

How a Cloud Forms

Name: _____

Date: _____

Class: _____

REMEMBER

A cloud forms when rising air cools to its dew point and its invisible water vapor condenses onto microscopic particles, becoming billions of visible droplets. The rise does the cooling, the cooling does the condensing, and the height where that happens, the lifting condensation level, is why clouds so often share one flat bottom.

THE RECIPE

Cloud in a Jar

About 10 minutes · Ages 6 and up, an adult strikes the match · Mess: low · Makes: one small cloud, briefly

INGREDIENTS

A clear glass jar with a lid

A washed pasta sauce jar is perfect. Wide mouth beats narrow.

Hot water, about a cup

Hot from the tap is enough. It does not need to boil.

Ice cubes, enough to fill the lid

Your freezer. The colder the better.

One match

Or a single quick spritz of hairspray. This is the secret ingredient: it supplies the condensation nuclei.

A flashlight

Optional, but a beam through the side makes the cloud far easier to see. Your phone works.

METHOD

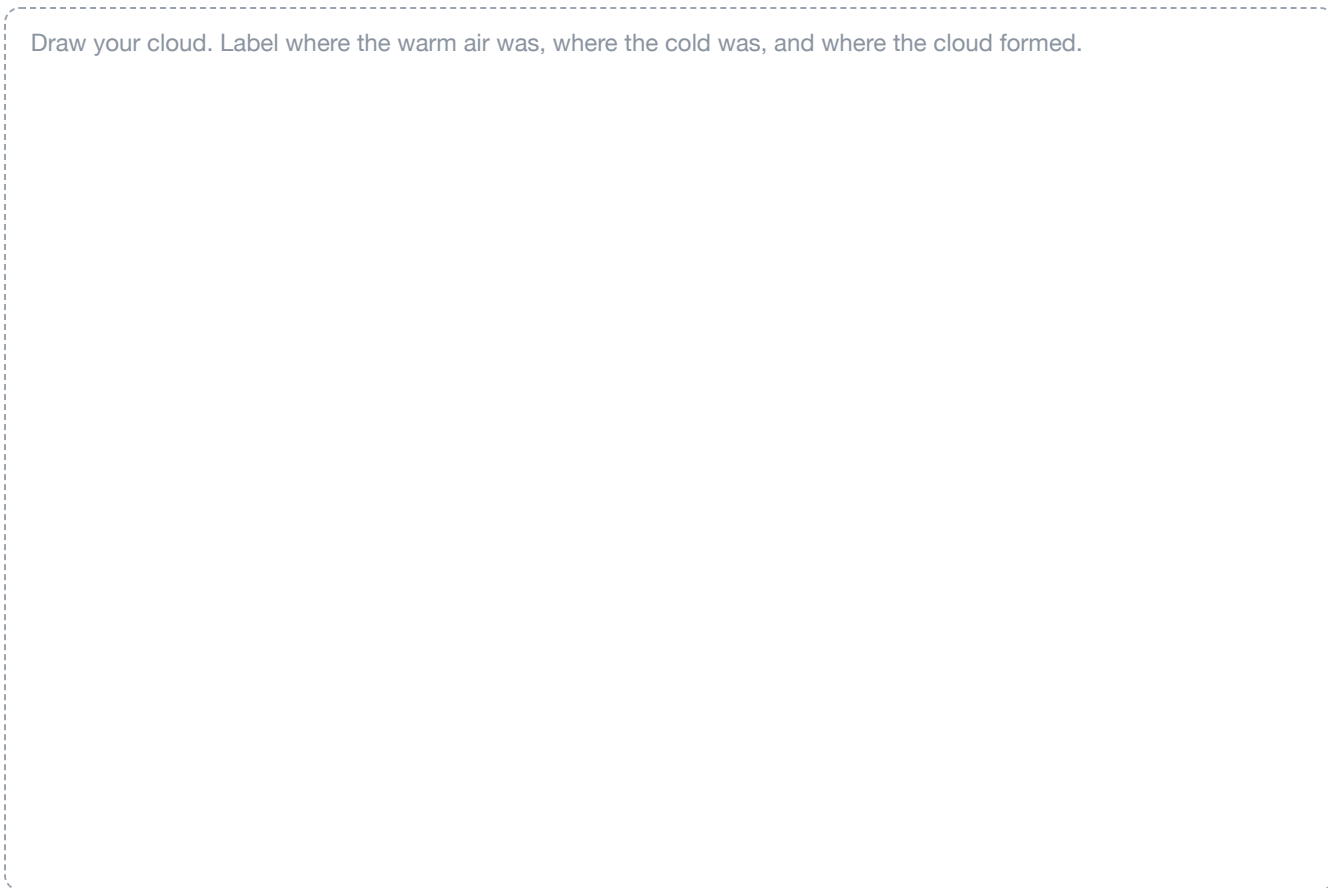
1. Pour the hot water into the jar, about a third full. Swirl it so the glass warms and the air inside fills with invisible water vapor.
2. Turn the lid upside down, rest it on the mouth of the jar, and pile it with ice. You have just built a cold ceiling.
3. Wait about twenty seconds while the air near the top chills.
4. Lift the lid, drop in a struck-and-blown-out match so a puff of smoke enters, and put the icy lid straight back on.
5. Watch. A cloud forms inside the jar within seconds. Shine the flashlight through the side to see it swirl, then lift the lid and let it escape.

