

Reading Science Models

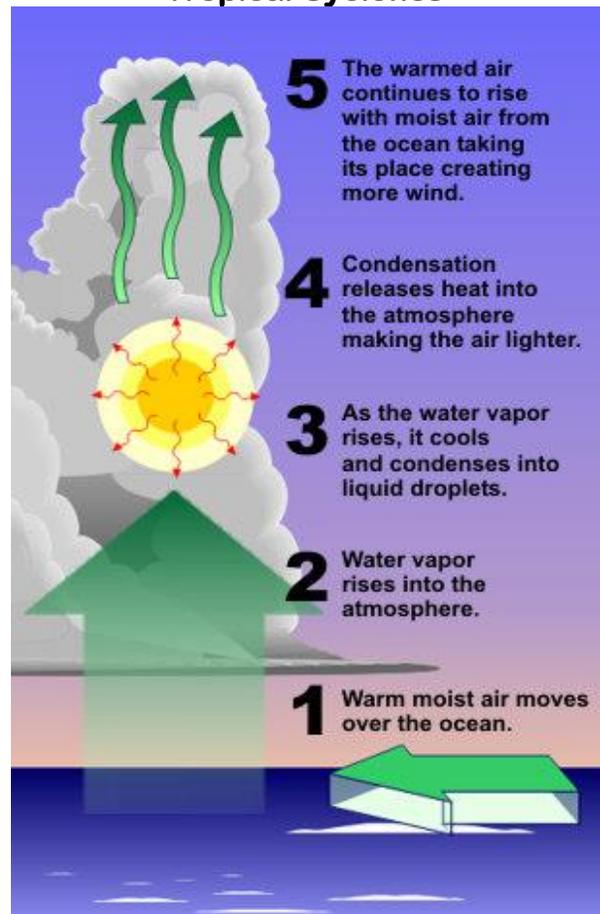
Interactive Notebook

Inquiry Questions

What are science Models?

How do we read science models?

Convection Powers Tropical Cyclones



The intended use of these materials is in tandem with ongoing professional development focused on supporting reading as scientific practice. This work is funded by the Reading for Understanding Initiative of the Institute for Education Sciences, U.S. Department of Education, through Grant R305F100007 to University of Illinois at Chicago. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

**READI READING SCIENCE MODELS MODULE
STUDENT INTERACTIVE NOTEBOOK
Iteration 1, Fall 2012**

Citations:

Pluta, W.J., Chinn, C.A., Duncan, R.G. (2011) Learners' Epistemic Criteria for Good Scientific Models, *Journal of Research in Science Teaching*, 48, 486-511

Krajcik, Joseph, & Reiser, Brian J. (Eds.). (2004). *IQWST: Investigating and Questioning our World Through Science and Technology*. Ann Arbor, MI: University of Michigan.

OUR IDEAS ABOUT MODELS

Individual Think-Write

Silently read the three questions below. Then, write notes on this page about your thoughts, any connections you make to what you know and questions you have.

- What connections do you make with the word 'model'?
- What are some examples of models?
- Are there different kinds of models?
- What are models for?

Pairs

Talk about the word model.

- Take turns sharing your thinking about models.
- Discuss what you notice about each other's ideas about models.
- Write notes about your ideas to share with the whole class.

Share

**BE READY TO SHARE SOMETHING YOU WROTE OR HEARD WITH THE CLASS
WHEN THE TEACHER ASKS FOR YOUR IDEAS!**

THINKING ALOUD ABOUT SCIENCE MODELS

Teacher Think Aloud Model

Make checkmarks next to strategies you hear your teacher use while thinking aloud about reading “Why do scientists use models.” Be ready to share what you hear.

Think Aloud checklist	Teacher	Partner
Setting Purposes I’m interested in ... I want to figure out ...		
Questioning I wonder why/ how/ if... Could this mean ...		
Predicting/hypothesizing I think that probably ...		
Picturing I can picture/ imagine/ see ...		
Making Connections I already knew ... This reminds me of...		
Identifying Roadblocks I’m confused about ... I need to know more about ...		
Summarizing This is about ... The big idea here is ...		
Using Fix-Ups I’ll re-read this I’ll mark this and come back		

