# The Water Cycle
# Lesson 5a: Using Molecules to Explain Evaporation and Condensation in Everyday Situations

| **Grade 5** | **Length of lesson:** 52 minutes | **Placement of lesson:** 5a of 6 two-part lessons on the water cycle |
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| **Unit central questions:** How does water change in the world around us? Does Earth ever run out of water? | | **Lesson focus question:** How can ideas about water molecules, evaporation, and condensation help us explain everyday situations? |
| **Main learning goal:** Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in forming clouds, steam above a teakettle spout, and "fog" on bathroom mirrors. | | |
| **Science content storyline**: Many everyday situations can be explained in terms of changes in the arrangement and motion of water molecules as they move from the liquid state to the gaseous state (evaporation) and back again (condensation). We know that evaporation occurs when water boils and molecules in the liquid state move faster, break away from other molecules, and rise into the air as water vapor. We also know that condensation occurs when water-vapor molecules in the air lose heat energy (cool), slow down, and join together to form liquid-water droplets when they come near a cold glass of ice water. Today we found out that some everyday situations involve both evaporation and condensation. For example, clouds form when liquid water on Earth is heated and the molecules evaporate, spreading throughout the air as water vapor. When these water-vapor molecules rise high up in the sky, they cool, lose energy, slow down, and condense on dust particles in the air, forming tiny droplets of liquid water that we see as a cloud. Other examples of everyday situations that involve both evaporation and condensation are the steam above a teakettle spout and a foggy bathroom mirror. | | |
| **Ideal student responses to the focus question:**<br>• **A foggy bathroom mirror:** Water droplets can fog up a bathroom mirror when hot liquid-water molecules come out of a showerhead, and some of the faster-moving molecules separate from other molecules, escape the surface of the water, and rise into the air as water vapor. That change from a liquid to a gaseous state is called *evaporation*. As the water-vapor molecules bounce around in the air, some of them come close to the mirror, which is cooler than the surrounding air. This causes the water-vapor molecules to lose heat energy (cool), slow down, and join to gether to form liquid-water droplets on the mirror. That's called *condensation*.<br>• **Across scenarios:** We looked at different examples of everyday scenarios where water changes happen, such as with clouds, a teakettle, and a fogged-up bathroom mirror. In all of these scenarios, water molecules in the liquid state gain heat energy and change from a liquid to a gas (evaporation) and then lose heat energy (cool), slow down, and change from a gas back to a liquid (condensation). | | |

**Preparation**

| **Materials Needed** | **Ahead of Time** |
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| • Science notebooks<br>• Chart paper and markers<br>• The Happy Scientist online video, *Cloud Formation*— https://www.thehappyscientist.com/content/cloud-formation-part-1<br>• **Optional:**<br>  • Water-changes-system setup<br>  • Highlighters or colored pencils to mark handout<br>  • Teakettle and hot plate<br><br>**Student Handouts**<br>• 5.1 How Do Clouds Form? (1 per student) | • Review the Water Cycle Content Background Document: sections 1.6, 1.9, and 2.3 (with a special focus on explanations of everyday connections).<br>• Review the PowerPoint slides and modify them as you wish.<br>• Study the options in the lesson plan so you know which sections to cut if time is running short.<br>• Decide whether you want students to read the handout (How Clouds Are Formed) independently, in pairs or small groups, or as a class. Do you want them to use highlighters/colored pencils to mark key ideas?<br>• View the Happy Scientist *Cloud Formation* video.<br>• **Optional:** Try heating water in the teakettle to make sure you can clearly see the space between the kettle spout and the steam cloud. |

