Reading Science Models
Middle School 6th Grade

Project READI Curriculum Module
Technical Report CM #30

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PROJECT READi

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Please send us comments, questions, etc.: info.projectreadi@gmail.com

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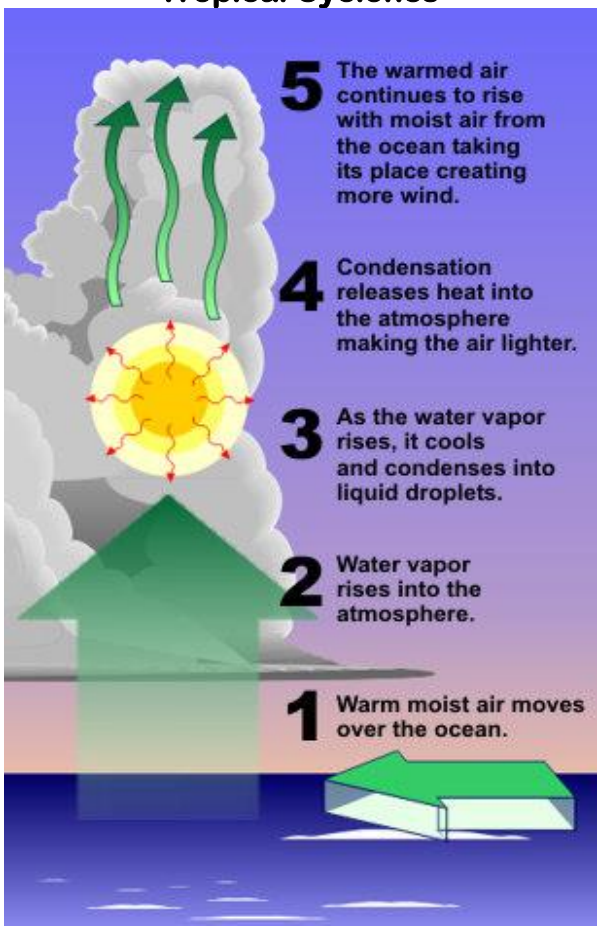
Project READI operated as a multi-institution collaboration among the Learning Sciences Research Institute, University of Illinois at Chicago; Northern Illinois University; Northwestern University; WestEd's Strategic Literacy Initiative; and Inquirium, LLC. Project READI developed and researched interventions in collaboration with classroom teachers that were designed to improve reading comprehension through argumentation from multiple sources in literature, history, and the sciences appropriate for adolescent learners. Curriculum materials in the READI modules were developed based on enacted instruction and are intended as case examples of the READI approach to deep and meaningful disciplinary literacy and learning.

PROJECT READi

Reading Science Models

Interactive Notebook

Convection Powers Tropical Cyclones



Inquiry Questions

What are science Models?

How do we read science models?

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.

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

Citations:

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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.

A Model of a heart can help you understand how it works

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 about phenomena.

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

Pressures build up under ground.

↓

There is magna close to the surface of the earth

↓

A hole forms in the earth

↓

Eruption!

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?

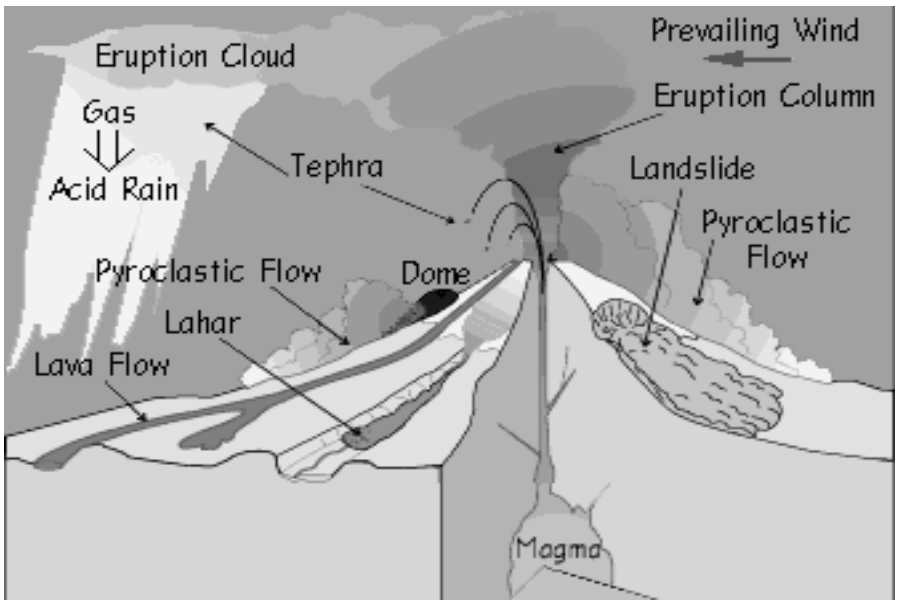
Be ready to share what you hear.

Text C

Volcano Making Kit

Text D

A Volcano



Here we see how a volcano is formed. Magna 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

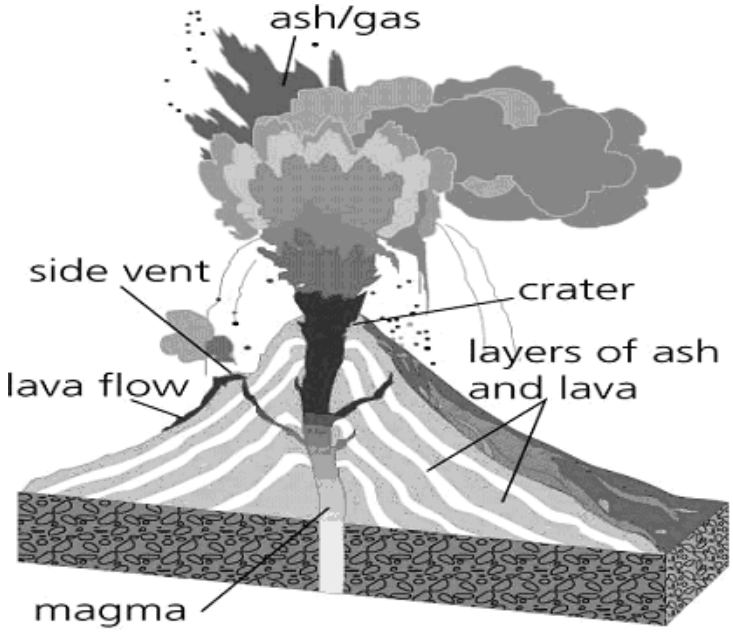
Share your Think Aloud check list observations. What reading strategies really helped you? What is one that you tried that didn't help much?

