

15. Architecture and Construction Cluster - Road Maintenance and Heavy Equipment (4 hours)

Purpose/Abstract: To introduce students to highway maintenance careers in the architecture and construction cluster.			
NCCCS Adult Education Standards: R.4.2.1, S.1.2.2 , W.5.2.6, M.2.3.2			
Learning Objective: <i>By the end of the session, students will be able to:</i>			
<ul style="list-style-type: none"> • Research and present on careers in road maintenance and heavy equipment • Utilize problem-solving strategies to apply mathematical principles to paving work 			
Soft Skills	teamwork, problem-solving & critical thinking	Resources	<p>Skills to Pay the Bills (STPTB) (for instructor reference to define each soft skill category)</p> <p>47-4051.00 - Highway Maintenance Workers (for information on the roles)</p> <p>Math games and worksheets used in the lesson:</p> <ul style="list-style-type: none"> • Perimeter of Polygons • Word Problems - Perimeter <p>NC Career Clusters Guide (for instructor reference)</p> <p>Handouts:</p> <ul style="list-style-type: none"> • Reading and Vocabulary - 1 for each student • Area and Perimeter - 1 for each student • Careers in the Architecture and Construction Cluster - 1 for each student
Additional Materials			
<ul style="list-style-type: none"> • Reading and Vocabulary handout, one for each student • Area and Perimeter, one for each student • Careers in the Architecture and Construction Cluster, one for each student. • Square blocks, for area and perimeter calculation demonstration • Art supplies (glue, glitter, markers, paint, etc.) • Pencils, paper, scissors • Computers for student use 			
Icons	 Activity	 Check-In	 Review

PREPARATION

- Review the worksheets and games on [Education.com](#) and print out the following worksheets to assign to students during independent work time.
 - [Perimeter of Polygons](#)
 - [Word Problems - Perimeter](#)
- Review the [Instructional Support Guide](#) and print/prepare referenced scaffolds.
- Print handouts.



- Familiarize yourself with the [OneStop Career Clusters](#).
- 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!

Begin the lesson by displaying images of road maintenance and heavy equipment on a screen or poster board.

Engage students in a discussion by asking the following questions:

What do you notice about the images?

What careers do you think are involved in road maintenance and heavy equipment?

Write down student responses on chart paper.

Share the objectives of the lesson and explain that students will be researching and presenting careers in this field.

Discuss the importance of problem-solving, critical thinking, and teamwork in road maintenance and heavy equipment jobs.

VOCABULARY, READING(45 min)

Distribute the reading and vocabulary handout to students.

Pair up students with different reading levels (lower and higher levels). Instruct students to read aloud two paragraphs each to their partner. This will help students practice fluency and proper intonation.

Encourage students to underline unfamiliar words and look them up in the dictionary with their partners.

Read the instructions for the writing activity and answer questions that come up.

Allow students 15 minutes to complete the writing activity with their partner.

Walk around and provide support as required.

REFLECTION (15 minutes)

✓ Facilitate a group discussion on the article to allow students to share their understanding and thoughts.

Have 1-2 pairs read out their opinions on the role to the rest of the class.

Emphasize the importance of teamwork and problem-solving skills in this role and ask 3-4 students to share a few examples of where these skills might be used from what they read in the article.

Lower Level	Higher Level
Encourage students to verbally share their opinions on the role using the guiding questions. Have their partner support them in writing down the responses.	Challenge students to do more research on the role using various sources on the internet and share highlights with the rest of the class. Allow students to complete their research outside the class if required.

MATHEMATICS (45 min)

Introduce the concepts of area and perimeter in the context of paving work.

Review using visual aids and manipulatives (e.g., square tiles) to demonstrate how to calculate the area and perimeter of rectangular shapes. Connect this to how a lot of road work involves working with rectangular shapes.

Provide these two real-world examples of a paving work scenario and ask students to calculate the area and perimeter of the surfaces with you on the board.

Encourage students to share the steps they will use as you demonstrate how to calculate the area and the rectangle for this problem.