Pairs Read and Think Aloud

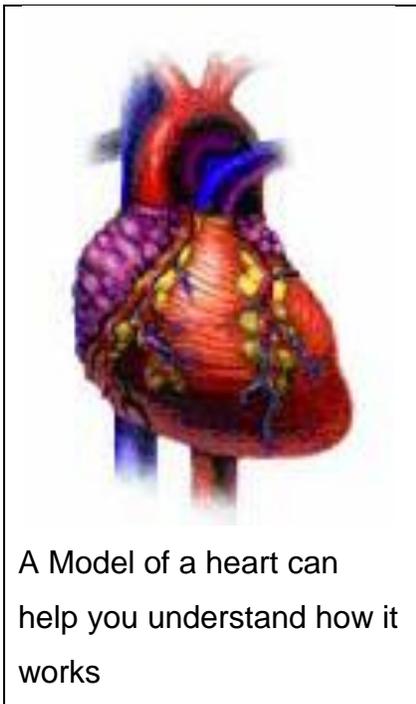
Reader: Read the next two sentences in “Why do scientists use models” and Think Aloud.

Listener: Make checkmarks next to strategies you hear your partner use while thinking aloud about reading “Why do scientists use models.”

Switch roles every two sentences. Be ready to share what you hear.

Why do scientists use models?

When you hear the word “model” you might think of fashion models. Or maybe you think of model airplanes or model cars. Scientists use the word model in a special way. In science, a model is a way to represent and explain something. Models help to explain things that are difficult to understand or difficult to observe.



about phenomena.

Models are useful in science because they can help you understand things that are difficult to observe. For instance, you cannot see your heart. But you can use a model of a heart to explain how it pumps blood through your body. Models can also represent things that are too big or too small to observe. People cannot observe the whole earth at once. But they can use maps and globes as models to help them explain a phenomenon like earthquakes. People on TV use maps to help them explain weather. Globes can help explain why it is day and night at different times in different parts of the world.

Models are helpful to scientists in many ways. Models help them explain possible answers to their questions

THINKING and TALKING ABOUT SCIENCE MODELS

Whole Class Discussion

- What was interesting or important in the article, “Why do scientists use models?”
- What questions came to mind about models?
- What are some examples of science models? Are there any examples in our classroom or in our books? Has anyone seen examples of science models on TV, in a movie, on a web page, or elsewhere?

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READING SCIENCE MODELS – HOW AND WHY

Pairs Read and Think Aloud

Reader: Read text A and Think Aloud.

Listener: Make checkmarks next to strategies you hear your partner use while thinking aloud about reading.

Switch roles and repeat for text B.

Think Aloud checklist	Text A	Text B
Setting Purposes I'm interested in ... I want to figure out ...		
Questioning I wonder why/ how/ if... Could this mean ...		
Predicting/hypothesizing I think that probably ...		
Picturing I can picture/ imagine/ see ...		
Making Connections I already knew ... This reminds me of...		
Identifying Roadblocks I'm confused about ... I need to know more about ...		
Summarizing This is about ... The big idea here is ...		
Using Fix-Ups I'll re-read this I'll mark this and come back		

Pair Discussion

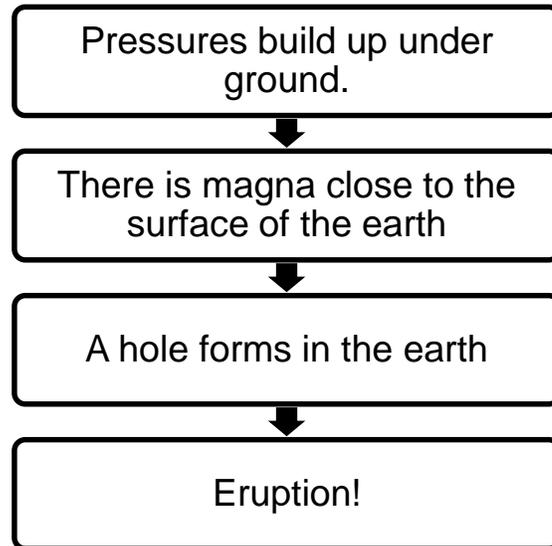
Share your Think Aloud check list observations. Did you have and commonalities or differences in your reading?

Which text is (or might be) a science model? How do you know? What is your evidence?

Be ready to share what you hear.

Text A

How a Volcano Works



Text B

Erupting Volcano in Pool



Pairs Read and Think Aloud

Reader: Read text C and Think Aloud.