**Lesson 5a General Outline**

| Time | Phase of Lesson | How the Science Content Storyline Develops |
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| 3 min | **Link to previous lesson:** The teacher engages students in explaining what they learned in the previous lesson about what is happening to water molecules in the water-changes system. | • Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in the water-changes system. When a flask of water is heated, water molecules gain energy, move faster, break away from other molecules, and escape the liquid surface as water-vapor (gas) molecules we can't see (evaporation). When these molecules encounter cooler air in the tubing, they lose energy, slow down, and join together to form liquid-water droplets (condensation). |
| 1 min | **Lesson focus question:** The teacher introduces the focus question, *How can ideas about water molecules, evaporation, and condensation help us explain everyday situations?* | |
| 8 min | **Setup for activity:** The class makes a list of key ideas about molecules, evaporation, and condensation. | • Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in the water-changes system. **In evaporation**, liquid-water molecules gain heat energy, move faster, break away from other molecules, and escape the liquid surface as water-vapor (gas) molecules we can't see. **In condensation**, water-vapor molecules lose heat energy (cool), slow down, and join together to form droplets of liquid water. |
| 25 min | **Activity:** The teacher elicits student ideas about how clouds form. Then students gather new ideas about clouds from a handout and a short video. | • Clouds form as a result of evaporation and condensation. In evaporation, liquid-water molecules gain heat energy, move faster, break away from other molecules, and escape the liquid surface as invisible water-vapor (gas) molecules. When water-vapor molecules rise into the sky and encounter cooler air, they lose heat energy, slow down, and join together to form liquid-water droplets on dust particles in the air (condensation). This collection of liquid-water droplets is a cloud. |
| 10 min | **Follow-up to activity:** Students use what they've learned about clouds to explain two other everyday situations: steam above a teakettle spout and a foggy bathroom mirror. | • Changes in the motion and arrangement of water molecules during evaporation and condensation help us explain everyday situations.<br>• **Steam:** Liquid-water molecules inside a heated teakettle gain energy and speed, break away from other water molecules, and rise into the air and out of the spout as water-vapor (gas) molecules (evaporation). When they encounter the cooler air outside the spout, they lose heat energy, slow down, and condense to form tiny liquid-water droplets called *steam*.<br>• **Foggy mirror:** Liquid-water molecules from a hot shower gain heat energy, move faster, break away from other molecules, and escape the liquid surface, spreading throughout the bathroom as water-vapor (gas) molecules (evaporation). When they encounter the cooler air near the mirror, they lose heat energy, slow down, and condense to form tiny liquid-water droplets on the mirror. |
| 5 min | **Synthesize/summarize today's lesson and link to next lesson:** Students consider which processes (evaporation, condensation, both, or neither) are involved in three everyday situations and in the water-changes system. The teacher links science ideas to the next lesson. | • Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in forming clouds, steam above a teakettle spout, and "fog" on bathroom mirrors.<br>• Ideas about molecules, evaporation, and condensation can be used to explain Earth's water cycle. |

| Time | Phase of Lesson and How the Science Content Storyline Develops | STeLLA Strategy | Teacher Talk and Questions | Anticipated Student Responses | Possible Probe/Challenge Questions |
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| 3 min | **Link to Previous Lesson**<br><br>**Synopsis:** The teacher engages students in explaining what they learned in the previous lesson about what is happening to water molecules in the water-changes system.<br><br>**Main science idea(s):**<br>• Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in the water-changes system. When a flask of water is heated, water molecules gain energy, move faster, break away from other molecules, and escape the liquid surface as water-vapor (gas) molecules we can't see (evaporation). When these molecules encounter cooler air in the tubing, they lose energy, slow down, and join together to form liquid-water droplets (condensation). | Summarize key science ideas.<br><br>Highlight key science ideas throughout.<br><br>Ask questions to challenge student thinking. | **Show slides 1 and 2.**<br><br>**Option:** *If you prefer, you can show the actual water-changes system instead of slide 2.*<br><br>Yesterday we used the ideas we've learned about water molecules to explain what happens in a water-changes system.<br><br>What's happening to the water molecules in this water-changes system? | The water molecules in the flask start moving faster, break apart from other molecules, and escape into the air as water vapor.<br><br>The water molecules break away from each other. | What do you mean by "break apart"? Does each water molecule break in two? What breaks apart?<br><br>Yes, this is important. The water molecules break away from each other, but each water molecule is still $H_2O$. The water |

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| | | | | | molecules don't break apart into individual hydrogen and oxygen atoms.<br><br>Why do the water molecules break away from each other? |
| | | | | Heat was added to the liquid water.<br><br>The water vapor goes into the tubing, and water drops form because of condensation. | Use the word *molecules* in your sentence. |
| | | | | Water-vapor molecules slow down because it's cooler in the tubing, and they come together to form liquid-water drops. | |
| | | | Is this an open system or a closed system? Tell me why. | It's an open system because some of the water molecules can escape into the air out of the top of the test tube. We saw steam | |

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| | | | | coming out of the test tube.<br><br>It's water vapor. [*Misconception. Don't address this now. You'll discuss it at the end of the lesson.*] | |
| | | | What is the steam?<br><br>Today we're going to explore steam, so we'll come back to this question at the end of the lesson.<br><br>**Show slide 3.**<br><br>Where would you expect to see water molecules arranged like this in our system? | Nowhere, because it's not cold enough for the water molecules to change to a solid (ice) state. | |
| | | | **Show slide 4.**<br><br>What about this arrangement? Where would these molecules appear in our system? | They're liquid-water molecules, so we'd see them in the flask.<br><br>We'd also see them in the tubing and the test tube. | |

