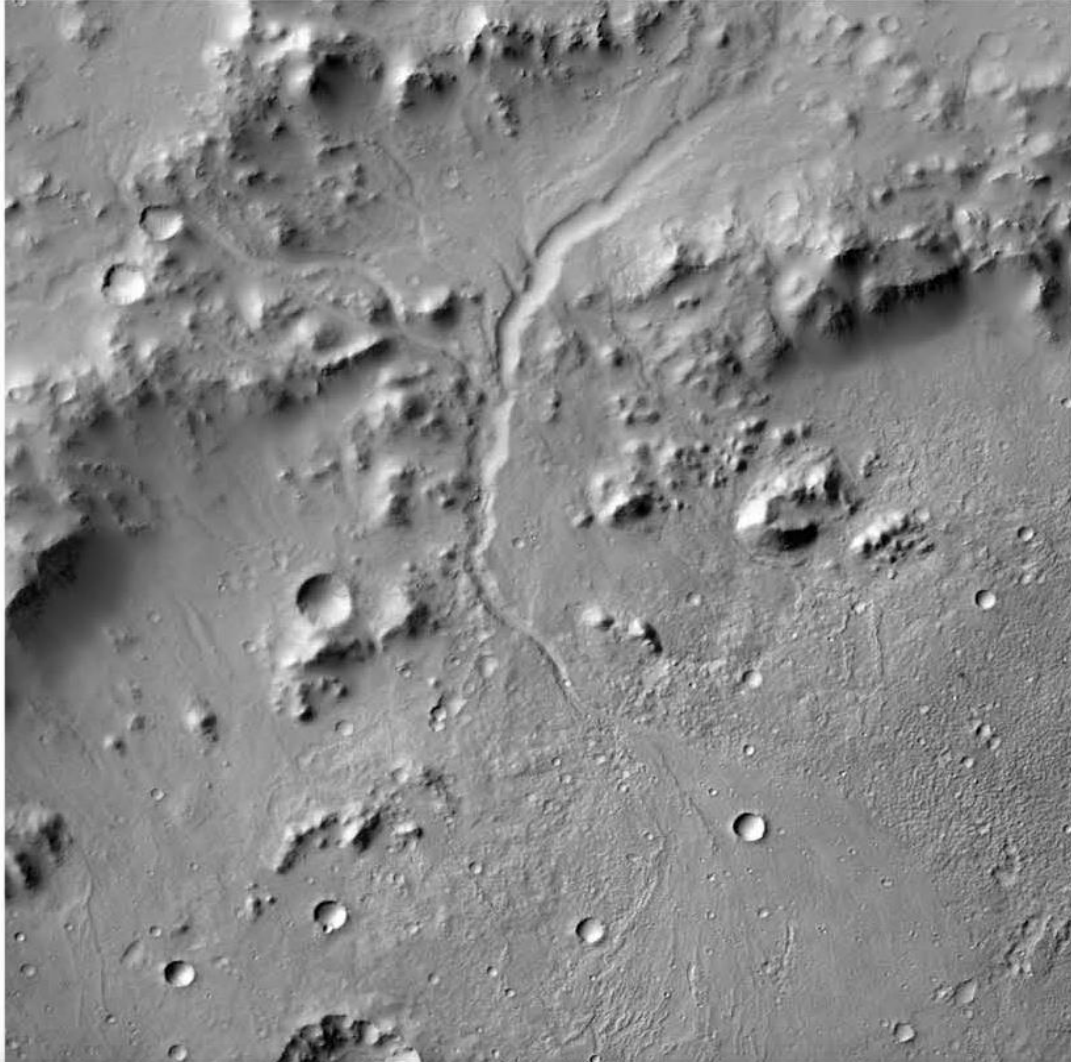
The model showed that a channel remains after the water stops flowing.





# CONNECTING EVIDENCE TO CHANNEL ON MARS

**Question:** What geologic process could have formed the channel on Mars?



**Claim 1:**  
Flowing water formed the  
channel on Mars.

**Claim 2:**  
Flowing lava formed the  
channel on Mars.

Which of these claims is now more viable evidence after observing the stream table.

Claim 1—the flowing water claim.





# USING THE MODEL LIKE REAL GEOLOGISTS

**Question: What geologic process could have formed the channel on Mars?**



Gerya had an idea about how the novae on Venus were formed. His computer model allowed him to test his idea.

Like Gerya, we used a model to test our ideas about whether landforms remain after water stops flowing.

Both the computer model and our Flowing Water Model provided evidence about how landforms are formed.





# HOMEWORK

## 2.2.4: (Activity 4)

You will have a chance to think further about how the Flowing Water Model compares to flowing water on Earth in the homework (Activity 4).

### Reflecting on the Flowing Water Model

In this lesson, you used a scientific model to learn more about the geologic process of flowing water.



1. How was the Flowing Water Model similar to flowing water on Earth?

2. How was the Flowing Water Model different than flowing water on Earth?

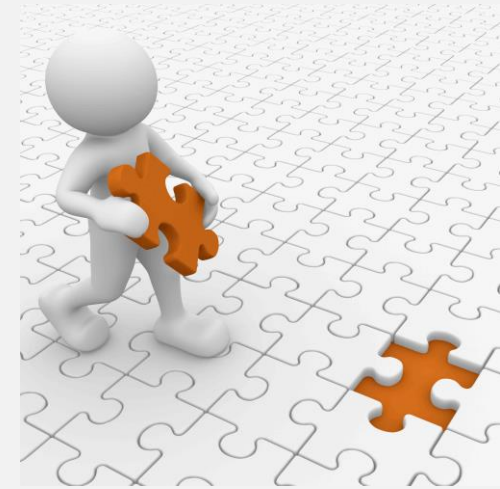
3. How would you change the Flowing Water Model to make it more like the actual geologic process on Earth?







# HOMEWORK



## 2.1.5: (Possible Answer)

1. How was the Flowing Water Model similar to flowing water on Earth?

The sand is like the geosphere, and the water represented the hydrosphere.

2. How was the Flowing Water Model different than flowing water on Earth?

The stream table only had sand at the surface, but on Earth there are other types of rocks and grass at the surface.

3. How would you change the Flowing Water Model to make it more like the actual geologic process on Earth?

I would add bigger rocks to the stream table to represent more rocky places.

