65. Manufacturing Cluster - Machinists and Machine Repair (4 hours)

Purpose/Abstract: To introduce students to machine repair careers in the manufacturing cluster.			
NCCCS Adult Education Standards: R.3.2.3, W.5.2.7, M.2.2.2			
Learning Objective: *By the end of the session, students will be able to:* ● Identify essential tasks performed by machinists, including operating machine tools, fabricating precision parts, and maintaining machinery. ● Recognize the importance of problem-solving and critical thinking in addressing challenges related to machine operation, precision, and quality control. ● Navigate and compare Manufacturing and Trades degree programs and discuss how each program aligns with their individual interests and career aspirations.			
Soft Skills	Problem-solving & Critical Thinking	**Resources**	MTCC Academic Degree Programs - McDowellTech Machinists - Custom Link Handouts: Number line diagram, one for each student
Additional Materials ● Number line diagram handout, one for each student - Print in landscape mode ● Art supplies (glue, glitter, markers, paint, etc.) ● Pencils, paper, and scissors ● Computers for student use			
Icons	💭 **Activity**	✔**Check-In**	⟲ **Review**

PREPARATION

- Familiarize yourself with MTCC Academic Degree Programs - McDowellTech and Machinists - Custom Link.
- Review the Instructional Support Guide and print/prepare referenced scaffolds.
- Print handouts.
- Familiarize yourself with O*NET
- Familiarize yourself with Skills to Pay the Bills, though it won't be used directly in this lesson.

INTRODUCTION (30 min)

Welcome students to the class!

Have students recall what they remember from the previous two lessons in this cluster. Conduct a short review of the manufacturing cluster.

Briefly introduce the topic of machinists and their role in manufacturing as follows:

Machinists set up and operate a variety of machine tools to produce precision parts and instruments out of metal. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

Provide an overview of the lesson objectives and what learners can expect to achieve by the end.

VOCABULARY, READING & WRITING (45 min)

Share this custom summary of the Machinist role with students. Machinists - Custom. Have students read through the webpage, explore the provided information and analyze the wage trends for North Carolina.

Walk around and clarify any questions that come up.

💭 REFLECTION (25 minutes)

✔ Ask the following questions to check for comprehension.

- *What is the primary role of Machinists as described in the provided information?*
- *The link mentions various tools used in this occupation, such as boring machines and calipers. Why are these tools important for Machinists, and how might they be used in their work?*
- *What are some of the key work activities mentioned in the occupational requirements section for Machinists?*
- *What level of education is typically required for someone to work as a Machinist, according to the article?*
- *The article mentions that "Realistic" is one of the interests associated with this occupation. What does it mean for an occupation to be "Realistic," and how does it relate to the work of Machinists?*
- *What is the median wage for Machinists in 2022, according to the provided information? How does this wage compare to the wages in your region?*
- *Based on the information, what is the projected job growth and job openings for Machinists in the coming years?*

Instructor Note: This activity and questions are aligned to the reading standards for this lesson.

Lower Level	Higher Level
Students can work in pairs to analyze the information.	Encourage students to read more about tools used by machinists.

MATHEMATICS (45 min)

Facilitate a discussion about the specific ways machinists use mathematics:

- Measurements: Discuss how precise measurements are crucial in machining tasks and how machinists use tools like micrometers and calipers to measure lengths accurately.
- Tolerances: Explain how machinists work within specific tolerances to ensure parts fit perfectly. Discuss how mathematics helps in calculating these tolerances.
- Conversions: Mention that machinists often need to convert units (e.g., inches to millimeters) and discuss why this is necessary.

- Angles and Geometry: Explain how machinists use geometry and trigonometry to calculate angles in their work.

Encourage students to ask questions and provide real-world examples of how mathematics is applied in machining.

Distribute number line diagrams that represent whole numbers from 0 to 100. Give each student number line worksheet.

Explain that these diagrams will help students visualize addition and subtraction in the context of machining.

Provide practical examples and ask students to use the number line diagrams to solve them. You can assign these to the students. Consider projecting them on the board.

1. You need to cut a piece of metal that is 45 inches long into two equal parts. How long will each part be after the cut?
2. You have a metal rod that is 72 inches long. You need to remove a 15-inch section. How long will the remaining rod be?
3. You are manufacturing a set of bolts, and each bolt needs to be 6 inches long. You have a steel rod that is 48 inches long. How many bolts can you produce from this rod, and how much rod material will be left?
4. You have a metal rod that is 60 inches long. You need to cut two pieces from it, one that is 28 inches long and another that is 15 inches long. How much of the original rod will remain after making these two cuts, and what will be its length?
5. You are machining a metal workpiece, and the initial length is 48 inches. After several machining operations, you need to remove 10 inches from one end and 5 inches from the other end to meet the desired specifications. What will be the final length of the workpiece?

Have students work individually or in pairs to solve these problems on their number line diagrams.

💭 REFLECTION (10 minutes)

✔ Review the answers with the whole class.

Lower Level	Higher Level
Work with students individually to support them with addition and subtraction using the number line for the assigned problems.	Allow students to work on the problems without the number line.

GROUP WORK (75 min)

Divide learners into small groups.
Share MTCC Academic Degree Programs - McDowellTech with students and explain that this is a list of programs offered by the college.

Assign each group a Manufacturing and Trades degree program to research.