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

The Volcano



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.

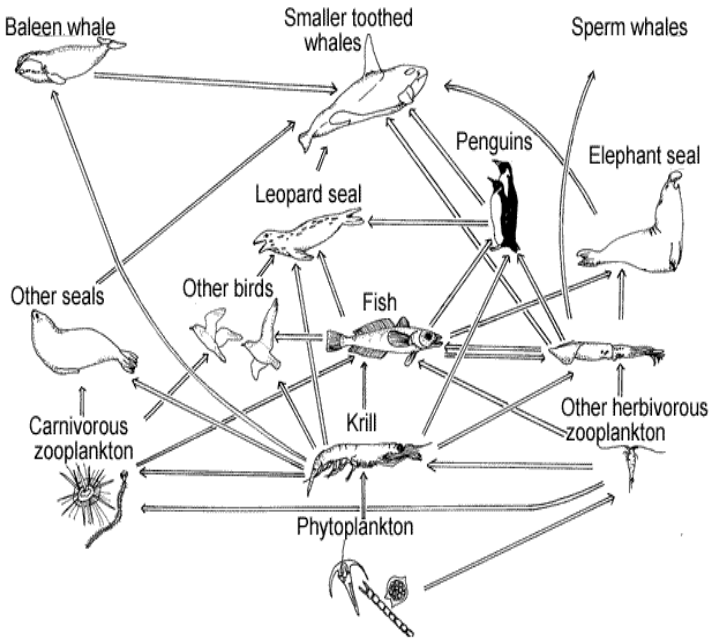
Pair Discussion

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

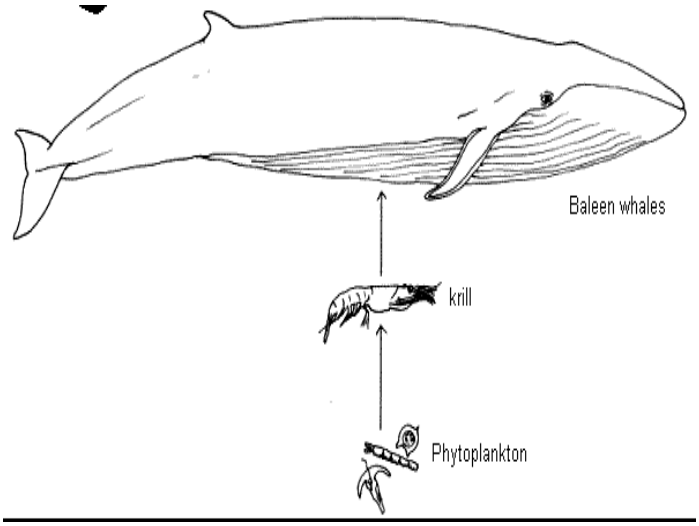
As a pair choose the best response.

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 <u>if you want to explain why baleen whales in the ocean might have enough food or why they might not have enough food</u>?

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

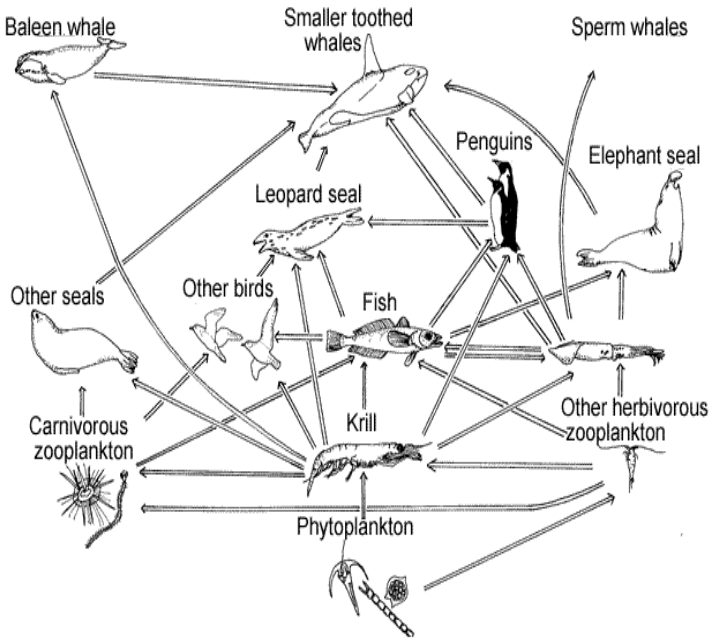
Pair Discussion

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

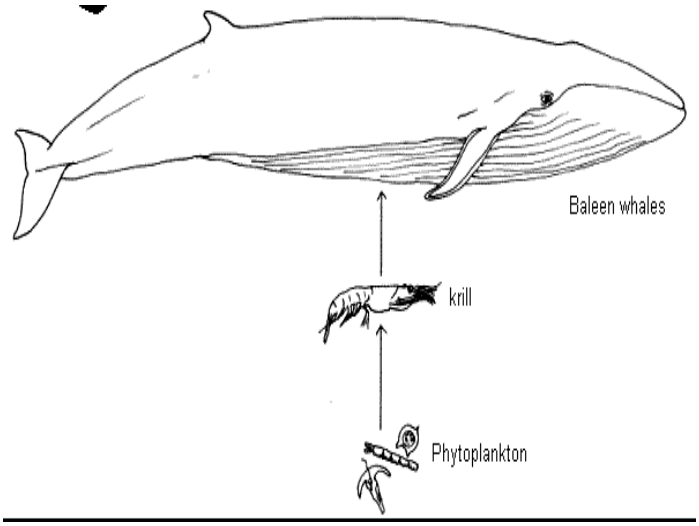
As a pair choose the best response.

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.