Listener: Make checkmarks next to strategies you hear your partner use while thinking aloud about reading.

Switch roles and repeat for text D.

Think Aloud checklist	Text C	Text D
Setting Purposes I'm interested in ... I want to figure out ...		
Questioning I wonder why/ how/ if... Could this mean ...		
Predicting/hypothesizing I think that probably ...		
Picturing I can picture/ imagine/ see ...		
Making Connections I already knew ... This reminds me of...		
Identifying Roadblocks I'm confused about ... I need to know more about ...		
Summarizing This is about ... The big idea here is ...		
Using Fix-Ups I'll re-read this I'll mark this and come back		

Pair Discussion

Share your Think Aloud check list observations. Did you your partner or you use any new reading strategies?

Which text is (or might be) a science model? How do you know? What is your evidence?

Be ready to share what you hear.

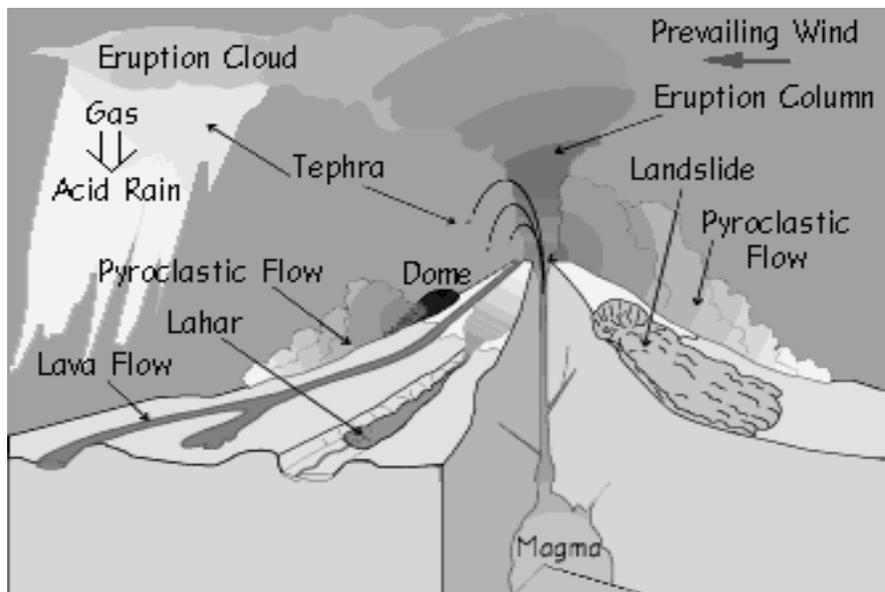
Text C

Volcano Making Kit



Text D

A Volcano



Here we see how a volcano is formed. Magma is found deep below the surface. It moves towards a hole in the ground. Finally, lava flows from the hole, as smoke also pours from the opening.

Pairs Read and Think Aloud

Reader: Read text E and Think Aloud.

Listener: Make checkmarks next to strategies you hear your partner use while thinking aloud about reading.

Switch roles and repeat for text F.

Think Aloud checklist	Text E	Text F
Setting Purposes I'm interested in ... I want to figure out ...		
Questioning I wonder why/ how/ if... Could this mean ...		
Predicting/hypothesizing I think that probably ...		
Picturing I can picture/ imagine/ see ...		
Making Connections I already knew ... This reminds me of...		
Identifying Roadblocks I'm confused about ... I need to know more about ...		
Summarizing This is about ... The big idea here is ...		
Using Fix-Ups I'll re-read this I'll mark this and come back		