*An adult handles the match. Hot water, not boiling.
The jar gets warm.*

What did you see?

Describe the cloud in the jar: when it appeared, what it looked like, and what happened when the lid came off.

Draw your cloud. Label where the warm air was, where the cold was, and where the cloud formed.



Questions

1. What single event turns invisible humid air into a visible cloud?

- ☐ A. The air warming up in sunshine
- ☐ B. The air cooling to its dew point so vapor condenses
- ☐ C. Wind mixing two air masses together

2. Why does a rising parcel of air cool even though nothing refrigerates it?

- ☐ A. It expands as pressure drops, and expansion spends its internal heat
- ☐ B. Higher air is simply colder and chills it
- ☐ C. Water vapor absorbs its heat

3. Temperature is 80 F and the dew point is 60 F. Roughly where is the cloud base?

- ☐ A. Around 1,000 feet
- ☐ B. Around 4,600 feet
- ☐ C. Around 15,000 feet

4. What are cloud condensation nuclei?

- ☐ A. Tiny ice pellets inside storm clouds
- ☐ B. Microscopic particles like salt and dust that vapor condenses onto
- ☐ C. The dense core at a thunderstorm's center

5. Why do cumulus clouds in one sky share a flat, common base?

- ☐ A. Wind shears their bottoms flat
- ☐ B. Every rising parcel in that air mass saturates at about the same altitude
- ☐ C. Gravity flattens the heavier droplets

In your own words

In your own words, explain why a rising parcel of air cools even though nothing is refrigerating it, and what that cooling has to do with the flat bottom of a cumulus cloud.

Answer key (for the teacher)

1. What single event turns invisible humid air into a visible cloud?

B. The air cooling to its dew point so vapor condenses — Cooling to saturation is the trigger, and rising is how the atmosphere does the cooling.

2. Why does a rising parcel of air cool even though nothing refrigerates it?

A. It expands as pressure drops, and expansion spends its internal heat — That is adiabatic cooling: the parcel pays for its own expansion at about 5.5 degrees F per thousand feet.

3. Temperature is 80 F and the dew point is 60 F. Roughly where is the cloud base?

B. Around 4,600 feet — Twenty degrees of spread times roughly 228 feet per degree lands near 4,600 feet.

4. What are cloud condensation nuclei?

B. Microscopic particles like salt and dust that vapor condenses onto — Every droplet forms on a particle. Clean-room air can be pushed far past saturation and refuse to make a cloud.

5. Why do cumulus clouds in one sky share a flat, common base?

B. Every rising parcel in that air mass saturates at about the same altitude — The lifting condensation level is nearly uniform across the air mass: one invisible floor, many clouds standing on it.

From The Weather School at myweatherrock.com/weather-school/, a free weather education project. Teachers, homeschoolers, and students may print, copy, and share this freely for any educational use. Credit "myweatherrock.com" and keep the weather accurate.