



In this unit, students will analyze data, interpret models, and construct explanations to investigate the relationship between atmospheric variables such as temperature, air pressure, and moisture and the typical weather events humans experience. Students will analyze atmospheric data to predict weather, explain how density creates air currents, and consider how ocean currents impact regional climates. By the end of this unit, students will have a strong understanding of how latitude, air pressure, and convection contribute to weather and climate.

NGSS Standards Alignment

Middle School	
Standards	Lessons & Activities
MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	• Water Cycle & Conservation Google Slides • Water Cycle Practice

MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	• Air Masses and Fronts Google Slides • Weather Fronts & Air Masses Reading • Weather Fronts Webquest • Fronts Foldable • Weather Forecasting Reading • Weather Prediction Task Cards
MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	• Climate Project - Ocean Currents & Global Winds • Convection Currents Google Slides • Convection Currents Reading • Ocean Currents Reading • Ocean Currents Extension Webquest • Global and Local Winds Google Slides • Ocean Currents Google Slides Lesson • Wind - Color by Number • Global and Local Winds Homework

Enduring Understandings

- Temperature has a large effect on the density of materials.
- The uneven heating of the Earth drives convection currents and weather.
- The Sun is the primary energy source for Earth's climate system.
- Use appropriate vocabulary related to investigations of weather – weather, climate, air masses, fronts, Instruments, forecast, water cycle, and cloud types.

- Air has mass and volume, moves, contracts when cooled, is heavier when dry, and moves from areas of high pressure to low pressure.
- Air tends to take on the qualities of the land or sea below it.
- Ocean currents have a large impact on coastal climates.
- Warm and cold air masses are important components of weather, and when a warm air front meets a cold air front, the warm air moves over the cold air.
- Public weather forecasts are derived from various sources – temperature, relative humidity, precipitation, wind speed and direction, barometric pressure, cloud cover, warm and cold fronts, and ultraviolet index.

Essential Questions

- How does the uneven heating of the Earth cause convection currents?
- What causes wind?
- What causes ocean currents?
- What do wind and ocean currents have in common?
- How does the Sun create weather?
- What happens when large air masses with different qualities (temperature and humidity) meet?
- What factors interact with and influence weather?
- How does latitude factor into climate?
- How do meteorologists predict upcoming weather events?
- What tools are used to collect atmospheric data?

Included Resources

Teach



[Water Cycle and Conservation Google Slides](#)

This presentation is a perfect start to your weather unit. Hopefully, students have some familiarity already with the water cycle. This lesson will serve as a review. Extend into the importance of the water cycle to replenishing our finite freshwater resources if human impact is in your curriculum! The [water cycle reading](#) is a perfect follow-up.



[Convection Currents Google Slides](#)

After the density virtual lab, your students should be ready to jump straight into convection currents. Convection currents are foundational to understanding how weather and ocean currents work. There is a [reading](#) that corresponds to this lesson, which will make a great homework or classwork review.



[The Atmosphere Google Slides](#)

Cover the layers of the atmosphere, its composition, and the importance of air pressure in this interactive presentation. Don't forget to also assign this [graphic organizer](#) for note-taking! Air pollution is also discussed in this presentation, which is one of the only times this is addressed. Please see [my other units](#) for more on human impact.



[Global & Local Winds Google Slides](#)

Help your students apply what they know about convection currents in this lesson on global and local winds. This 14-slide lesson will review density and cover the key points of both global and local winds. There's a [reading](#) that corresponds to this lesson, which will make a great homework or classwork review.

Use the [winds color by number](#) anytime after this lesson as a review or formative assessment.



[Ocean Currents Google Slides](#)

In this lesson on ocean currents, students will again apply their knowledge of convection currents. Hopefully, they'll see the connections between winds and ocean currents, too. This 31-slide lesson covers surface and density currents and the causes and major effects of each. It may even be a good idea to split this lesson into two days, depending on the length of your periods. Again, there's a [reading](#) that corresponds to this lesson, which will make a great homework or classwork review.

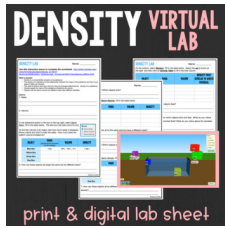


[Air Masses and Fronts Google Slides](#)

This lesson combines a lot of the learning from winds and ocean currents to describe the types of air masses and how they interact. Students will hopefully find this lesson interesting since it deals with local weather and its causes. This is an interactive lesson with a lot of opportunities for student engagement.