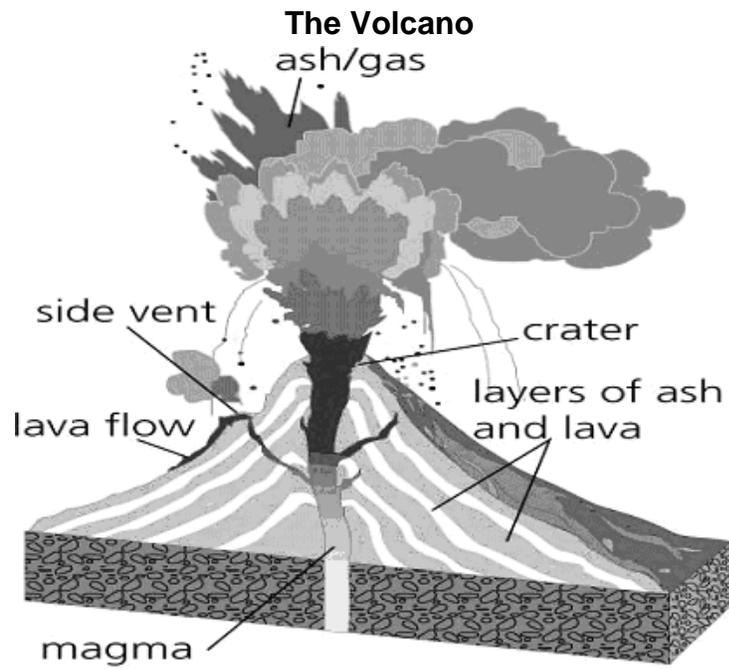
Pair Discussion

Share your Think Aloud check list observations. What reading strategies really helped you? What is one that you tried that didn't help much?

Which text is (or might be) a science model? How do you know? What is your evidence?

Be ready to share what you hear.

Text E



Text F

Picture of Volcano Erupting



WHAT I LEARNED

Individual Think-Write

Silently read the three questions below. Then, write notes on this page about your thoughts, any connections you make to what you know and questions you have.

- What do you now know about science models that you didn't know before?
- What did you learn about your own reading process?
- What did you learn about reading science texts?

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WHAT MAKES A SCIENCE MODEL BETTER?

Pairs Read and Think Aloud

Reader: Read Model A and Think Aloud.

Listener: Make notes on the text about your partners reading process.

Switch roles and repeat for Model B.

Discuss what you noticed about your own reading and your partner's reading.

Individual Think-Write

Silently read the question below. Circle the best response and write your reasons for choosing it.

Which model is better, Model A or Model B?

- Model A is better.
- Model B is better.
- Models A and B are equally good.
- It is impossible to say which is better.

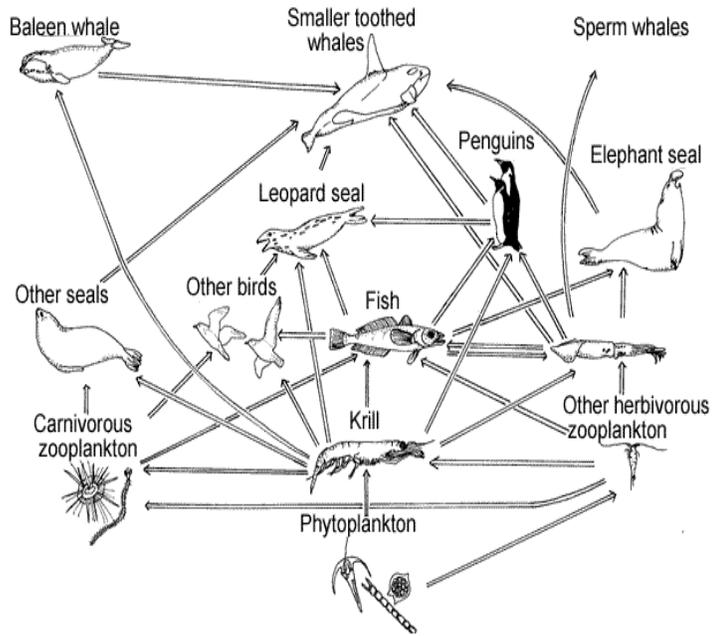
Pair Discussion

Share and discuss your responses. Be sure to give the reasons for your ideas.

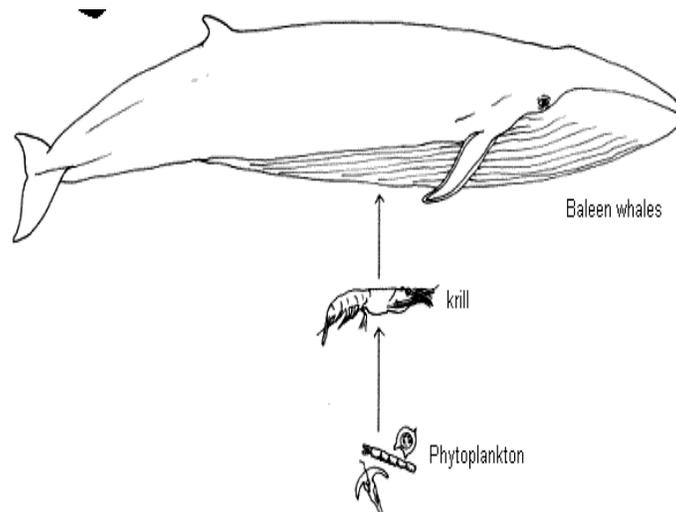
As a pair choose the best response.