Tell students to explore the types of degrees offered for the program, benefits, requirements, career paths and work areas.

Have groups discuss and prepare brief presentations on their assigned programs.

💭 REFLECTION (15 minutes)

✔ Have each group present their findings with the rest of the class. Spend time discussing what interests students about each program that was presented. Lead a short discussion around how problem-solving & critical thinking help excel in these careers.

INDEPENDENT WORK TIME (30 min)

Have students reflect on the importance of problem-solving and critical thinking in machinists' roles.

Based on their interests, personalities and the program comparisons, have students write a short paragraph about which Manufacturing and Trades degree program they find most aligned with their career aspirations.

💭 REFLECTION (10 minutes)

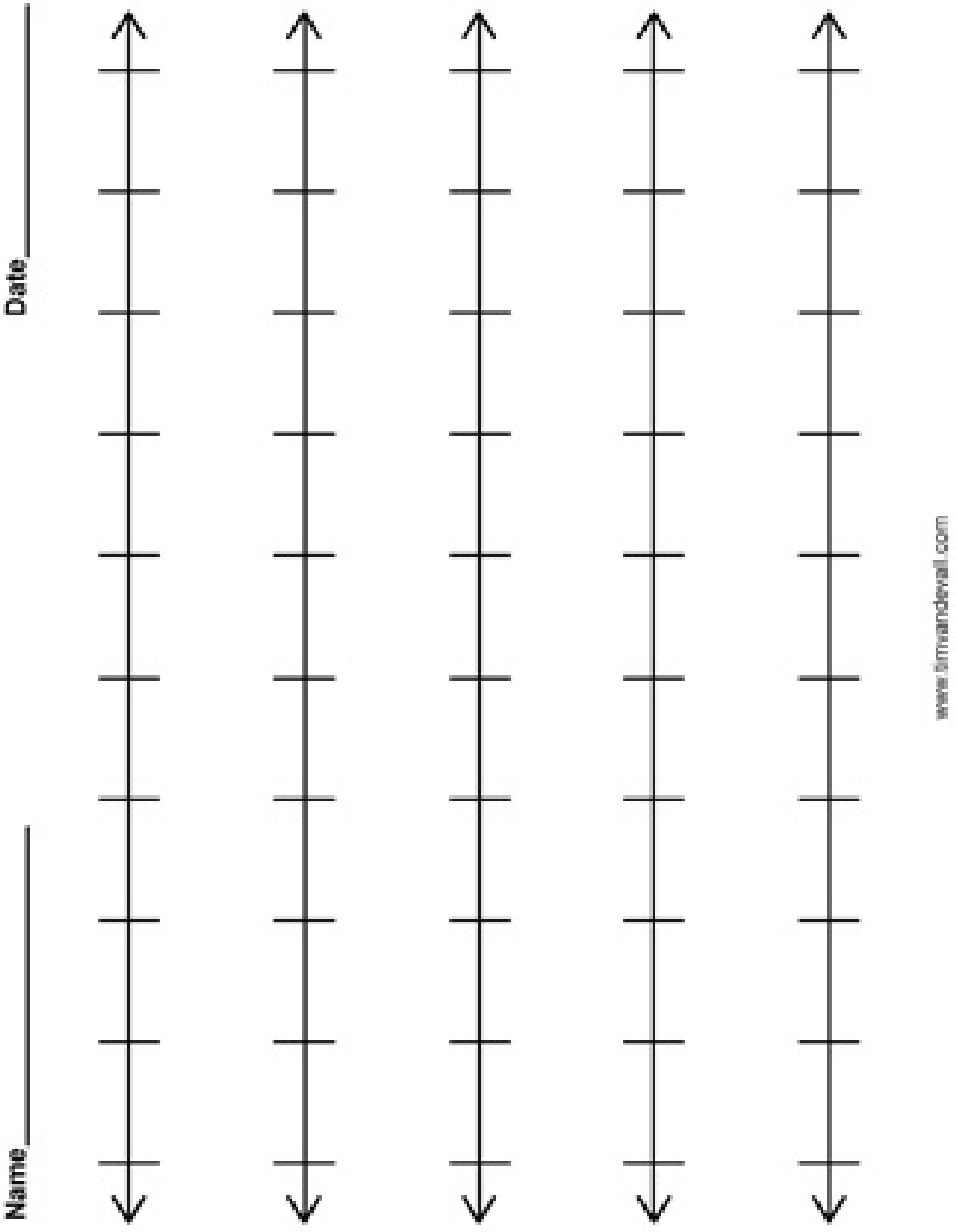
✔ Ask interested volunteers to read what they wrote.

Lower Level	Higher Level
Provide sentence starters to help students write their reflections.	Have students explore the wage trends for the program they choose to write about and include that in their paragraphs.

WRAP-UP & REFLECTION (15 min)

Summarize key points from the lesson.
Reinforce the significance of problem-solving skills and the value of pursuing relevant degree programs.

Distribute exit slips to students.
Ask for a few volunteers to share their reflections.
Collect and review the answers.


Date
Name
www.timmandeval.com

Reflection Exit Slip

In one sentence, describe what you learned in this lesson.

Today, I learned _____.

Is one of the careers discussed today of interest to you? Why or why not?

I liked / did not like _____ *career because*_____

_____.

Is there anything you still need help understanding?

What's one question you have?

Circle the emoji that shows how you feel about your mastery of content in this lesson.