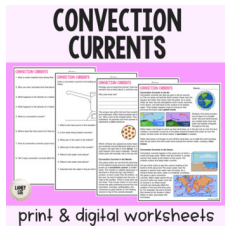
After this lesson, use the corresponding [reading](#) as homework or review and then the [weather prediction task cards](#) as either a second review or an assessment. There is also a fun [foldable](#) which can be used to help students remember the various fronts and the weather each brings.

Practice



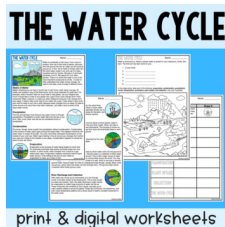
[Density Virtual Lab](#) **BEST SELLER**

I would suggest using this lab as a “hook” for the unit. Density has always been a bit abstract for my students, so I find that spending at least a day talking about density alone.



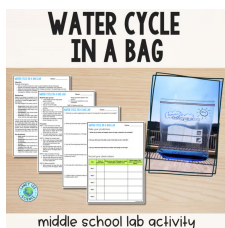
[Convection Currents Reading](#)

Use this resource as homework or to reinforce convection currents following the convection currents presentation. I’ve often used these readings in class to work on close reading skills. You could also use this assignment as a station or a square on a choice board. If you use interactive notebooks, then I’d suggest printing these pages in a half size and gluing them in as an easy reference.



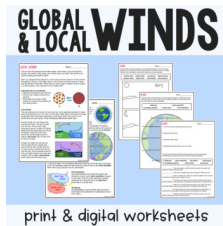
[Water Cycle Practice](#) **BEST SELLER**

Generally, my students come in already knowing at least a little about the water cycle. If your students have never seen it before, I might supplement this topic a bit more. No weather/climate unit is complete without at least a base knowledge of the water cycle!



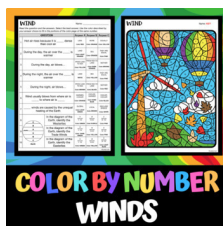
[Water Cycle in a Bag Activity](#)

Teach the water cycle the easy, visual way with the Water Cycle in a Bag Lab! Students model evaporation, condensation, precipitation, and collection inside a simple zip-lock bag.



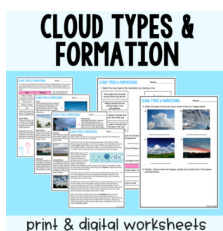
Global and Local Winds Homework **BEST SELLER**

Use this resource as homework or to reinforce convection currents following the winds presentation. I've often used these readings in class to work on close reading skills. You could also use this assignment as a station or a square on a choice board. If you use interactive notebooks, then I'd suggest printing these pages in a half size and gluing them in as an easy reference.



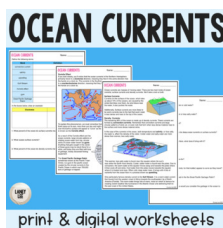
Wind - Color by Number *

If you need a sub day or just a day to relax, this is the resource for you! Coloring is a great way to find a chance to unwind with your students and work on building relationships. This resource makes a great review or could be used as an easy-to-check assessment.



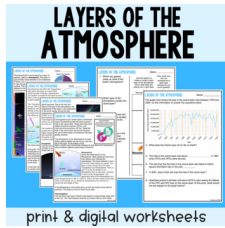
Cloud Types and Formation Reading

This resource prepares students for weather prediction. Different clouds indicate different kinds of weather and are associated with various fronts. Questions including real cloud images will help bring this topic home for students.



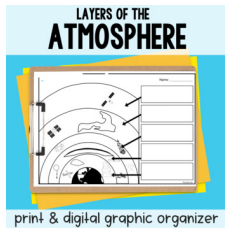
Ocean Currents Reading **BEST SELLER**

Use this resource as homework or to reinforce convection currents following the ocean currents presentation. I've often used these readings in class to work on close reading skills. You could also use this assignment as a station or a square on a choice board. If you use interactive notebooks, I'd suggest printing these pages in a half size and gluing them in as an easy reference.