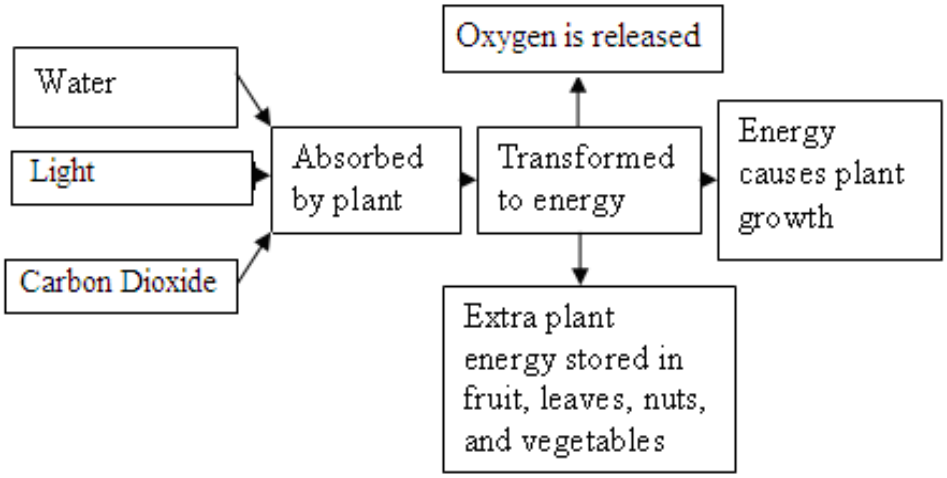
Pair Discussion

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

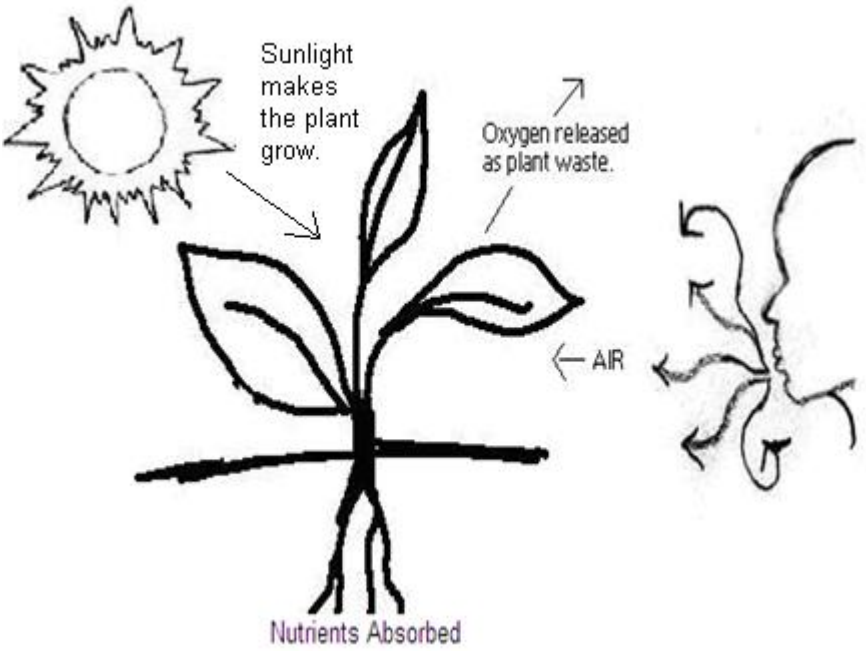
As a pair choose the best response.

