

Spinning Earth Coherence Flowchart

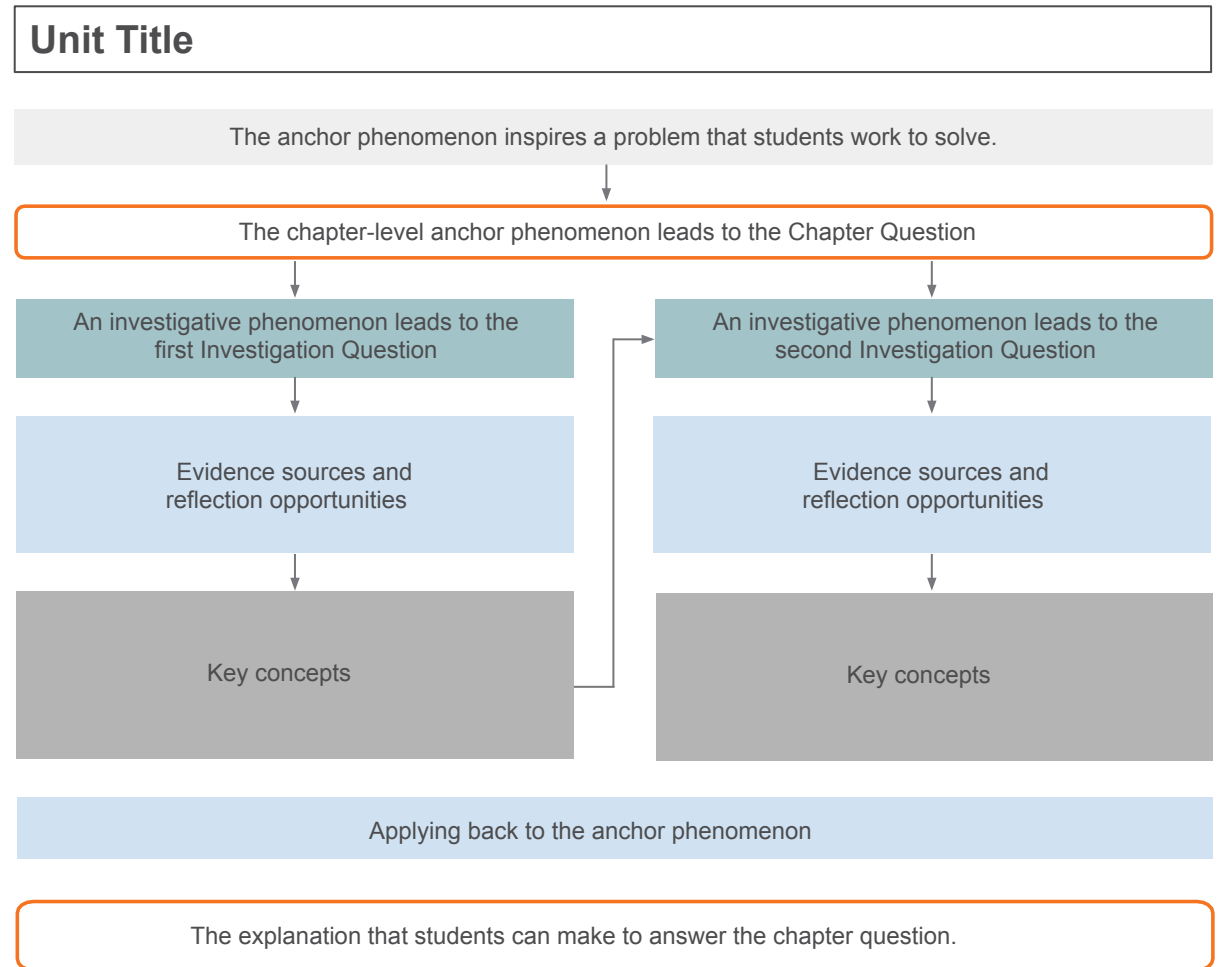
The storyline of the unit

In each Amplify Science unit, students figure out a phenomenon by asking questions, gathering evidence, and coming up with an explanation of how the phenomenon works. The Coherence Flowchart visually represents the storyline of the unit, showing the coherent flow of questions based on phenomena, evidence, and ideas that support students as they build complex explanations of the unit's anchor phenomenon. The Coherence Flowchart on the following pages (one chapter per page) can be used to see the connections between the phenomena and questions that drive students' experiences, the evidence they gather, the ideas they figure out, and the new questions that those ideas generate. The diagram to the right explains the structure of a chapter in the Coherence Flowchart.

