Air Masses on the Move

Teacher		**Class**	Grade 6
Subject	Science	**Topic**	Weather and air masses
Date		**Room**	
Lesson length	60 minutes	**Country**	United States

Students learn how moving air masses and fronts change weather. They graph data to prove a cold front passed.

Curriculum links

- Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
- S6.D.2.1.1 Describe cloud types and measurable factors (i.e., wind direction, temperature, barometric pressure, moisture, and precipitation) that are associated with various weather patterns [2].
- S6.D.2.1.2 Interpret weather data to develop a weather forecast [2].

Learning objectives

- Students will describe air masses by temperature and humidity from source region.
- Students will compare two days of weather data to spot a front passing through.
- Students will explain weather change using data as evidence of air mass collision.

Success criteria

- I can name what warmth and dampness an air mass brings.
- I can read map signs and numbers to find a passing front.
- I can back my claim about weather with temperature and pressure data.

What students already know

Show yesterday 72 degrees Fahrenheit sunny and today 48 degrees rainy. Ask: Did the sun quit or did different air move in? Listen for moving air ideas.

Key words

air mass	a huge stretch of sky with almost the same warmth and dampness all through it [12]
humidity	how much water as invisible gas is mixed in the sky
front	the line at the ground where two different stretches of sky meet [4]
cold front	a moving edge where cool dry air slides under warm damp air and takes its place [3]
warm front	a moving edge where heated damp air slides up over cool dry air and takes its place [5]

Materials

- Slides 1-7, 9-12
- Video clip 1 Air Masses and Fronts (0:00-3:15) on slide 6
- printed 3-day data tables in degrees Fahrenheit
- pencils, rulers
- Worksheet Task B storyboard sheets
- Worksheet Task E spot the mistake sheets
- mini whiteboards and markers

Before the lesson

- Show the two-day data on slide 9 in degrees Fahrenheit, one per pair, plus rulers and pencils
- Print Worksheet Task B and Task E, one per student
- Test Slides 1-12 and Video clip 1 (0:00-3:15) on slide 6 for sound and picture
- Set desks in pairs with space to graph and display storyboard

Lesson outline

0–7 min **Starter** 7 min · Whole class

Hook interest in sudden weather shifts and link them to moving air.

YOU DO

1. Show Slide 1 Air Masses on the Move and state the goal to explain changing weather with clues.
2. Show Slide 2 Your Weather Day vote and take a show of hands for temperature drop, rain, wind, clouds.
3. Say the mystery hook and preview the pencil-and-paper data task.
4. Link votes to the idea that a huge body of moving air causes the shift.

STUDENTS DO

1. Vote and tell a neighbor which change messes with plans most.
2. Share one fast weather change they have felt.
3. Predict what data could prove different air moved in.

Say: No computers. Just you, a pencil, and a mystery cold snap. Can you solve it? Yesterday was warm and sticky, today is chilly and clear. Something huge in the sky moved, and your numbers will prove it.

Ask: Which weather change messes with your plans the most and why? (Answers vary; listen for sudden drop, rain, wind, clouds rolling in.) · Yesterday was 72 degrees and sunny, today is 48 and rainy. What moved? (A different air mass moved in and pushed the warm air out.)

Check understanding: Thumbs up if you can name one weather change and one possible cause. If split, restate that moving air masses carry weather [10].

Support: Offer picture cards for sunny, cloudy, rainy, windy to point to instead of explaining. **Stretch:** Ask students to guess how wind direction might also change when new air arrives.

Use: Slides 1–2

7–17 min **Teaching** 10 min · Whole class

Build the core idea that air gets temperature and humidity from its source region.

YOU DO

1. Show Slide 3 What Is an Air Mass and define a large body with similar temperature and humidity throughout [12].
2. Explain maritime forms over water and is humid, continental forms over land and is dry [10], and tropical is warm while polar is cold [10].
3. Show Slide 4 storm photo and ask what temperature, wind and rain changes they would feel.
4. Model naming: first part tells humidity, second part tells temperature [4].

STUDENTS DO

1. Repeat maritime = moist and continental = dry, tropical = warm and polar = cold with hand signals.
2. Name two examples from source cards: over tropical ocean and over polar land.
3. Describe what each would feel like if it moved over town.