1. *You are a paving contractor and have been hired to resurface a rectangular parking lot. The length of the parking lot is 60 feet, and the width is 40 feet. Calculate the area and perimeter of the parking lot.*
2. *A park is adding a rectangular picnic area. The length of the picnic area is 30 meters, and the width is 20 meters. Determine the area and perimeter of the picnic area.*

Distribute the Area and Perimeter handout and allow 25 minutes for students to solve the problems.

Conduct a class discussion to review the answers and provide individual support as required. .

 REFLECTION (10 minutes)

- ✓ Collect and review students' work to assess their understanding of the concept.

Ask 1-2 students to summarize how perimeter and area calculations are important in road maintenance careers.

Lower Level	Higher Level
Simplify the examples and guide them through the calculations step by step. Provide graph sheets to help them visualize how to solve the problems.	Challenge students with this more complex problem that requires critical thinking to solve. <i>Megan has a backyard garden that she wants to enclose with a fence. The shape of her garden is irregular, but she realizes that she can break it down into multiple rectangles to calculate the area and perimeter more easily. The dimensions of each rectangle are as</i>



follows:

Rectangle 1: Length = 8 meters, Width = 5 meters

Rectangle 2: Length = 6 meters, Width = 3 meters

Rectangle 3: Length = 10 meters, Width = 2 meters

Rectangle 4: Length = 4 meters, Width = 7 meters

Megan wants to calculate the total area and perimeter of her garden to determine the amount of fencing she will need. Help Megan solve this problem by calculating the total area and perimeter of her garden using the given dimensions of each rectangle.

Encourage them to illustrate these shapes, explain their problem-solving strategies, and justify their answers.

GROUP WORK (60 min)

Divide the students into groups of four.

Explain that each group will be exploring and discussing information about the career of Highway Maintenance Workers using the provided webpage.

Assign each group a specific aspect of the career to focus on (e.g., job duties, required skills, work environment, salary, etc.)

Provide each group with the webpage link: [47-4051.00 - Highway Maintenance Workers](#).

Instruct the groups to access the webpage and navigate to their assigned section.

Encourage them to read the information carefully and take notes or highlight key details.

Allow 15 minutes for groups to explore their assigned sections. Once time is up, get the class together. Each group will take turns sharing the key information they found about their assigned aspect of the career. Encourage students to engage in active listening and ask questions for clarification or additional information. Take notes on a flipchart to capture the important points discussed.

REFLECTION (15 minutes)

✓ After each group has shared their findings, initiate a group discussion by asking open-ended questions, such as:

What did you find most interesting about the career of Highway Maintenance Workers?

Were there any surprises or challenges mentioned in the information?

How do the required skills align with the problem-solving and critical-thinking skills we discussed earlier?

How does this career contribute to the community or society as a whole?

What are some potential career paths or opportunities related to this occupation?

Summarize the key points and insights from the group discussion.

Emphasize the importance of career exploration and how it helps individuals make informed decisions about their future.

Lower Level	Higher Level
Assign roles within the group so all students can contribute to the research in ways they are most comfortable. Help students with summarizing the information they read by providing guided questions.	Encourage students to look for additional sources to learn more about other similar roles related to road maintenance and heavy equipment careers and share the list with the rest of the class.

INDEPENDENT WORK TIME (45 min)

Tell students that they can use this time to work on two separate review activities. They can choose the order in which they want to complete them.

- a) Work on additional Area and Perimeter problems
- b) Review all that they’ve learned so far about careers in the Architecture and Construction cluster and write a summary of what they remember.

Share the links for careers used in the previous lessons in this cluster if students want to refer to them.

 REFLECTION (10 minutes)

Conclude the activity by summarizing all the careers discussed so far in the architecture and construction cluster and conduct a quick poll to see which ones students are most interested in pursuing and have them share their reasons.

Lower Level	Higher Level
Assign Perimeter of Polygons to students and walk around providing support. As students write their summary of careers, encourage them to use mind maps, or illustrations to organize their thoughts on each career they are summarizing.	Assign Word Problems - Perimeter to students. As they write their summary on careers covered so far in this cluster, encourage them to compare the pay they might receive in each career and arrange them in ascending order.