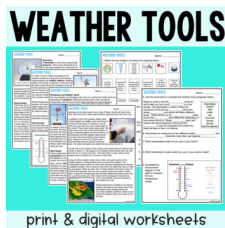
[Layers of the Atmosphere Reading](#)

This reading will cover the layers of the atmosphere, including the troposphere, stratosphere, ozone layer, mesosphere, thermosphere, and exosphere.



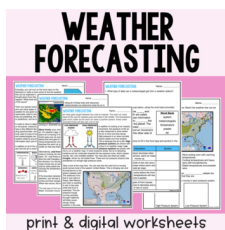
[Layers of the Atmosphere Graphic Organizer](#)

Use this graphic organizer as notes or to review the layers of the atmosphere as covered in the presentation and the guided reading.



[Weather Tools Reading](#)

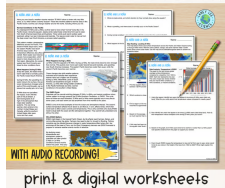
This reading comprehensively covers all the major tools used in weather prediction, including thermometer, barometer, psychrometer, wind sock, weather vane, anemometer, rain gauge, and radar.



[Weather Forecasting Reading](#)

This fun guided reading describes what a meteorologist is and does. Vocabulary covered includes forecast, weather station, doppler radar, fronts, and pressure systems.

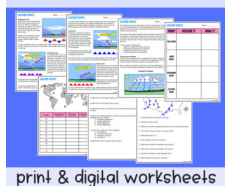
EL NIÑO / LA NIÑA



[El Niño & La Niña Reading](#)

El Niño and La Niña are climate patterns caused by changes in Pacific Ocean temperatures that can affect weather around the world. Learning about them helps students understand how Earth's oceans and atmosphere work together to influence temperature, rainfall, storms, and climate.

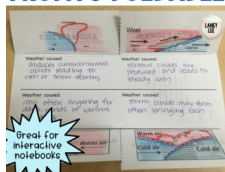
WEATHER FRONTS



[Weather Fronts & Air Masses Reading](#) **BEST SELLER**

Use this resource as homework or to reinforce convection currents following the weather fronts presentation. I've often used these readings in class to work on close reading skills. You could also use this assignment as a station or a square on a choice board. If you use interactive notebooks, I'd suggest printing these pages in a half size and gluing them in as an easy reference.

WEATHER FRONTS FOLDABLE



[Fronts Foldable](#)

Foldables are another great way for kids to use their fine motor skills and incorporate some art into science. Again, if you use interactive notebooks, I'd recommend gluing these in! This activity can be used as a review or assessment.

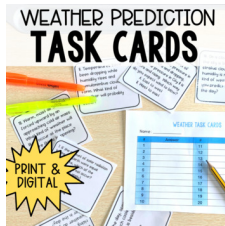
Encourage your students to combine their knowledge with these weather prediction task cards. This is a difficult skill but a great one to develop since it is one of the rare (in my opinion) standards in middle school science that truly pushes critical thinking. Break students into groups for this activity or

WEATHER FRONTS EXTENSION WEBQUEST



[Weather Fronts Webquest](#)

Use this webquest to review air pressure, density, major air masses and their characteristics, and major fronts and their characteristics. One key feature of this activity is the [website](#) that allows students to see fronts in action, which I found to help make sense of these concepts.



Weather Prediction Task Cards

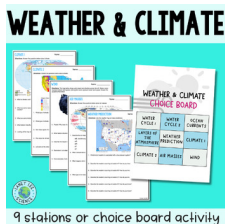
Some fun ways to use task cards:

- Scavenger hunt - Hide cards around the room for students to find. Great for students who need to be moving!
- Fishing - Put all the questions in a bowl and have students come up and "fish" for a new question while throwing their old question back. This is a great activity for students who enjoy being hands-on.
- Sticky Hands - (if you dare) Let kids pick cards with sticky hands
- Have students pull a question and answer it correctly to earn privileges like leaving for lunch.
- Use the questions individually as a warm-up or closure activity.



Ocean Currents Extension Webquest

I created this webquest to extend ocean currents and incorporate more on human impact. This webquest covers major global ocean currents, map analysis skills, and how ocean currents affect regional climates, gyres, and the Great Pacific Garbage Patch. For this resource, I'd recommend printing at least the map so students can draw on it and color code.