Say: An air mass is a large body of air that stays nearly the same all through. It picks up warmth and dampness from the place where it sits. When wind pushes it, it carries that weather to a new town [10].

Worked example: Over tropical ocean = maritime tropical = warm and humid [10]. Over polar land = continental polar = cold and dry [10]. The first part of the name describes humidity and the second part describes temperature [4].

Ask: How does air that forms over a tropical ocean feel? (Warm and humid, called maritime tropical [10].) · How does air that forms over polar land feel? (Cold and dry, called continental polar [10].)

Check understanding: Mini whiteboards: write mT or cP for over tropical ocean and over polar land. Reteach with helper chart if mixed.

Support: Give two-column helper chart: maritime = moist and continental = dry, tropical = warm and polar = cold [4]. **Stretch:** Predict what happens as continental polar air moves over warm ocean: it warms and picks up moisture [4].

Use: Slides 3–4

17–30 min **Teaching** 13 min · Whole class

Show how air masses meet at fronts and how those fronts move.

YOU DO

1. Show Slide 5 mystery lines and reveal fronts as borders where two air masses meet [3].
2. Play Video clip 1 (0:00-3:15) on Slide 6 and ask students to spot blue triangles and rain clues.
3. Show Slide 7 How Air Masses Move: sun heats equator more, air moves high to low pressure, jet streams steer storms [3].
4. Show Slide 10 Cold Front vs Warm Front and contrast blue triangles and red half-circles [3].

STUDENTS DO

1. Point to blue triangles for cold front and red half-circles for warm front on the map.
2. Call out temperature, wind and rain changes at the line.
3. Sketch which way each side is moving with arrows.

Say: When two different air masses meet, the line where they meet at the surface is a front [4]. Blue triangles track cold air pushing in fast, red half-circles track warm air sliding in. Strong winds high above push these lines along [3].

Worked example: Cold air pushes under warm air. Blue triangles show its direction [3]. Cold fronts move rapidly at around 25 to 30 mph [5]. You feel a quick drop in temperature and a rapid rise in pressure [15], with clouds and thunderstorms where they meet [4].

Ask: What is the border where two air masses meet called? (A front, the border between two air masses at the surface [4].) · What happens at a cold front and how fast does it move? (Cold air replaces warm air [3], moves about 25 to 30 mph [5], temperature drops fast.)

Check understanding: Hinge: show blue triangles — cold or warm front? All hold up C or W on boards. Recheck colors if split.

Support: Give front-symbol guide with blue triangles = cold and red half-circles = warm [3] to keep on desks. **Stretch:** Explain how narrow bands of strong wind high above steer weather systems [3] and predict where the line goes next.

Use: Slides 5–7, 10 and Video clip 1 (0:00–3:15)

30–50 min **Main activity** 20 min · Pairs

Graph real numbers to prove an air mass swap caused the weather change.

YOU DO

1. Show Slide 9 task: Day 1 78°F humid south wind 15 mph low pressure rain, Day 2 56°F dry north wind 20 mph high pressure clear.
2. Hand out printed 3-day data tables in degrees Fahrenheit, pencils and rulers and Worksheet Task B.
3. Model graphing temperature and pressure and writing a claim-evidence sentence.
4. Set pairs to graph, find the swap day, and complete the storyboard.

STUDENTS DO

1. Graph temperature and pressure by hand across three days.
2. Draw and label Worksheet Task B storyboard to show masses, front line and data change.
3. Write a claim-evidence sentence with temperature and pressure numbers.

Say: Day 1 is 78 degrees Fahrenheit, humid, south wind. Day 2 is 56 degrees, dry, north wind. Graph both days, find the swap, then write: the weather changed because a new air mass moved in. Your numbers are the proof.

Worked example: Day 1: 78°F, humid, south 15 mph, low pressure, rain = maritime tropical warm humid. Day 2: 56°F, dry, north 20 mph, high pressure, clear = continental polar cold dry. Claim: a cold front passed where cold air replaced warm air [3]. Evidence: temperature fell 22°F, pressure rose, wind shifted south to north, air went humid to dry [2].