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| | | | **CONTENT NOTE TO TEACHER:** *Water molecules in the liquid state would also be seen in the steam that forms over the test tube, but this will be addressed at the end of the lesson, not here.*<br><br>**Show slide 5.**<br><br>Where would you expect to see this arrangement of water molecules in our system? | In the air above the liquid water in the flask.<br><br>In the tubing.<br><br>In the steam coming out of the test tube. [*Misconception*] | Since we're going to explore steam today, we'll come back to this idea later. |
| 1 min | **Lesson Focus Question**<br>**Synopsis:** The teacher introduces the focus question, *How can ideas about water molecules, evaporation, and condensation help us explain everyday situations?* | | **Show slide 6.**<br><br>We've seen that we can use ideas about molecules, evaporation, and condensation to explain what's happening in our water-changes system. But what about in our everyday lives? Can we use these ideas to explain what happens in the world around us? | | |

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| | | Set the purpose with a <u>focus question</u> or goal statement. | So our focus question for today is *How can ideas about water molecules, evaporation, and condensation help us explain everyday situations?*<br><br>Today we'll use these ideas to explain some everyday situations.<br><br>**NOTE TO TEACHER**: *Make sure the focus question is visible for all to see throughout the lesson.* | | |
| 8 min | **Setup for Activity**<br><br>**Synopsis:** The class makes a list of key ideas about molecules, evaporation, and condensation.<br><br>**Main science idea(s):**<br>• Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in the water-changes system. **In evaporation**, liquid-water molecules gain heat energy, move faster, break away from other molecules, and escape the liquid surface as water-vapor (gas) molecules we can't see. **In condensation**, water- | Make explicit links between science ideas and activities **before** the activity. | **Show slide 7.**<br><br>First, let's come up with a list of key ideas that describe what we've learned about molecules, evaporation, and condensation. I'll divide the class into two groups, and then you'll work with a partner on the assigned task for your group. Make sure to use the sentence starter on the slide for your specific group.<br><br>**NOTE TO TEACHER:** *Divide the class into two groups—Group 1 and Group 2—and have students in these group pair up for their assigned task. Assign pairs in Group 1 the task of coming up with an idea about water molecules and evaporation. Assign pairs in Group 2 the task of coming up with an idea about water molecules and condensation.*<br><br>**Pairs work.** | | |

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| | vapor molecules lose heat energy (cool), slow down, and join together to form droplets of liquid water. | Highlight key science ideas and focus question throughout.<br><br>Engage students in communicating in scientific ways. | **Whole-class discussion:** So let's hear your ideas, starting with pairs in Group 1. What key idea did you come up with about evaporation and water molecules?<br><br>Everyone listen carefully and think about what needs to be corrected or added to the ideas others share.<br><br>**NOTE TO TEACHER**: *Chart the key ideas for students to refer to during the activity. Make sure that only* ***accurate*** *statements are listed on chart paper.*<br><br>OK, now let's hear from the pairs in Group 2. What key ideas did you come up with about condensation and water molecules? Again, everyone listen carefully and provide feedback.<br><br>Next we'll try to explain some everyday situations using ideas about evaporation and condensation, so you'll need to refer this chart. | *Ideal response:*<br><br>Evaporation happens when molecules in the liquid state gain heat energy, move faster, break away from each other, and escape into the air as a gas (water vapor).<br><br>Condensation happens when water-vapor molecules in the air lose heat energy (cool), slow down, and come together to form liquid-water drops. | |
| 25 min | **Activity**<br><br>**Synopsis:** The teacher elicits student ideas about how clouds form. Then students gather new ideas | Make explicit links between science ideas and activities **during** the | **Show slide 8.**<br><br>We've already observed two everyday situations involving water molecules. The first involved boiling water, and the other involved water droplets forming on the | | |