Weather & Climate Stations

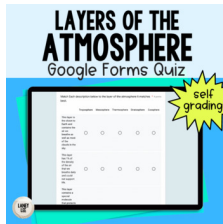
This set of 9 stations is a great review of all the concepts covered in this unit! To save time and incorporate more student choice, consider using the included choice board. Students may complete a tic-tac-toe of their choosing as a review activity. It could be a great sub plan!



[Weather AI Activities](#)

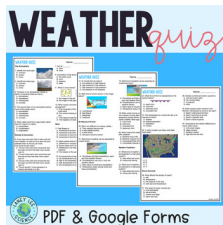
Prepare your students for the future by bringing AI to your science classroom! This resource is designed to introduce students to the exciting world of artificial intelligence and its applications through interactive, creative activities that teach students about the uses and limitations of AI.

Assess



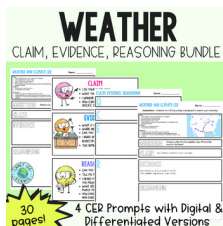
These short Google Forms quizzes align with a guided reading and can be used for a quick formative assessment. They are self-grading, so students will get feedback immediately!

- [Layers of the Atmosphere Google Forms Quiz](#)
- [Weather Tools Google Forms Quiz](#)
- [Weather Forecasting Google Forms Quiz](#)
- [Cloud Types & Formation Google Forms Quiz](#)



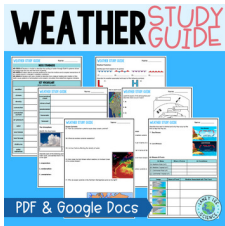
[Weather Quiz](#)

30 multiple-choice questions that make for an excellent pretest!



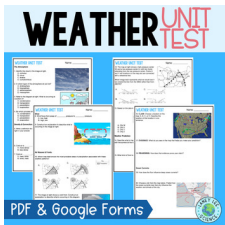
[Weather CER Prompts](#)

Use these four CER prompts to reinforce concepts related to fronts, data interpretation, weather prediction, and understanding how ocean current and latitude play a role in regional climates!



[Weather Study Guide](#)

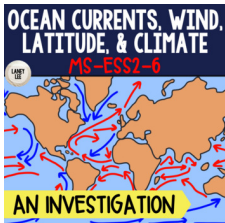
Use the Google Docs or PDF to help students prepare for their unit test! Fully aligned!



[Weather Unit Test](#)

The questions in this assessment are designed to be rigorous and require students to predict, reflect, connect, and think critically about the content they have learned.

Project



[Climate Project](#) **BEST SELLER**

The climate project is a great culminating activity! This project is designed to combine students' knowledge of the uneven heating of the Earth (latitude), global winds, and ocean currents to determine a location's climate. You may want to spend a little bit of time explaining what latitude is before beginning this project, depending on how strong your students' map skills are.

I also might suggest splitting this project into 4 or 5 days:

- Day 1: Project Intro and practice determining latitudes
- Day 2: Pick a city & research
- Day 3: Researching & mapping ocean currents near your city
- Day 4: Research & map global winds around your city

- Day 5: Conclusions & final notes

If students are struggling, consider scaffolding by providing just one resource for ocean currents and winds and have them find their city on the map.

- Ocean Currents: https://d32ogoqmya1dw8.cloudfront.net/images/eslabs/climate/global_currents.gif
- Global Winds: https://o.quizlet.com/lum6FXwluP4XioXSp95EqQ_b.png

The maps are nice because the kids can work on their map skills by identifying their city and then applying critical thinking to conclude how the winds, air masses, and nearby ocean currents will work together to create the climate of their coastal city.