In some units a design problem drives the investigations of the unit or of specific lessons. In these cases the design problem will be noted in place of the phenomenon.

Note: The Coherence Flowchart is a tool for teachers and is not meant to be distributed to students.

Typical structure of one chapter in a Coherence Flowchart



Instruction is framed by questions about the unit's anchor phenomenon and the related problem students are solving. Chapter Questions then guide students in figuring out the phenomenon, piece by piece. Within each chapter, investigative phenomena lead to Investigation Questions that focus students on a manageable piece of content that will help them figure out the Chapter Question. Each phenomenon leads to a question which motivates activities, and each activity provides specific evidence related to the Investigation Question. Students synthesize the understanding constructed over multiple activities, and this understanding is formalized through key concepts. Often a key concept leads students to an additional investigative phenomenon and Investigation Question students need to pursue to answer the Chapter Question. At the end of the chapter, students' new understanding is applied back to the unit's anchor phenomenon and leads students to a new Chapter Question or a final explanation.

Spinning Earth: Investigating Patterns in the Sky

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 1 Question

Investigative Phenomena Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 1 Question

The sky looks different to Sai than to his grandma when they talk on the phone.
Why doesn't the sky always look the same?

The sky looked different to Sai than to his grandma when Sai called.
Why did the sky look different to Sai than to his grandma?

Different things are visible in the sky at different times of day.
What can we see in the sky at different times? (1.1-1.3)

- Make, record, and discuss observations of the sky (1.1)
- Make a new sky observation and compare to the first (1.2)
- Read *After Sunset* (1.2)
- Collect daytime and nighttime observations from *After Sunset* (1.2)
- Sort Sky Observations data (1.3)
- Engage in Sky Investigations Role-Play (1.3)
- Read about patterns in *Patterns of Earth and Space* (1.3)

- We can see the sun in the sky during the daytime and the stars in the sky during the nighttime. (1.3)

- Shared Writing to answer the Chapter 1 Question (1.5)

Sai and his grandma saw different things at the same time because they live in different places. When it is daytime for Sai, it is nighttime for his grandma. When Sai sees the sun, Sai's grandma sees the stars.

Different things are visible in the sky from different places on Earth.
What does the sky look like to people in different places on Earth right now? (1.4-1.5)

- Make observations of webcams showing the sky from different places (1.4)
- Engage in Sky Investigations Role-Play (1.4)
- Use Interpretation Language Frame to discuss and record whether it is daytime or nighttime in different places on Earth (1.4)
- Organize webcam data to look for patterns (1.4)
- Explain what different people on Earth see at the same time (1.5)

- Right now, the sky looks different to different places on Earth. (1.5)

Spinning Earth: Investigating Patterns in the Sky

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 2 Question

Investigative Phenomena Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 2 Question

The sky looks different to Sai than to his grandma when they talk on the phone.
Why doesn't the sky always look the same?

When it was daytime for Sai, it was nighttime for his grandma.
Why was it daytime for Sai when it was nighttime for his grandma?

When it is daytime in some places on Earth, it is nighttime in other places.
Why is it daytime in some places on Earth when it is nighttime in other places? (2.1-2.4)

- Observe what Earth looks like from space in *After Sunset* (2.1)
- Observe Earth from space in *Zoom Out to Space* and *Earth in Space* videos (2.1)
- Reorganize webcam data on globes and discuss patterns in the data (2.1-2.2)
- Engage in Mount Nose Role-Play of Earth in space (2.2)
- Make and check predictions about whether it is daytime or nighttime in new locations on the globe (2.2)
- Revisit Mount Nose Role-Play (2.3)
- Use Explanation Language Frame to explain why it is daytime or nighttime in different locations on Earth (2.3)
- Make diagrams to show daytime and nighttime in different locations on Earth (2.3)

- Earth is round like a ball. (2.1)
- It is daytime for people in places on Earth that are facing the sun. (2.3)
- It is nighttime for people in places on Earth that are not facing the sun. (2.3)

- Create diagrams to show where Sai and his grandma were when it was daytime for Sai and nighttime for his grandma (2.4)
- Place Sai and his grandma on a globe (2.4)
- Shared Writing to answer the Chapter 2 Question (2.4)

It was daytime for Sai when it was nighttime for his grandma because Earth is shaped like a ball, and Sai and his grandma live on different parts of Earth. When the place where Sai lives is facing the sun, the place where his grandma lives is facing away from the sun.

Spinning Earth: Investigating Patterns in the Sky

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 3 Question

Investigative Phenomena Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 3 Question

The sky looks different to Sai than to his grandma when they talk on the phone.
Why doesn't the sky always look the same?