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

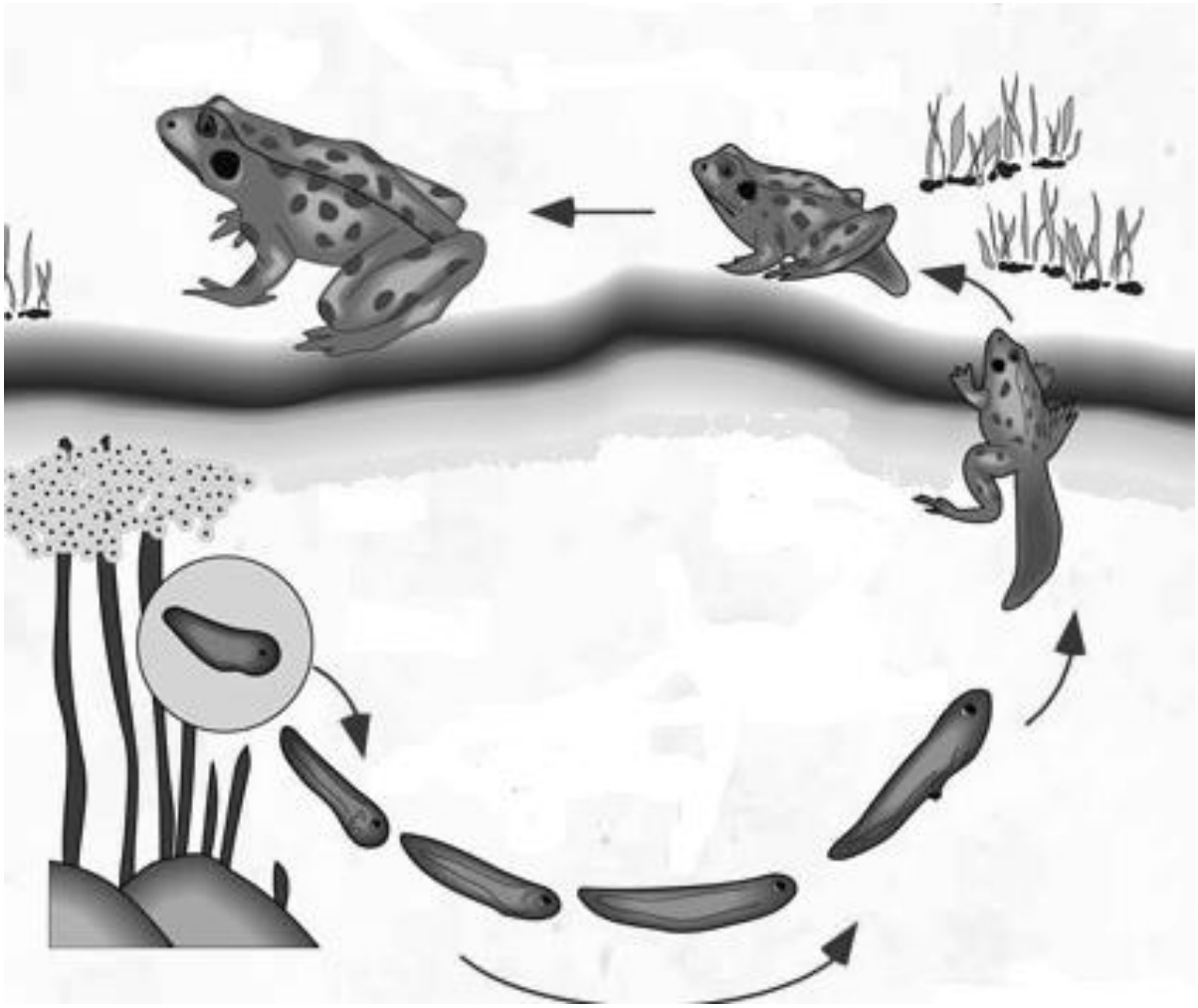
Pair Discussion

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

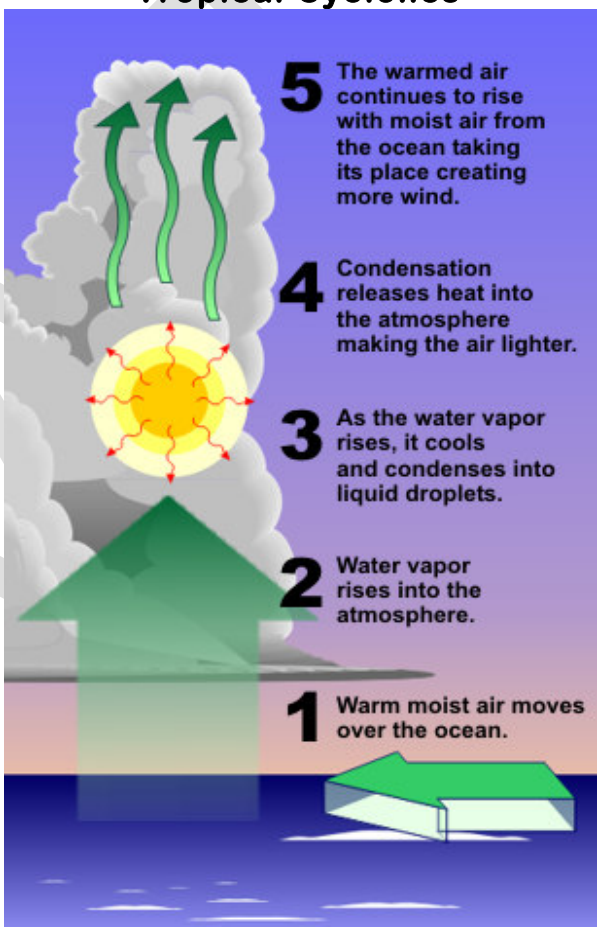
Silently read the three questions below. Then, write notes on this page about your thoughts, any connections you make to what you know and questions you have.

- 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?

Reading Science Models

Teacher Guide

Convection Powers Tropical Cyclones



Inquiry Questions

What are science Models?

How do we read science models?

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

Citations:

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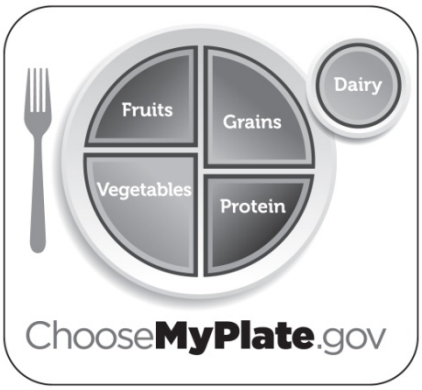
Note to Teachers



Science modeling is critical science literacy. Science models are common in our everyday life as well as in academic and science contexts. Reading science models is essential for understanding science concepts. Forming mental science models and writing science models are core practices for both science inquiry learning and science research.

The READi Reading Science Models module revolves around two complementary inquiries:

- What are science models?
- How do we read science models?

The module engages students in close reading of multiple science texts, discussion about how to read science models and in discovering the conventions and criteria for science models. The module engages teachers in enacting four pedagogies to support students in this work.

- Think-Pair-share
- Think Aloud
- Building a Reading Strategies List Poster
- Building a 'What is a science model' List Poster

The Think-Pair-share discourse routine positions students' voices at the center of the classroom. The Think Aloud routine and Building a Reading Strategies List routine support close reading and makes invisible science reading processes visible by engaging students in metacognitive conversation about how to read science texts. The

Inquiry into Science Models routine supports student knowledge building around science discourse and practices.

The READi Reading Science Models module consists of two approximately one hour lessons, longer if introducing the pedagogical routines for the first time in these lessons. The module initiates inquiry into science models and how to read science models. Ongoing use of the four pedagogical routines develops students' science reading capacity and builds knowledge of science discourse and practices over time. The purpose for the module lessons is to initiate the four routines and to begin building students' science reading capacity and knowledge of science discourse and practices.

This module supports READi Science Learning Goals one and three directly and goals two, four, five and six indirectly.

1. Engage in close reading of science information to construct domain knowledge- including multiple representations characteristic of the discipline and language learning strategies.

2. Synthesize science information from multiple text sources

3. Construct explanations of science phenomena (explanatory models) using science principles, frameworks and enduring understandings (big ideas) and scientific evidence.

4. Justify explanations using science principles, frameworks and enduring understandings (big ideas) and scientific evidence.

5. Critique explanations of using science principles, frameworks and enduring understandings (big ideas) and scientific evidence.

6. Demonstrate understanding of epistemology of science through demonstrating inquiry dispositions and conceptual change awareness/orientation (intentionally building and refining key concepts through multiple encounters with text); seeing science as a means to solve problems and address authentic questions about scientific problems, tolerating ambiguity and seeking "best understandings given the evidence", considering significance, relevance, magnitude and feasibility of inquiry.

Lessons at a glance

***Setting norms for talking in science**

Lesson 1	**Lesson 2**
Our Ideas About Models	What Makes a Science Model is Better?
Thinking Aloud About Science Models	Which Science Model is Better?
Thinking and Talking About Science Models	What Would Make This Science Model Better?
Reading Science Models	
What I Learned	What I Learned

FIVE THINGS YOU'LL NEED

WARM UP

Read these two pages and make notes about your

- Predictions: Based on the information, what kinds of things do you think you will be doing as you work?
- What kinds of experiences have you had with this kind of work?
- Questions: What questions do you about the texts?