Be ready to share your pair's response and reasons.

Model A: Food web



Model B: Food web



Baleen whales eat about 4% of their body weight each day during the feeding season. Some whales eat up to 3,600 kg of krill each day. Krill eat very large amounts of phytoplankton each day.

Individual Think-Write

Silently read the question below and review models A and B. Circle the best response and write your reasons for choosing it.

Which model is better if you want to explain why baleen whales in the ocean might have enough food or why they might not have enough food?

- Model A is better.
- Model B is better.
- Models A and B are equally good.
- It is impossible to say which is better.

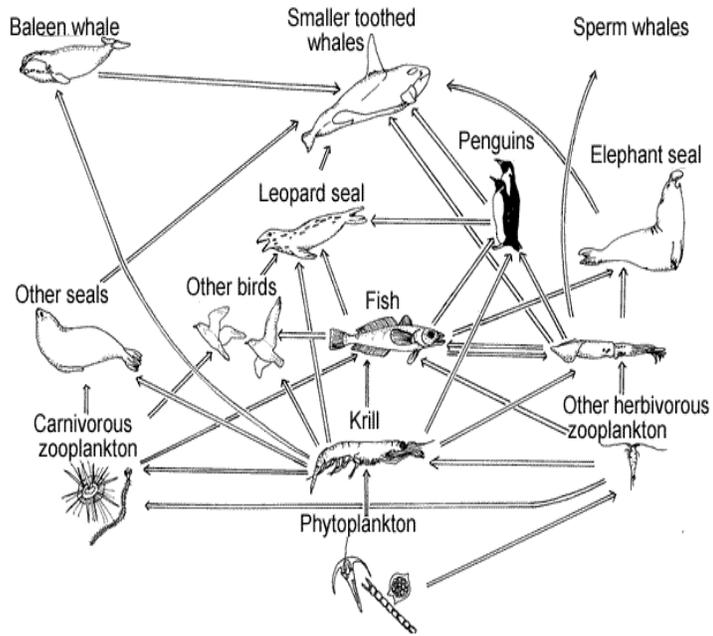
Pair Discussion

Share and discuss your responses. Be sure to give the reasons for your ideas.

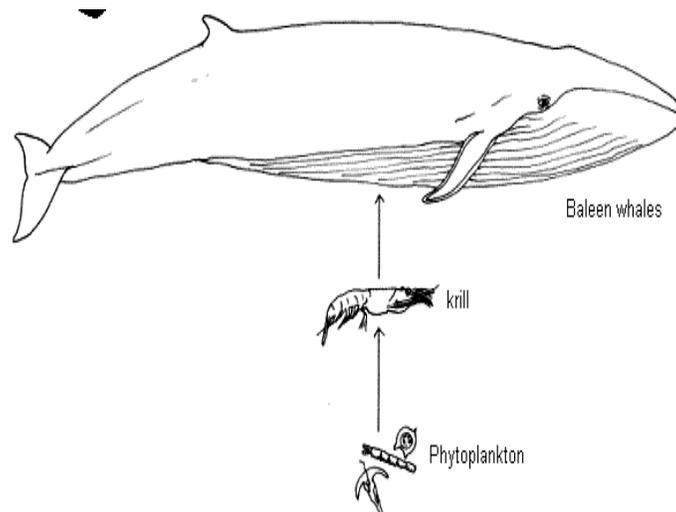
As a pair choose the best response.

Be ready to share your pair's response and reasons.

Model A: Food web



Model B: Food web



Baleen whales eat about 4% of their body weight each day during the feeding season. Some whales eat up to 3,600 kg of krill each day. Krill eat very large amounts of phytoplankton each day.

WHICH SCIENCE MODEL IS BETTER?

Pairs Read and Think Aloud

Reader: Read Model C and Think Aloud.

Listener: Make notes on the text about your partners reading process.

Switch roles and repeat for Model D.

Discuss what you noticed about your partner's reading?