WRAP-UP & REFLECTION (15 min)

Instruct students to turn to a partner and share



- a) One thing they are grateful for today.
- b) One thing they are most curious about in the architecture and construction cluster careers.
- c) One thing they want more information on in this cluster.

Ask 2-3 volunteer pairs to share their thoughts with the rest of the class.

Distribute exit slips to students.

Ask for a few volunteers to share their reflections.

Collect and review the answers.

Reading and Vocabulary

Name: _____

Date: _____

Directions:

- Read the passage with your partner
- Highlight important information that helps you understand the role
- With your partner, on a blank piece of paper, discuss and write your opinions about the role. Think about the following as you frame your answers:
 - *What do you find interesting about the role?*
 - *What would you not like doing in this role?*
 - *How would you deal with a situation when a driver does not follow the rules and puts themselves at risk? What would you say and do?*
 - *What are some ways in which you can learn road markings and signals to be good at this role?*
 - *What might your day look like as a traffic control flagger on main roads in your city?*

Traffic Control Flaggers

A flagger is someone who helps keep drivers and workers safe on the roads. They stand in the streets and direct traffic. Flaggers use special signals, like flags and signs, to tell drivers when to stop and go. They work in construction areas and other places where roads are being fixed. Flaggers make sure everyone follows the rules and stays safe.

When flaggers are on the job, they wear bright-colored vests and helmets to be easily seen. They use cones, warning signs, and barricades to mark off the areas where work is happening. This helps drivers know where to go and avoid accidents. Flaggers need to pay close attention to what's happening around them. They watch for cars, trucks, and other vehicles to make sure everyone is safe.

To become a flagger, you need to learn the rules and signals for traffic control. Flaggers usually get special training to know how to do their job well. They need to be able to stay focused and make quick decisions. Being a flagger is important because it helps keep people safe while the roads are being fixed. It's a responsible and essential job.

In conclusion, flagger traffic control is a job that involves directing traffic in construction areas and other places where the roads are being fixed. Flaggers use signals, signs, and barricades to make sure drivers follow the rules and stay safe. They wear special gear and need to pay close attention to what's happening around them. To become a flagger, you need training and the ability to make quick decisions. Being a flagger is important for keeping people safe on the roads.

Area and Perimeter

Directions:

- Solve the following problems to calculate area and perimeter, on a separate sheet of paper.
- Write down the formula you will use for each and show your steps.
- Ask your instructor for graph paper if you require to work on each problem.

Problems:

1. A construction company is installing new asphalt on a basketball court. The dimensions of the court are 50 feet by 84 feet. Find the area and perimeter of the basketball court.
2. A road maintenance crew needs to repair a section of a road that measures 100 meters in length and 8 meters in width. Determine the area and perimeter of the section that needs repair.
3. A rectangular sidewalk needs to be constructed outside a building. The length of the sidewalk is 25 meters, and the width is 4 meters. Calculate the area and perimeter of the sidewalk.
4. A contractor is installing a paved pathway in a park. The pathway is in the shape of a rectangle with a length of 70 feet and a width of 6 feet. Find the area and perimeter of the paved pathway.
5. A construction crew is working on repaving a rectangular driveway. The length of the driveway is 45 feet, and the width is 12 feet. Calculate the area and perimeter of the driveway.

Careers in the Architecture and Construction Cluster

Directions:

- Review all the information and concepts covered about careers in the Architecture and Construction cluster in the last four lessons and this one. Use this list below for your reference:
 - Construction careers
 - Carpentry careers
 - Maintenance careers
 - Painting and Interior design careers
 - Road maintenance and heavy equipment careers
- Reflect on the key points, job roles, skills required, and any other important details that were discussed during the lessons. Take a few minutes to think about what you remember and consider how these careers align with your interests and abilities.
- **Write a short summary** that captures the main ideas and information you recall about careers in the Architecture and Construction cluster. Wherever possible, include specific examples, important skills, and any insights or connections you have made during the lessons.
- Take your time to organize your thoughts and express them clearly in your summary.
- Feel free to refer back to your class notes, handouts, or any other resources provided during the lessons to help you remember and include relevant information.
- Optional: You can choose to read your summary with the rest of the class.

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.



Happy



Smart



Confused



Sad



Angry