TEAM WORK

HIGHLIGHTERS, PEN AND THIS NOTEBOOK

YOUR BRAIN

READING SCIENCE MODELS NOTEBOOK

This bookmark! CUT IT OUT, WRITE YOUR NAME ON IT! **Keep it!**

THINK ALOUD BOOKMARK

Setting Purposes

- ❑ I'm interested in …
- ❑ I want to figure out …

Questioning

- ❑ I wonder why/ how/ if…
- ❑ Could this mean …

Predicting

- ❑ I think the next part will …

Visualizing

- ❑ I can picture/ imagine/ see …
- ❑ I'll make a sketch …

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

**setting norms is now done before the models module

SCIENCE TEAM NORMS

BEFORE WE START

Scientists collaborate, work together to investigate interesting questions and solve important problems. We'll be collaborating a lot as we work on the water unit.

THINK-WRITE

Thinking about *how* people work and talk together can help teams work smoothly.

- Think about a time when you were talking with someone who really made you feel listened to.
- Write notes about what that person did or said to show they were listening and paying attention to you.

This lesson lays out the norms for how discussions happen in science class. In this lesson, we make these norms explicit, although you may have addressed this in the beginning of the year.

PAIRS

Talking about how people work and talk can help teams work smoothly.

- Take turns talking about things people do to listen, talk and work well together.
- Write notes about your ideas to share with the whole class.

SCIENCE TEAM NORMS

WHOLE CLASS DISCUSSION

- Share some ideas about things people can do to help you feel listened to.
- Make notes about other people's ideas.

Some prompts (for you as the teacher) that may be helpful students pay close attention to others ideas:

- Mary did you hear what Johnny said? What do you think what she said?
- Can anyone add on to what Mary just said?
- Is what you're saying *different* or the *same* as what Mary just said?
- That's a great idea – should we look in the text and see what else we can find out about that?
- **Linking Ss' ideas to evidence:** It sounds like we have a couple of different ideas here – what does the evidence we have seem to suggest? (this helps push students to identify ideas that are substantiated by the evidence in texts)
- **Linking Ss' ideas to models:** how does what Mary said help us improve our model? What new information can we now add, based on what she said?

"Solar" is one easy way to remember some things that good listeners do. Make notes below about what SOLAR stands for.

S

O

L

A

R

By the end of this lesson, students should be able to:

- Identify the metacognitive activities you model the think aloud process
- Describe and begin enacting the science norms for listening to one another

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!

Teacher Note: Chart student ideas on a white board board. Value all ideas. Not looking here for the right answer. Looking for student to share all their connections with the word 'model'.

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."

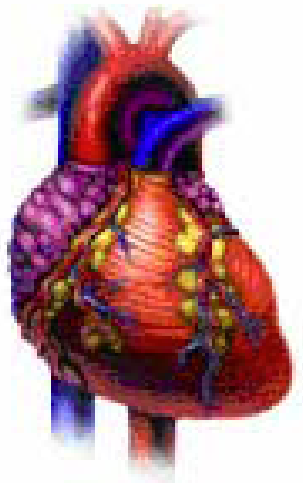
Switch roles every two sentences. Be ready to share what you hear.

Teacher Note:

- **Elicit how student read. Begin or add to a reading strategies list. Keep student voices at the center of the conversation. No lecture here about how to read.**

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.



A Model of a heart can help you understand how it works

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 about phenomena.

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?

Teacher Note:

- **Elicit students’ thoughts about science models. Begin’ what are science model’ poster.**
- **If student suggestion is ‘surprising or apparently off –base, probe gently for why they think what they do. Also you can redirect the class back to the text ‘ why do scientists use models’ to get ideas to add tit he poster.**

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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 …		
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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.

Teacher Note:

- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which text (A or B) might be a model and probe for their reasons. Direct class to texts A and B, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

Text A

How a Volcano Works

- Pressures build up under ground.

↓

- There is magna close to the surface of the earth

↓

- A hole forms in the earth

↓

- Eruption!

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.

Teacher Note:

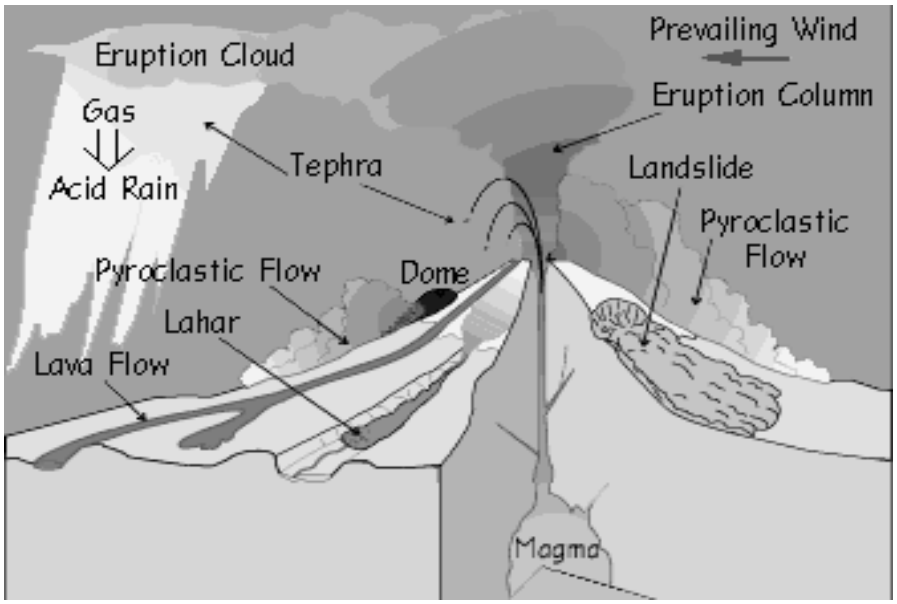
- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which text (C or D) might be a model and probe for their reasons. Direct class to texts C and D, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

Text C

Volcano Making Kit

Text D

A Volcano



Here we see how a volcano is formed. Magna 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		