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| | about clouds from a handout and a short video.<br><br>**Main science idea(s):**<br>• Clouds form as a result of evaporation and condensation. In evaporation, liquid-water molecules gain heat energy, move faster, break away from other molecules, and escape the liquid surface as invisible water-vapor (gas) molecules. When water-vapor molecules rise into the sky and encounter cooler air, they lose heat energy, slow down, and join together to form liquid-water droplets on dust particles in the air (condensation). This collection of liquid-water droplets is a cloud. | activity.<br><br>Engage students in communicating in scientific ways. | outside of a cold container.<br><br>What's happening to the water molecules in the pot of boiling water on this slide?<br><br>What's happening to the water molecules in this other picture?<br><br>**Show slide 9.**<br><br>So a new situation we're going to explain today is clouds. What are clouds, and how do you think they form?<br><br>**Show slide 10.**<br><br>In your science notebooks, write down your ideas about how clouds form.<br><br>**Individual writing time (2–3 min).** | They're evaporating!<br><br>They're speeding up because they're gaining energy, and then they're spreading out into the air.<br><br>The water-vapor molecules in the air are cooling down because of the cold glass. As the molecules cool, they slow down and join together to form drops of liquid water. | Give me more details. |

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| | | | **NOTE TO TEACHER:** *During the activity, wander around the room and read what students are writing to gain a sense of the common ideas they hold.*<br><br>I saw some different ideas in your writing. Some of you have the idea that clouds are [*insert student ideas here*]. Others think [*insert student ideas here*].<br><br>Keep in mind that these are your **initial** ideas. They may or may not agree with what scientists know, so next we're going to read about some ideas scientists have developed about how clouds form.<br><br>**NOTE TO TEACHER**: *Distribute handout 5.1, How Do Clouds Form? Direct students to read the handout independently, in pairs or small groups, or as a class. Also let them know if you want them to use highlighters or colored pencils to mark key ideas in the handout.*<br><br>**Show slide 11.**<br><br>As you read the handout, take note of any **new ideas** you discover about how clouds form. After you finish reading, write those new ideas in your notebooks [*or turn and talk about them with a partner*].<br><br>**Reading and writing [or Turn and Talk] time (3–4 min).** | *Common student ideas*:<br><br>Clouds form because of evaporation.<br><br>Water evaporates and goes into the sky to form clouds. So clouds are made of water vapor.<br><br>Clouds are made of snow because they're white. | |

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| | | | **Whole-class share-out:** Let's hear the new ideas you discovered in the reading about how clouds are formed. | Clouds are **not** made of water vapor! They're made of liquid-water drops. | How do those water drops get there? |
| | | | | I learned that you need both evaporation and condensation for clouds to form. | |
| | | | **Show slide 12.** | | Right! Say more about how that works. |
| | | | Now let's watch a video and see if we discover any other ideas about how clouds form. | | |
| | | | **Option:** *If time is running short, you can skip the Happy Scientist video.* | | |
| | | | **Show the Happy Scientist *Cloud Formation* video.** | | |
| | | | **NOTE TO TEACHER:** *You can stop the video at segment 1:50 if you want to show this segment again. After the video, have students write in their notebooks about scientists' ideas on cloud formation (or have them turn and talk with a partner). As students work, circulate and read what they're writing (or listen to what pairs are* | | |

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| | | | *talking about). Ask challenge questions to move their thinking forward toward more scientifically accurate ideas. If students are having trouble using scientific ideas accurately, play the first minute and a half of the video again.*<br><br>**Show slide 13.**<br><br>What did you learn from the video about how clouds form? Write about these new ideas in your notebooks [*or talk about them with a partner*] and be ready to share them with the class.<br><br>**Individual writing time (2–3 min).**<br><br>**Whole-class share-out:** So what new ideas about cloud formation did you discover from watching the video?<br><br>  <br>*Listen to students' ideas. What is visible about student thinking? Do students understand how clouds form?* | There's water vapor in our breath, so we can make clouds.<br><br>The cold air makes the water vapor visible. [*Misconception*]<br><br>No. What we're seeing are tiny drops of liquid water that formed when the water vapor in the air cooled. | Why does it have to be cold outside for you to see your breath (i.e., make a cloud)?<br><br>Can we see water vapor?<br><br>So when you make a |

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| | | | | | cloud with your breath, is that evaporation or condensation? Why? |
| | | | | It's condensation because the water-vapor or gas molecules in your breath cool and slow down and start gathering together to form liquid-water drops. | What's a scientific way of saying the water-vapor molecules cool? |
| | | | | They lose heat energy. | |
| | | | | Another idea about cloud formation is that clouds are always swirling and moving. | Does that make sense given what you know about molecules in the liquid state? Why or why not? |
| | | | | Yes, because water molecules in the liquid state are always moving and swirling around. | |
| | | | **Show slide 14.**<br><br>So let's summarize what we've learned | | |