Resources by Concept

Concept 1: The Atmosphere

- [Layers of the Atmosphere Reading](#)
- [Layers of the Atmosphere Google Forms Quiz](#)

Concept 2: Density & Convection Currents

- [Convection Currents Google Slides](#)

- [Density Virtual Lab](#)
- [Convection Currents Reading](#)

Concept 3: Wind

- [Global & Local Winds Google Slides](#)
- [Wind - Color by Number](#)
- [Global and Local Winds Homework](#)

Concept 4: Air Masses & Fronts

- [Air Masses and Fronts Google Slides](#)
- [Weather Fronts & Air Masses Reading](#)
- [Fronts Foldable](#)
- [Weather Fronts Webquest](#)

Concept 5: Weather Prediction

- [Cloud Types and Formation Reading](#)
- [Cloud Types & Formation Google Forms Quiz](#)
- [Water Cycle and Conservation Presentation](#)
- [Water Cycle Practice](#)
- [Water Cycle in a Bag Activity](#)
- [Weather Tools Reading](#)
- [Weather Tools Google Forms Quiz](#)
- [Weather Forecasting Reading](#)
- [Weather Forecasting Google Forms Quiz](#)

- [Weather Prediction Task Cards](#)

Concept 6: Ocean Currents

- [Ocean Currents Google Slides](#)
- [Ocean Currents Reading](#)
- [Ocean Currents Extension Webquest](#)
- [El Niño & La Niña Reading](#)
- [Climate Project](#)

Suggested Pacing

Week 1: Density & Convection Currents

I'd suggest opening the unit with the [Weather Quiz](#) as a pretest!

Consider starting the unit with the [Sink or Float Density Lab](#). I've used this one in the past to create a foundation for density. Or you can always just stick with the [Density Virtual Lab](#), which is great! Follow up with the [Convection Currents Google Slides](#) and the [Convection Currents Reading](#) to prepare students for wind and ocean currents.

Week 2: Wind

Depending on how you prefer to structure your classroom, begin with either the [Global & Local Winds Google Slides](#) or the [Global and Local Winds Homework](#). Sometimes, I like to do a flipped classroom style and have the kids do some reading before they take notes. Use the [Wind - Color by Number](#) to reinforce concepts. It makes a great self-sub day!

Week 3: Air Masses & Fronts

Again, begin this week with either the [Air Masses and Fronts Google Slides](#) or the [Weather Fronts & Air Masses Reading](#). Follow those up with the [Weather Fronts Webquest](#) to give students a little more experience with the topic using animations. If you use interactive notebooks, the [Fronts Foldable](#) is a great resource to reinforce concepts.

Week 4: Ocean Currents

Begin the week with the [Ocean Currents Google Slides](#) or the [Ocean Currents Reading](#), followed by the [Ocean Currents Extension Webquest](#). This webquest is great for making connections to the human impact on ecosystems and focuses on how ocean currents create gyres that trap aquatic pollution. Use the [El Niño & La Niña Reading](#) to discuss these phenomena if you have time!

Week 5-6: Weather Prediction

To cover weather prediction, begin with the [Water Cycle and Conservation Presentation](#) and [Water Cycle Practice](#). Get hands on with a quick demo using the [Water Cycle in a Bag Activity](#).

Follow up the water cycle with clouds using the [Cloud Types and Formation Reading](#) with the [Cloud Types & Formation Google Forms Quiz](#). From there, jump into [Weather Tools Reading](#) and [Weather Tools Google Forms Quiz](#). Next, use [Weather Forecasting Reading](#) with the [Weather Forecasting Google Forms Quiz](#).

Finally, the [Weather Prediction Task Cards](#) are a great way to round out the unit and have students combine their knowledge of density, air currents, and water to predict weather using those task cards. That resource also includes a Google Forms version if you'd rather make it an assessment.

Week 7: Climate Project

Finally, round out the unit with the [Climate Project](#)! Look at the resource description on page 9 to get more guidance on that project and ideas for scaffolding.

Week 8: Review and Assess

Use the [Weather & Climate Stations](#), [Weather Study Guide](#), and [Weather Unit Test](#) to allow students to show what they've learned! The [Weather CER Prompts](#) are also great to use throughout the unit or at the end as a summarizing activity!