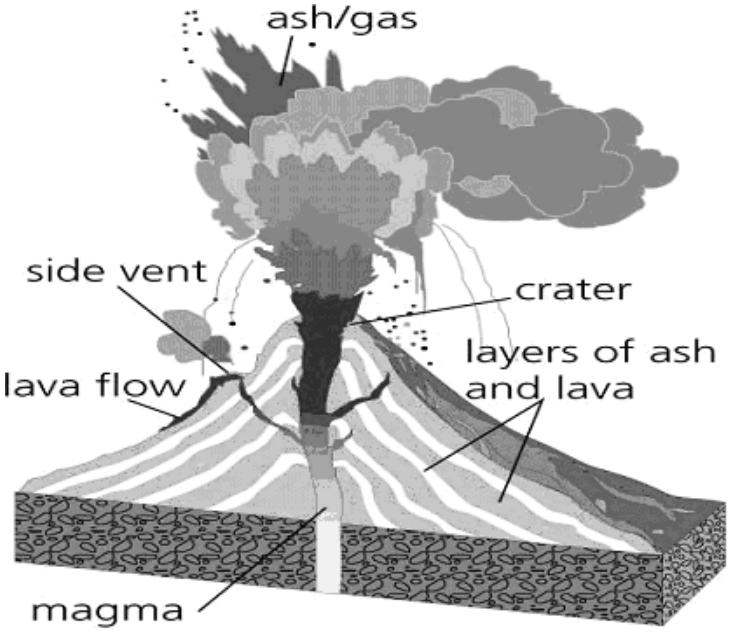
Pair Discussion
Share your Think Aloud check list observations. What reading strategies really helped you? What is one that you tried that didn't help much?
Which text is (or might be) a science model? How do you know? What is your evidence?
Be ready to share what you hear.

Teacher Note:

- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which text (E or F) might be a model and probe for their reasons. Direct class to texts E and F, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

Text E

The Volcano



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?

Teacher Note: This reflection is consolidation and formative assessment. Time permitting elicit student ideas to gather info about what student are learning not time to recap the day with the 'right answers' If you offer a recap, let it be that we explored how to read models and criteria for what models are – a recap of the process.

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WHAT MAKES A SCIENCE MODEL IS 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.

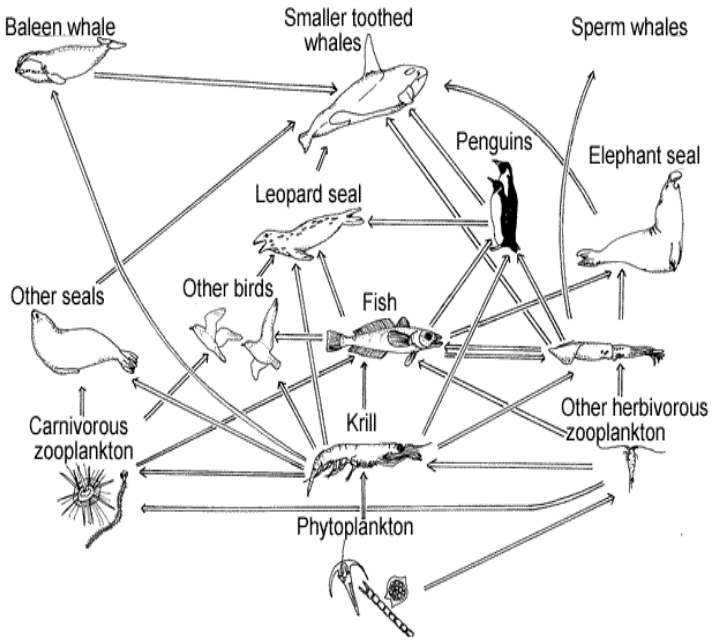
As a pair choose the best response.

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

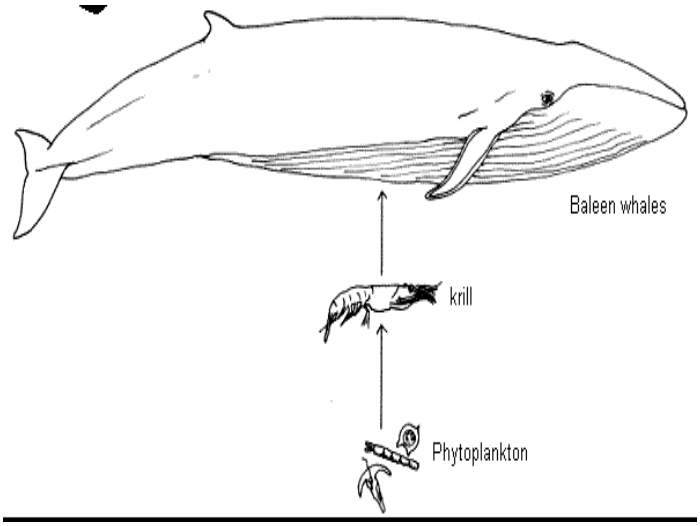
Teacher Note:

- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which text (A or B) is a better model and probe for their reasons. Direct class to texts A andBF, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

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.

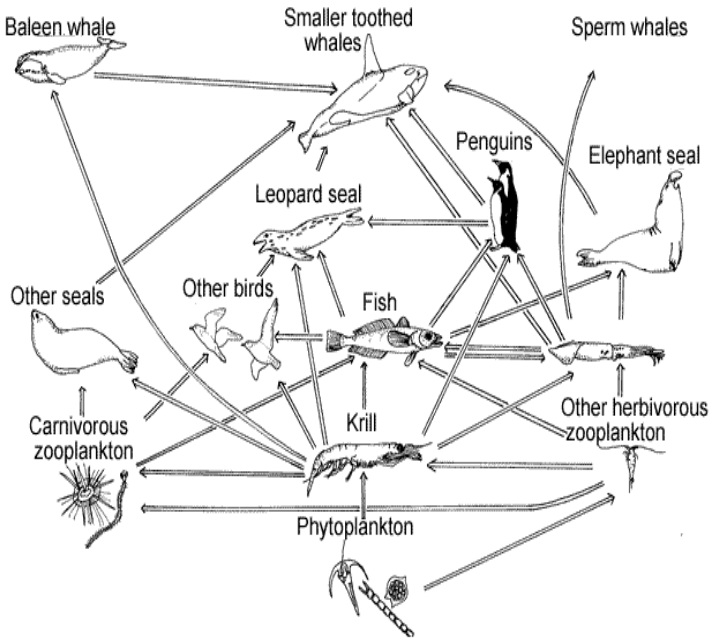
Pair Discussion

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

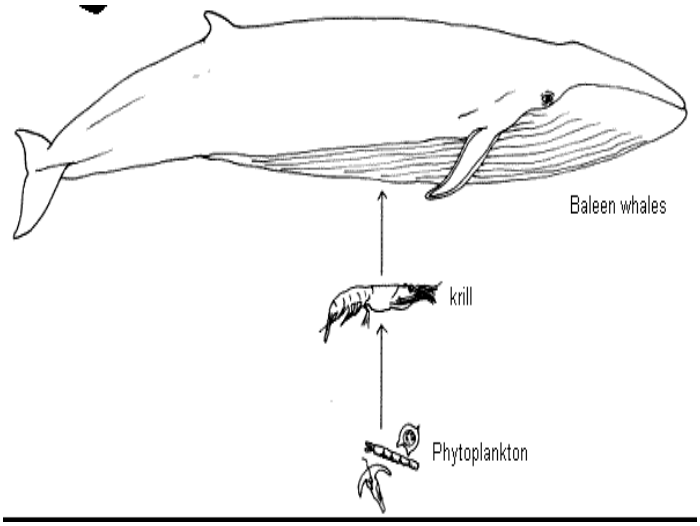
As a pair choose the best response.