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| | | | about clouds from the reading and the video.<br><br>**NOTE TO TEACHER:** *Summarize the key ideas about clouds and cloud formation on the slide.* | | |
| 10 min | **Follow-Up to Activity**<br><br>**Synopsis:** Students use what they've learned about clouds to explain two other everyday situations: steam above a teakettle spout and a foggy bathroom mirror.<br><br>**Main science idea(s):**<br>• Changes in the motion and arrangement of water molecules during evaporation and condensation help us explain everyday situations.<br>• **Steam:** Liquid-water molecules inside a heated teakettle gain energy and speed, break away from other water molecules, and rise into the air and out of the spout as water-vapor (gas) molecules (evaporation). When they encounter the cooler air outside the spout, they lose heat energy, slow | Make explicit links between science ideas and activities **after** the activity.<br><br>Engage students in using and applying new science ideas in a variety of ways and contexts. | Now let's see if you can use what you've learned about clouds to explain another situation.<br><br>**Show slide 15.**<br><br>Observe the teakettle carefully. What's happening? What do you see? If you need help describing your observations, look at our chart of key ideas about evaporation and condensation.<br><br>**NOTE TO TEACHER**: *Make sure students clearly see the clear space between the kettle spout and the steam cloud.*<br><br>**Turn and Talk (1 min):** Now I'd like you to turn and talk with a partner about what's happening with the teakettle. How is the steam cloud forming above the kettle spout?<br><br>**Whole-class discussion:** OK, let's hear the ideas you came up with to explain the steam cloud.<br><br>**CONTENT NOTE TO TEACHER:** *The* | I see a cloud of steam!<br><br>The steam doesn't form right at the opening of the spout. It's clear there.<br><br>Liquid-water molecules in the teakettle got hot | What else do you notice? |

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| | down, and condense to form tiny liquid-water droplets called *steam*.<br>• **Foggy mirror:** Liquid-water molecules from a hot shower gain heat energy, move faster, break away from other molecules, and escape the liquid surface, spreading throughout the bathroom as water-vapor (gas) molecules (evaporation). When they encounter the cooler air near the mirror, they lose heat energy, slow down, and condense to form tiny liquid-water droplets on the mirror. | | *space between the kettle spout and the cloud of steam contains gas (water-vapor) molecules. As these molecules hit the cooler air around them, they slow down and condense to form tiny liquid-water droplets. This is the steam.*<br><br>**Show slide 16.** | and broke away into the air as water vapor. The water-vapor molecules escaped through the teakettle spout. [*This student is focusing only on evaporation.*]<br><br>The steam can't be water vapor because we can see it—just like we can see clouds. So the steam must be tiny drops of liquid water.<br><br>I think the water vapor came out of the spout, and then it hit cooler air, so it changed back to liquid water, which is the steam.<br><br>The water molecules slow down when they come out of the spout and hit the cooler air. | Come point to the picture and show us where the water vapor is.<br><br>If the steam is liquid-water drops, where did they come from?<br><br>Can you say something about what's happening to the molecules? |

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| | | Highlight key science ideas and focus question throughout. | **NOTE TO TEACHER**: *Summarize key science ideas about the teakettle.*<br><br>So here's what we learned about the steam cloud coming from the teakettle: When the liquid-water molecules inside a teakettle heat up and begin to boil, they gain energy, speed up, break away from other molecules, and escape through the kettle spout as water-vapor or gas molecules. That's evaporation. But when they hit the cooler air outside the spout, they quickly lose heat energy, slow down, and condense to form the steam we see outside the kettle spout. That steam is condensed liquid-water droplets.<br><br>**Show slide 17.**<br><br>Now let's read about another everyday situation.<br><br>**Option:** *If time is running short, you can skip the foggy mirror and move on to the lesson synthesis and summary.*<br><br>What do you observe in the picture? | There's water on the mirror.<br><br>The liquid state. | What state is the |

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| | | Engage students in using and applying new science ideas in a variety of ways and contexts. | So there's liquid water on the mirror, but it wasn't there before Arturo took his shower.<br><br>**Turn and Talk (1 min):** Talk with a partner about what's happening and why. How do you think the liquid water formed on that mirror?<br><br>**Whole-class share-out:** Now let's hear your ideas about how liquid water got on the mirror.<br><br>**Show slide 18**.<br><br>**NOTE TO TEACHER:** *Summarize the key points on the slide about the foggy* | The water on the mirror is in the liquid state.<br><br>*Strong response*:<br><br>The water from the shower was hot, so the liquid-water molecules evaporated as water vapor. These water-vapor molecules moved out into the room, but when they got near the cooler mirror, they slowed down and started moving together to form liquid-water drops on the mirror. | water in?<br><br>Can you put that in a complete sentence? |