Individual Think-Write

Silently read the question below. Circle the best response and write your reasons for choosing it.

Which model is better if you want to explain how plants get food and energy in order to grow?

- Model C is better.
- Model D is better.
- Models C and D are equally good.
- It is impossible to say which is better.

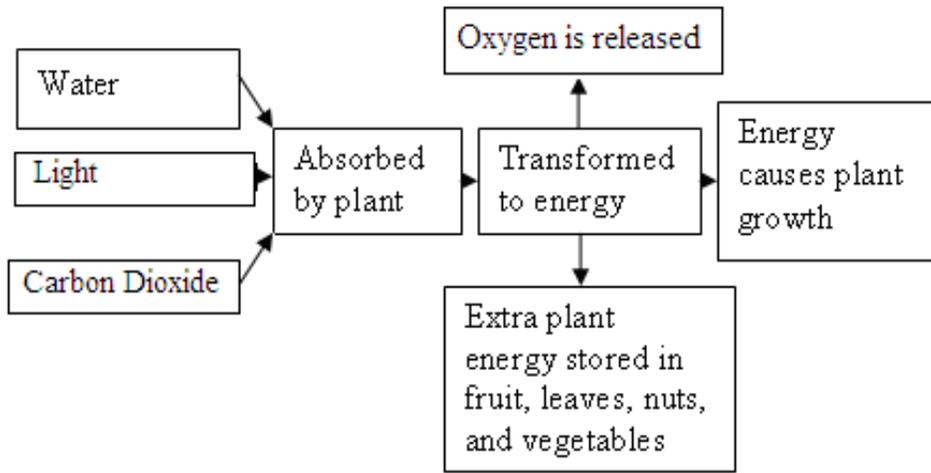
Pair Discussion

Share and discuss your responses. Be sure to give the reasons for your ideas.

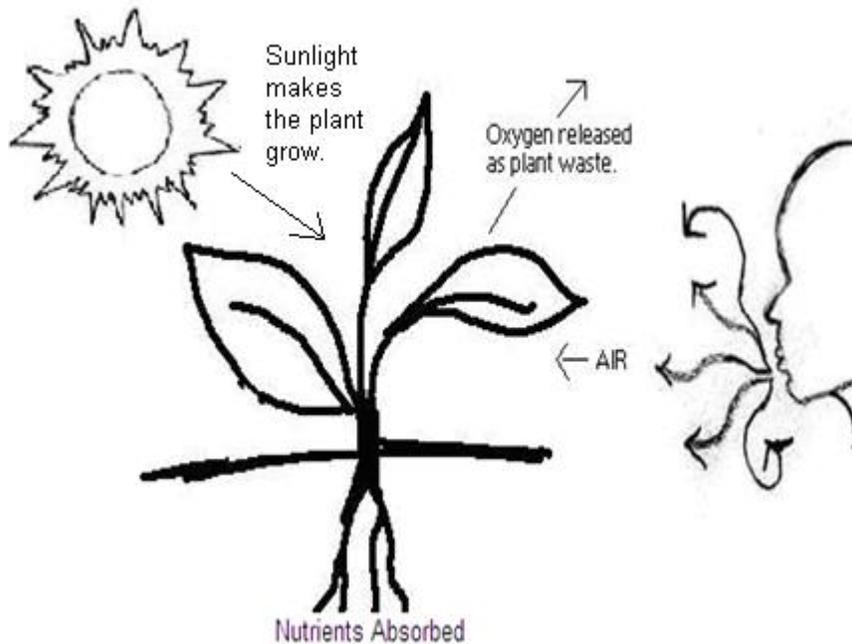
As a pair choose the best response.

Be ready to share your pair's response and reasons.

Model C: How plants get food and energy to grow.



Model D: How plants get food and energy to grow.



WHAT WOULD MAKE THIS SCIENCE MODEL BETTER?

Pairs Read and Think Aloud

Reader: Read Model E and Think Aloud.

Listener: Make notes next to strategies you hear your partner use while thinking aloud about reading.

Switch roles and repeat, re-reading model E.

Discuss what you noticed about your partner's reading?

Individual Think-Write

Silently read the question below. Circle the best response and write your reasons for choosing it.

How good is this model of how tadpoles transform into frogs?