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.

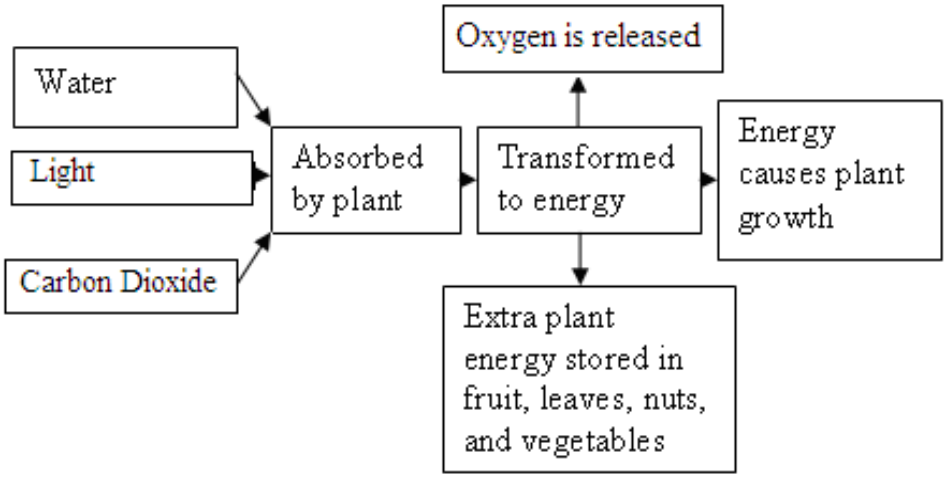
As a pair choose the best response.

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

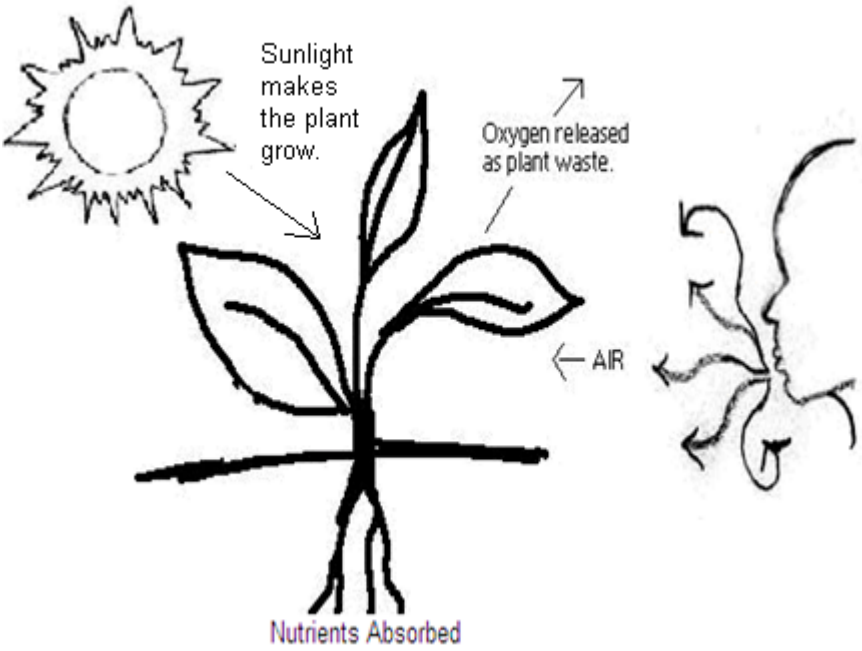
Teacher Note:

- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which text (A or B) is a better model and probe for their reasons. Direct class to texts A andBF, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

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 checkmarks 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.

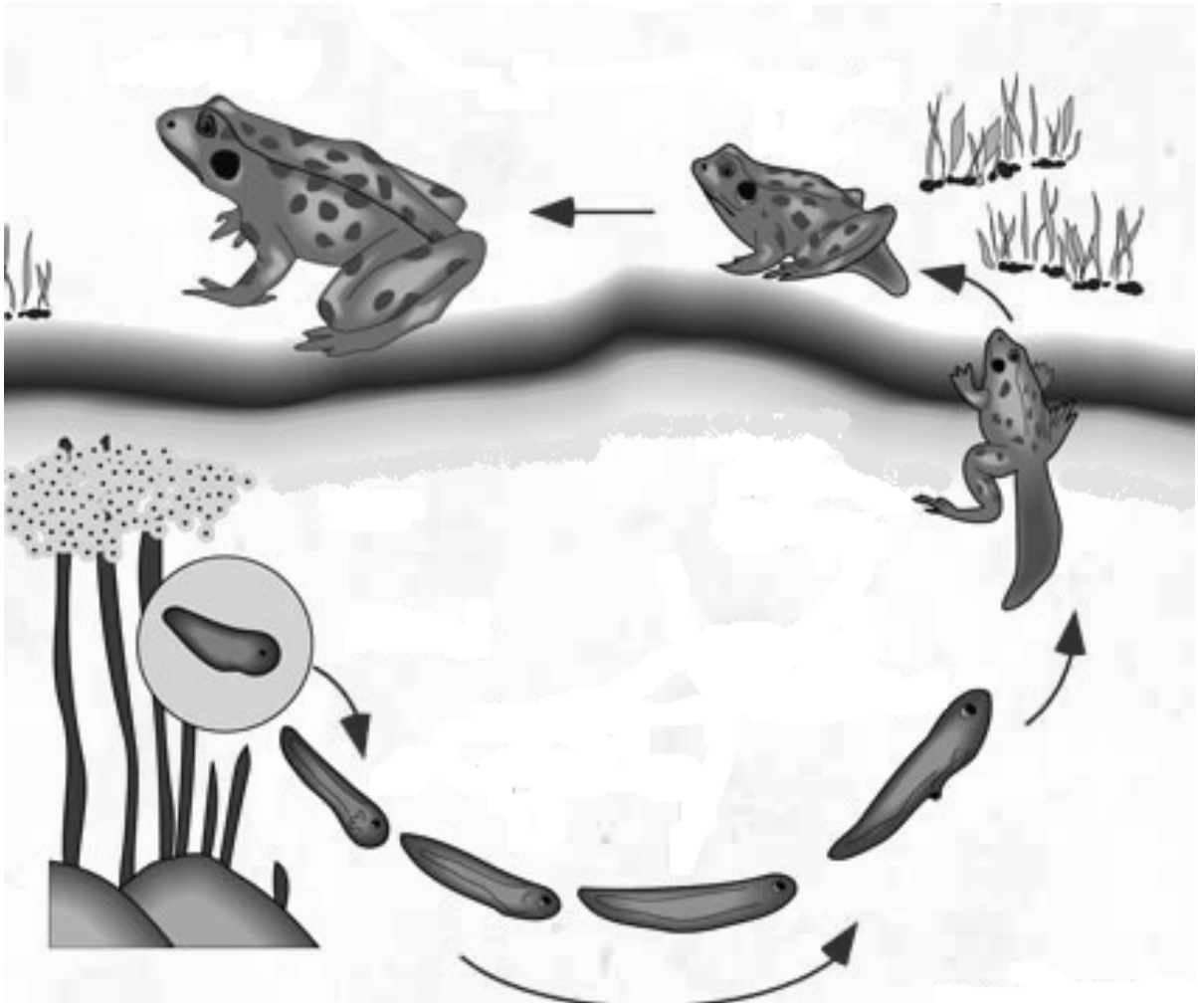
As a pair choose the best response.