Sai observed the sky change from daytime to nighttime
Why did daytime change to nighttime while Sai talked on the phone?

The sun appears in different places in the sky at different times.
Where is the sun in the sky at different times? (3.1-3.4)

- Observe the sunset in a time-lapse video (3.1)
- Plan how to investigate the sun's position in the sky at different times (3.1)
- Create a Sky Mural of the horizon from the school's location (3.2)
- Observe the sun's morning and afternoon positions
- Add daytime observations of the sun's position to the Sky Mural (3.3)
- Add the teacher's observation of the sun's position at sunset to the Sky Mural (3.4)

- The sun looks like it is in different places in the sky at different times. (3.4)

- Use Spinning Mount Nose Role-Play to model Sai's perspective (3.6)
- Use Explanation Language Frame construct explanations to answer the Chapter 3 Question (3.6)

It changed from daytime to nighttime because Earth is spinning. When Sai and his grandma started talking, he saw the sun because the place on Earth where he lives was facing the sun. As Earth spins, the place where Sai lives moves to face away from the sun, so it changes to nighttime.

The sun appears in different places in the sky at different times but is not visible at night.
Why do we see the sun in different places in the sky during the daytime, and then not at all during the nighttime? (3.4-3.6)

- Read *What Spins?* (3.4)
- Spin and observe how objects appear to change positions (3.4)
- Observe *Spinning Earth* video (3.5)
- Revisit Mount Nose Role-Play and spin to consider why the sun appears to change positions (3.5)
- Read about moon patterns in *Patterns of Earth and Space* (3.5)

- As Earth spins, we face different directions, so the sky looks different to us. (3.5)

Spinning Earth: Investigating Patterns in the Sky

Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 4 Question

Investigative Phenomena Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 4 Question

The sky looks different to Sai than to his grandma when they talk on the phone.
Why doesn't the sky always look the same?

What Sai saw in the sky changed while Sai talked to his grandmother
What will Sai see in the sky when he calls his grandma tomorrow?

What we see in the sky changes throughout the day.
What will we see in the sky at the same times on a different day? (4.1-4.2)

- Observe the sun's position in the sky at the same times of day as the Chapter 3 observations (4.1)
- Add sky observation data to the Sky Mural (4.1)
- Add teacher's second sunset observation to the Sky Mural (4.2)
- Read *Nighttime Investigation* (4.2)
- Reorganize Sky Mural data into a data table (4.2)

- The sun follows the same pattern in the sky every day. (4.2)

We see the sun in about the same place in the sky at the same time each day.
Why does the sun follow the same pattern in the sky every day? (4.3-4.4)

- Reread *What Spins?* for information about the observed daily pattern of the sun's position across the sky (4.3)
- Revisit Mount Nose Role-Play to model Earth's repeated spin (4.3)
- Use Explanation Language Frame to explain the sun's repeating pattern (4.3)
- Revisit Mount Nose Role-Play to reflect on the pattern the sun makes in the sky (4.4)
- Write and illustrate the *What We See in the Sky* mini-book (4.4)

- The sun follows the same pattern in the sky every day because Earth spins one full time every day. (4.4)

- Shared Writing to answer the Chapter 4 Question (4.4)

When Sai talks on the phone to his grandma at the same time tomorrow, he will see the same thing he saw in the sky today. The sun makes the same pattern in the sky every day because Earth spins one full time every day. This pattern lets us predict that Sai will see the sunset in the evening.

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Unit Anchor Phenomenon

Problem students work to solve

Chapter-level Anchor Phenomenon Chapter 5 Question

Investigative Phenomena Investigation Questions

Evidence sources and reflection opportunities

Key concepts

Application of key concepts to the problem

Explanation that students can make to answer the Chapter 5 Question

The sky looks different to Sai than to his grandma when they talk on the phone.
Why doesn't the sky always look the same?

It is nighttime when Sai calls his grandma in winter, but it is daytime when he calls during other seasons
Why was it nighttime for Sai when he called his grandma during the winter?

The sky is different in different seasons.
How do the days change over a year? (5.1-5.2)

- Read *A Walk Through the Seasons* in partners (5.1)
- Organize data from *A Walk Through the Seasons* (5.1)
- Act out and discuss the sun's position in different seasons (5.1)
- Analyze images in *Patterns of Earth and Space* to find out length of daytime in different seasons (5.2)

- Daytime is shorter and nighttime is longer in winter than in other seasons. (5.2)

- Shared Writing answer the Chapter 5 Question (5.2)

It was nighttime when Sai called his grandma during the winter because in winter, daytime is shorter and nighttime is longer than in other seasons.