

MASS CLEAN ENERGY CENTER **MODULE 1 • REFRIGERANT FUNDAMENTALS**

Identifying the Flow and State of Refrigerant

Contextualized ESOL Support Activity

ACTIVITY

Critical Thinking

45

minutes

ACTIVITY OVERVIEW

Objective	Students will label the flow and state of refrigerant in a typical refrigeration system.
Durable Skill	Critical Thinking
Student Interacts With Hypothetical	Not Applicable in this Activity
When to Use	After completing the Lab for Amatrol Module 1 or a similar activity.
Activity Type	Small group work Video discussion
Time Needed	45 minutes

STUDENT MATERIALS

- Module 1 – Handout 1: Vocabulary Definitions
- Module 1 – Handout 2: Matching Terms and Definitions for Refrigeration Fundamentals
- Module 1 – Handout 3A: Refrigeration Cycle – Labeling Worksheet – Student

Instructor Preparation**Activity Location**

Classroom with video capability

Material Preparation

- Review and print student handouts — make one copy per student.
- Review the Video Resources table below and select one video that highlights the terms in Handout 2.
- Activity order: Complete Handout 2 → watch selected video → complete Handout 3.
- Review Handout 3: Refrigeration Cycle – Labeling Worksheet – Instructor Key before class.
- **Best Practice**
 - Identify any key vocabulary terms from Handout 1: Module 1 Vocabulary Definitions that students should be referencing as part of the activity. Be prepared to reference these terms during the activity.
- **Best Practice**
 - When showing the video, use closed captions and reduced playback speed for multilingual learners. Consider sharing the video link with students ahead of time for preview.

VIDEO RESOURCES

Video Title	Time	Description
<u>HVAC Training Basics for New Technicians and Students! Refrigeration Cycle!</u>	6:11	This video shows the basics of how refrigerant flows through a system, saturated temperatures, phase changes, superheat, subcooling, airflow, heat absorption and rejection. It shows examples of pressures and temperatures.
<u>Refrigeration Cycle 101</u>	10:35	This video covers the basics of the air conditioning and refrigeration circuit. It explains the cycle in simple terms to help those new to HVAC or for those who want a refresher.
<u>HVACR: Basic Refrigeration Cycle Explained</u>	7:36	This video covers the basic air conditioning/refrigeration cycle. Intended to help students understand the basic theory of the refrigeration cycle.
<u>How does the refrigeration cycle work? (Part 1)</u>	< 1 min	YouTube Short — concise visual overview of the cycle.

How does the refrigeration cycle work? (Part 2)

< 1 min

YouTube Short — continuation of Part 1.

ACTIVITY DIRECTIONS

1. Ask students to think about a time they called a service person to fix something in their home — a dishwasher, refrigerator, clogged sink, or something else in their home. Then ask and have students share their answers to the following questions:
 - What gave you confidence they could fix the problem?
 - Were they able to clearly name all the parts?
2. Note that being able to readily identify and name components is key to knowing what needs to be fixed. It is also essential when interacting with customers who want to feel confident in the technician's ability.
3. Explain that they will be practicing vocabulary that is fundamental to becoming a skilled service technician.
4. Distribute and review Handout 2: *Matching Terms and Definitions for Refrigeration Fundamentals*.
5. Divide students into groups of three to four. Allow 20 minutes for the matching activity.
6. Then, as a class, review and share their answers.
7. Next, explain that they will view a video describing the refrigeration cycle.
8. Show the video that was chosen highlighting the terms in Handout 2. As it plays, pause when it references a term from Handout 2. Ask students to place a checkmark next to that term on their handout.
9. Debrief the video using these guiding questions:
 - Which terms came up most often?
 - Which terms do students still have questions about?
10. Next, tell students that they are going to practice labeling heat pump components and identifying the phases and pressures in the heat pump system.
11. In the front of the room, have either a drawing or screen share of Handout 3 displayed. Distribute Handout 3: Refrigeration Cycle – Labeling Worksheet – Student.
12. Divide students into pairs or trios. Each group will work together to label the components, the phases, and the pressures. Allow 15 minutes for the activity.
13. When the groups have completed the handout, go around the room asking each group to identify one to two labels on Handout 3. If groups have different answers, have the students discuss their answers until the correct answer is confirmed. Then the instructor fills the label on the Handout displayed at the front of the room. As needed, students correct their handouts. Continue going around the groups until all labels are completed.
14. Take a moment to ask the group why it is important for a technician to accurately identify these components when speaking with coworkers or customers? Allow for a handful of responses as time permits

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15. Debrief by reiterating that knowing the names of fundamental heat pump components and how the refrigeration system flows will lay the groundwork for them to build their knowledge and skills in the training program.
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POST-ACTIVITY RECOMMENDATIONS

Have students practice vocabulary and deepen their understanding of refrigerant flow by viewing an additional video from the Video Resources table above. Students can use their copy of Handout 1: *Vocabulary Definitions* to cross-reference an image of a refrigeration system from the video or the module.

ESOL Strategy Note

Encourage multilingual learners to annotate their vocabulary handout with translations or sketches during the group activity.

The labeling worksheet in Handout 3 is especially accessible for ESOL learners — visual context supports comprehension independent of language proficiency.