- Very good
- Good
- Average
- Bad
- Very bad

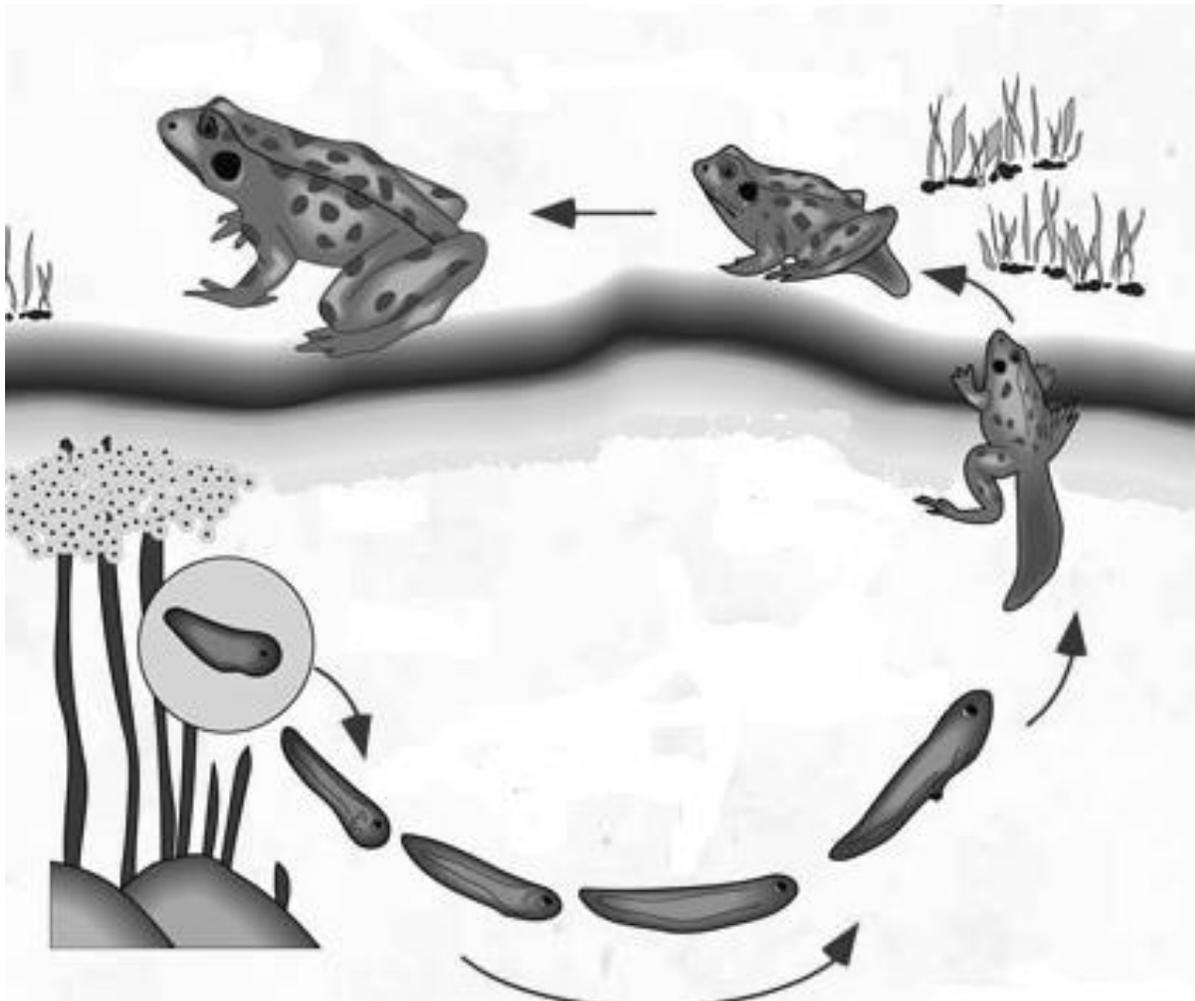
Pair Discussion

Share and discuss your responses. Be sure to give the reasons for your ideas.

As a pair choose the best response.

Be ready to share your pair's response and reasons.

Model E: How tadpoles transform into frogs



WHAT WE LEARNED TO DO

Individual Think-Write

Silently read the three questions below. Then, write notes on this page about your thoughts, any connections you make to what you know and questions you have.

- What do you now know about science models that you didn't know before?
- What did you learn about your own reading process?
- What did you learn about reading science texts?