Key Vocabulary

weather	the conditions of the troposphere at any given time
climate	the weather conditions prevailing in an area in general or over a long period
density	mass per unit volume
convection	the transfer of heat by the circulation or movement of the heated parts of a liquid or gas
convection current	the flowing fluid that is moving because there is a temperature or density difference within the material
air pressure	The force put on a given area by the weight of the air above it
wind	a current of air blowing from a particular direction

sea breeze	a breeze blowing towards the land from the sea, especially during the day owing to the relative warmth of the land
land breeze	a breeze blowing towards the sea from the land, especially at night, owing to the relative warmth of the sea
doldrums	a low-pressure area from 5°N to 5°S of the Equator where winds are calm
polar easterlies	dry, cold prevailing winds that blow around the high-pressure areas of the polar highs at the North and South Poles
trade winds	winds that reliably blow east to west just north and south of the equator
westerlies	the winds in the middle latitudes between 35 and 65 degrees latitude. They tend to blow from the high pressure area in the horse latitudes towards the poles
horse latitudes	Subtropical regions known for calm winds and little precipitation, characterized by calm winds and little precipitation, and located at about 30 degrees north and south of the equator
ocean current	the continuous, predictable, directional movement of seawater driven by gravity, wind (Coriolis Effect), and water density
Coriolis effect	The pattern of deflection taken by objects not firmly connected to the ground as they travel long distances around the Earth
salinity	The saltiness or amount of salt dissolved in a body of water
precipitation	any form of water particles that fall from the atmosphere and reach the ground. It can be liquid or solid.
humidity	the amount of water vapor in the air
air mass	a large body of air having nearly uniform conditions of temperature and humidity a

warm front	forms when a warm air mass pushes into a cooler air mass and rises above it
cold front	forms when a cold air mass pushes into a warmer air mass, forcing it upwards
occluded front	forms when a cold air mass overtakes a warm front
stationary front	forms when a cold front or warm front stops moving
stratus cloud	a cloud that forms in blanket-like layers
cumulus cloud	puffy clouds that appear to rise from a flat bottom
cumulonimbus cloud	a dense, towering vertical cloud, forming from water vapor carried by powerful upward air currents
cirrus cloud	Clouds that form at very high altitudes out of ice crystals and have a wispy, feather-like shape
anemometer	an instrument for measuring the speed of the wind
barometer	A tool used to measure air pressure
forecast	An analysis of the state of the weather in an area with an assessment of likely developments

Helpful Links

Virtual Labs

- [PhET Simulations](#) (free)
- [Gizmo](#) (Paid) has some great weather resources.

Virtual Practice

- [Blooket](#) (my students are obsessed with this website) has great practice games.
- [Quizizz](#)

Hands-on Activities:

- Hang sandwich bags with water in them on classroom windows. Have students label the different parts of the water cycle as they occur in the bag. Leave them up for a few weeks to observe the changes!
- [Cloud in a Jar](#)
- [Sea and Land Breeze Demo](#)
- [Air Pressure Demos](#)
- [Warm Air Rises Demo](#)

More Resources:

- [Weather Instrument Challenge](#)
- [Sink or Float Density Lab](#) - I use this lab as another way to front-load density for my students. It seems a bit elementary, but many of my students were more engaged than they have been in a long time with this activity.
- [Graphing the Layers of the Atmosphere](#)
- [A Variety of FREE Color-by-Number Resources](#)

Download the Unit!

If you've enjoyed this unit guide, please download the full unit by clicking below. With your purchase, you will enjoy free lifetime updates, and any additional resources added to this unit will be yours for free as well!



<https://www.teacherspayteachers.com/Product/Weather-Climate-Unit-Bundle-6692473>

Next Steps:

Jump into your next free planning resource!

Life Science	Earth & Space Science	Physical Science	Other	Full Year Pacing Guides
Human Body Systems	Geology	Force & Motion	Scientific Method	Life Science
Cells	Astronomy	Energy & Work	Engineering	Physical Science
Mitosis & Meiosis	Weather & Climate	Matter		Earth & Space Science
Reproduction & Heredity	Natural Hazards	Atoms & The Periodic Table		
DNA	Human Impact	Bonding & Reactions		
Evolution		Electric & Magnetic Forces		
Ecosystems		Waves		
Photosynthesis & Respiration				

I'd love to stay in touch! Below are some ways we can stay connected:

- I host a [Middle School Science Teachers](#) group on Facebook where we discuss best practices and share ideas and resources. Feel free to join that to participate in some great discussions!
- Find me on [Instagram](#)!

- [Sign up](#) for my newsletter to receive free resources every month!
- Email me at *lanyleeteaches@gmail.com*

Looking forward to hearing from you soon!

A pink heart outline is positioned to the left of the handwritten signature 'lahey' in a cursive script.