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| | | | *mirror.*<br><br>So let's summarize what we learned about the foggy mirror. Liquid-water molecules from the shower gain heat energy, speed up, break away from other molecules, and evaporate or spread out into the air as water-vapor or gas molecules. When they get close to the cooler mirror, they lose energy, slow down, and condense onto the mirror as tiny liquid-water droplets. | | |
| 5 min | **Synthesize/Summarize Today's Lesson and Link to Next Lesson**<br><br>**Synopsis:** Students consider which processes (evaporation, condensation, both, or neither) are involved in three everyday situations and in the water-changes system. The teacher links science ideas to the next lesson.<br><br>**Main science idea(s):**<br>• Changes in the motion and arrangement of water molecules during evaporation and condensation are involved in forming clouds, steam above a teakettle spout, and "fog" on bathroom mirrors. | Highlight key science ideas and focus question throughout.<br><br>Engage students in making connections by synthesizing and summarizing key science ideas. | **Show slide 19.**<br><br>Our focus question is *How can ideas about water molecules help us explain everyday situations?*<br><br>What everyday situations did we explain today using ideas about water molecules and changes from one state to another?<br><br>**Show slide 20.**<br><br>**Turn and Talk (1 min):** Now let's think about which processes were involved in these three situations. Turn and talk with a partner about each situation and be ready to share your ideas and reasons with the class.<br><br>**Option:** *You can make this a jigsaw* | Clouds.<br><br>Steam from a teakettle.<br><br>A foggy mirror. | |

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| | • Ideas about molecules, evaporation, and condensation can be used to explain Earth's water cycle. | | *activity so that each pair of students is discussing only one situation.*<br><br>***Embedded Assessment Task***<br>*Listen to students and assess whether they recognize that both evaporation and condensation are involved in all three situations.*<br><br>**Whole-class discussion:** What did you decide about the processes involved in each of these situations?<br><br>**ASSESSMENT NOTE TO TEACHER:** *Hopefully students will see the pattern that evaporation and condensation are involved in all three situations. But it's also accurate to say that all three situations involved condensation. If students see the pattern, ask challenge questions to push them to talk about what the molecules are doing in each situation. If they're having trouble seeing the pattern, go back to slides 13, 15, and 17 to review the key ideas.*<br><br>**Option:** *If time allows, ask students to explain how the steam cloud formed above the test tube. If time is short, provide an explanation using slide 21 or skip slides 20–23.*<br><br>**Show slide 21.**<br><br>**Whole-class discussion:** Based on our | Both evaporation and condensation are involved in all three situations! | |

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| | | | explanations for these everyday situations, how do you think the steam cloud formed above the test tube?<br><br>**Show slide 22.**<br><br>This slide explains how the steam cloud formed. Liquid-water molecules in the test tube gained heat energy and speed, broke away from other molecules, and escaped the test tube through evaporation, changing into water-vapor molecules. Then the water-vapor molecules encountered cooler air outside the test tube, lost heat energy, slowed down, and condensed to form liquid-water droplet that appear above the test tube as a steam cloud.<br><br>**Show slide 23.**<br><br>Which diagram on the slide best shows how the water molecules are arranged inside the cloud of steam above the test tube? | *Ideal response*:<br><br>The diagram on the right shows water molecules in the liquid state. The steam cloud is made up of liquid-water droplets, so the molecules are arranged close together but not locked in a rigid pattern like the diagram at the bottom of the slide. | |

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| | | | **Show slide 24.**<br><br>The correct answer is that water molecules are arranged in the liquid state in the steam cloud.<br><br>**Optional question:** Where else in this diagram might the water molecules be arranged this way?<br><br>**Optional question:** Where might water molecules be arranged like the diagram on the left?<br><br>**Show slide 25.**<br><br>Today we learned more about the water-changes system and how ideas about molecules, condensation, and evaporation | At the bottom of the flask.<br><br>In water drops in the tubing.<br><br>At the bottom of the test tube.<br><br>In the top part of the flask.<br><br>In the tubing.<br><br>Coming out the top of the test tube.<br><br>All throughout the air. | |
| | | Link science ideas to other science ideas. | | | |

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| | | | can explain everyday situations.<br><br>Next time, we'll use all of these ideas to help us explain Earth's water cycle. | | |