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

Teacher Note:

- **FIRST Elicit how student read. Add to a reading strategies list. Mark the side reading models. Keep student voices at the center of the conversation. No lecture here about how to read.**
- **Second elicit student thoughts about which how good of a model 'E' is and probe for their reasons. Direct class to texts A andBF, the 'what is a model' poster or 'why do scientists use models' text as needed to develop text-based and evidenced based responses.**

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?

Teacher Note: This reflection is consolidation and formative assessment. Time permitting elicit student ideas to gather info about what student are learning not time to recap the day with the 'right answers' If you offer a recap, let it be that we explored how to read models and criteria for what good models are – a recap of the process.

Name:
Teacher:
Date:

Scientific models are explanations. We can use scientific models to explain things in the world. Often, we can also use scientific models to predict things. For example, a model of how plants grow explains why and how plants grow, and it can help us make predictions about when plants will grow and when they will not grow.

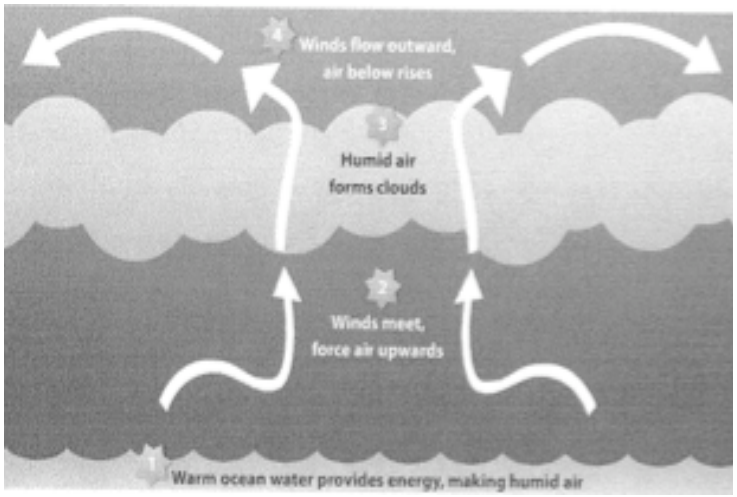
Look at each of the images below and think carefully about whether each image is a scientific model. When you're done, answer the questions below and make sure you provide lots of reasons for your answer.

A.

Aerial View of a Hurricane

B.

The Making of a Hurricane



Do you think A is a scientific model? Explain why or why not.

Do you think B is a scientific model? Explain why or why not.

Do you think one of these is a better scientific model than the other? Or are they equally good? Or is it impossible to say? Explain your answer.

What do you think are the characteristics of a good scientific model? Please list them below and explain your answer.

Name:
Teacher:
Date:

Scientific models are explanations. We can use scientific models to explain things in the world. Often, we can also use scientific models to predict things. For example, a model of how plants grow explains why and how plants grow, and it can help us make predictions about when plants will grow and when they will not grow.

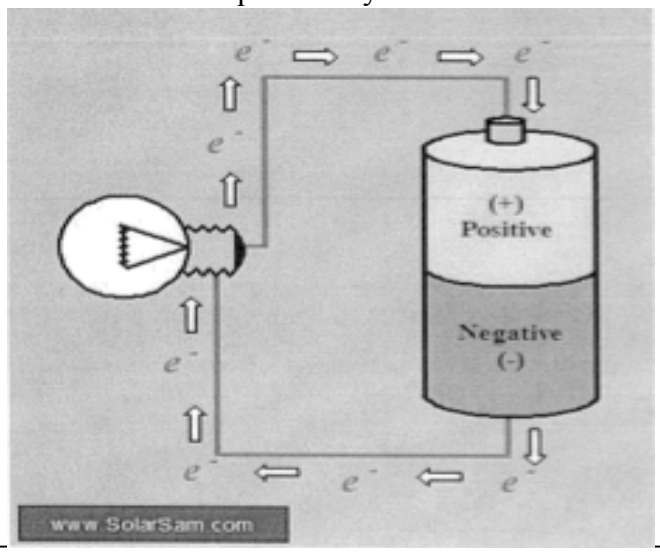
Look at each of the images below and think carefully about whether each image is a scientific model. When you're done, answer the questions below and make sure you provide lots of reasons for your answer.

A.

Batteries

B.

Simple Battery Circuit



Do you think A is a scientific model? Explain why or why not.

Do you think B is a scientific model? Explain why or why not.

Do you think one of these is a better scientific model than the other? Or are they equally good? Or is it impossible to say? Explain your answer.

What do you think are the characteristics of a good scientific model? Please list them below and explain your answer.