Ask: Which masses swapped and what front was it? (Warm humid maritime tropical replaced by cold dry continental polar, so a cold front [3].) · What data proves a new air mass arrived? (Temperature 78 to 56°F, pressure low to high, wind south to north, humid to dry [2].)

Check understanding: Collect storyboards and check graph points and claim sentence. If gaps, reshow model graph and sentence frame.

Support: Provide pre-labeled graph axes and highlight the two key columns for temperature and pressure to reduce copying. **Stretch:** Students add humidity and wind-shift evidence to strengthen their claim about a different air mass moving in.

Use: Slide 9 and Worksheet Task B

50–60 min **Plenary** 10 min · Whole class

Check that data evidence explains the front and fix common mix-ups.

YOU DO

1. Show Slide 11 Think, pair, share and let pairs explain a 20°F overnight drop with north wind shift.
2. Show Slide 12 True or false and vote on maritime over land, uniform traits, and source region ideas.
3. Use Worksheet Task E to spot and fix two students mistakes about fronts.
4. Summarize that uneven heating moves air [3] and clashing masses can make storms [10].

STUDENTS DO

1. Pair-share an explanation using one data point as proof.
2. Vote true or false and correct the false one.
3. Fix Worksheet Task E mistakes by rewriting the front rule correctly.

Say: If temperature fell 20 degrees and wind turned north overnight, a cold dry mass pushed in. Your graph is the proof. Scientists collect numbers like you did to explain weather.

Worked example: Maritime air forms over land and is dry: False. Maritime forms over water and is humid, continental forms over land and is dry [10]. An air mass has nearly the same temperature and humidity throughout: True [12].

Ask: If temperature fell 20°F and wind shifted north overnight, what explains it? (Cold dry continental polar air moved in at a cold front where cold replaces warm [3].) · Turbulence where two air masses meet can cause what? (Clouds and thunderstorms to form [4].)

Check understanding: Exit tickets with three questions. If many miss maritime vs continental, reteach with ocean vs land chart tomorrow.

Support: Provide sentence frames: On Day 1 it was __. On Day 2 it was __. This shows __ moved in. **Stretch:** Write a one-sentence forecast for Day 3 and justify it by where the front is heading next.

Use: Slides 11–12 and Worksheet Task E

Common mistakes

Mistake	How to spot it	How to fix it
Mixing up maritime and continental	Labels warm humid ocean air as continental or dry land air as maritime	Restate maritime forms over water and is humid, continental forms over land and is dry [10]. Use ocean vs land picture sort.
Swapping cold front and warm front symbols	Calls blue triangles warm front or says warm front is cold replacing warm	Cold fronts in blue occur where cold replaces warm [3]; warm fronts in red occur where warm replaces cold [5]. Practice with map symbols.
Using only temperature as proof	Claim has no pressure, wind or humidity numbers	Remind that wind direction, temperature, pressure, moisture and precipitation together show patterns [2]. Add pressure rise [15] and wind shift.

Support

- Pre-labeled graph axes, highlighted temperature and pressure columns, and picture data sheets with sunny-cloudy icons
- Word bank with cold, warm, front and sentence frames for claim-evidence writing

Stretch

- Add humidity and wind-shift evidence to strengthen the claim about a different air mass moving in
- Write and justify a Day 3 forecast from front direction and jet stream push

For the LSE or teaching assistant

Sit near pairs graphing in main activity. Help line up ruler, read Fahrenheit numbers, and prompt claim sentence. Keep symbol guide visible.

Check for understanding

Question	Answer

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An air mass that forms over a tropical ocean is what type and what weather does it bring?	Maritime tropical, warm and humid [10].
Day 1 was 78°F humid south wind, Day 2 was 56°F dry north wind. What front passed and what is your evidence?	Cold front where cold replaces warm [3]; temperature fell 22°F, pressure rose, wind shifted south to north.
True or false: When air masses with different temperature and humidity meet, it can create a severe storm.	True, clashing air masses can create a severe storm [10].

Homework

Record tonight temperature in Fahrenheit, wind and clouds and write which air mass you think is over town.

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