

Hour of Code: Teacher Guide

Important Note: If students are accessing this hour of code without logging in to a CodeHS account, the programs they write during each exercise will **NOT SAVE** when they continue on to a new exercise. They should be reminded to **copy** their code from each exercise to use in the following exercises or they will not have access to it once they continue on with the activity.

This is a beginner Hour of Code. It is designed for middle school students with little to no computer programming experience.

Before the Hour of Code:

- Make sure student computers have an up-to-date browser (Chrome, Safari, or Firefox).
- Read through teacher notes in this document. Download notes to have exercise solutions ready.

During the Hour of Code:

1. Direct students to codehs.com/hoc_litterfree
2. Allow students to work through Hour of Code at their own pace, providing encouragement and support when needed. See tips below for handling student questions.
3. Tweet pictures or stories at @CodeHS #ReadWriteCode #HourOfCode!
4. If time allows at the end of the period, facilitate a discussion around the Hour of Code using the following guiding questions:
 - Before today, what did you think about programming or coding?
 - Did any of these ideas change during the Hour of Code?
 - What was your favorite part of the Hour of Code?
 - Did any parts of the Hour of Code challenge you? How?

Hour of Code Tips:

If students get stuck or have questions, it is okay if you don't have the answer! Ask questions to activate their problem-solving skills such as:

- What can we try differently?
- What do you want the program to do? What are you telling the program to do?
- How can we break this problem into smaller steps?

Thank you for your dedication to Computer Science Education!

Interested in going beyond the Hour of Code?

Reach out to us at hello@codehs.com.

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In this Hour of Code, students learn about how they can use computer science to help solve one of the biggest problems facing our world today: litter and waste. Students start by exploring real world examples of how engineers are using computer programming to reduce the amount of litter in their community. Then, they choose between two programming adventures: Clean Up with Karel or Web Design for a Litter-Free Community. In Clean Up with Karel, students learn the basics of programming in Python by giving commands to Karel. In Web Design for a Litter-Free Community, students learn the basics of HTML by creating their own webpage.

Planning Note

There are two potential pathways in this Hour of Code, one where students learn the basics of Python and one where students learn the basics of HTML. Decide ahead of time if you want to give students the option to choose their pathway or if you want to have the entire class work on the same pathway. Additionally, you can extend the Hour of Code by having students complete the alternative pathway.

Objective

Students will be able to:

- Explain how computer programming can be used to impact a community problem
- Clean Up with Karel:
 - Use proper Python syntax to give Karel commands
 - Use for loops to give Karel a set of repeated commands
 - Use if statements to have Karel interact with the world around her
 - Use for loops and if statements to write concise code and solve problems
- Web Design for a Litter-Free Community:
 - Develop a webpage that addresses an issue in their community
 - Format text using header tags and paragraph tags
 - Add horizontal lines to organize their webpage
 - Add images to a website

Link to Activity: codehs.com/hoc_litterfree

Discussion Questions Before Class

- What are some negative impacts litter can have on our community and our environment?
- In your own words, what does *computer programming* mean?

Discussion Questions After Class

- How can you use computer programming to address an issue in your community?
- Clean Up with Karel: How does using if statements and for loops help you when writing code?
- Web Design: What are some strategies you can use to organize a webpage?

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Exercise Solutions: Clean Up with Karel

Clean Up Challenge Level 1	
Description	<p>Welcome to your first Clean Up Challenge! Your job is to write a program that has Karel walk down the street and pick up litter as she goes.</p> <p>Make sure that Karel walks all the way down the street. Your program should match the Ending World.</p>
Motivation	Students practice writing basic Karel commands.
Solution	<pre>move() move() take_ball() move() move() move() take_ball() move() move()</pre>
Common Questions and Tips	<p>Tips</p> <ul style="list-style-type: none">• Note that spaces do not impact the program. Students can use spaces to help them organize their code.• Students can look at the “Exercise” tab if they forget the directions for the exercise.• Encourage students to use the left and right arrows to walk through their command. <p>Why won't Karel follow my commands?</p> <p>In order for Karel to follow a command, the command must be written using the proper syntax. Have students double check that they end each command with an open and closed parentheses.</p> <p>Why doesn't my program start at the beginning?</p> <p>Students need to click the “Reset” button each time they want to restart their program.</p>

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Clean Up Challenge Level 2	
Description	<p>Karel is participating in her neighborhood’s adopt a street program! This means that Karel is in charge of keeping her adopted street clean and litter-free. Help Karel beautify her community by picking up all of the yellow tennis balls as she walks down the street. Your program should match the Ending World.</p> <p>Hint: you can use for loops to make Karel’s job easier!</p>
Motivation	Students use for loops to make it easy to repeat a set of commands a specific number of times.
Solution	<pre>for i in range(4): move() take_ball() turn_left() for i in range(6): move() take_ball() turn_right() for i in range(5): move() take_ball()</pre>
Common Questions and Tips	<p>Tips:</p> <ul style="list-style-type: none">• There are multiple parts to this program. Have students work through one part at a time, testing their program as they go. <p>What does the “ParseError” error message mean?</p> <p>This typically means there is a syntax error at the specified line in the error message. With regard to for loops, this could mean that the student did not include the colon or parentheses, did not use the entire phrase “for i in range”, or did not properly indent the commands to be repeated.</p> <p>What does it mean that Karel crashed into a wall?</p> <p>Karel cannot move forward if there is a wall in front of her. Have students use the arrows to walk through their program and identify where they might need to add or remove a <code>move()</code> command.</p>

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Clean Up Challenge Level 3	
Description	<p>Karel goes back to clean up the street she adopted once a week for the next three weeks. Each time she finds that there is less litter!</p> <p>Write one program that has Karel clean up the litter regardless of which week it is. Start with the program you wrote for the <i>Litter Pick Up Level 2</i> activity. Then, revise your program to include some <i>if statements</i> that help Karel react to the different amounts of litter each week.</p> <p>Make sure to test your program against all three worlds!</p>
Motivation	<p>Students learn to use if statements to help Karel ask questions about the world around her. This enables students to use the same code for multiple scenarios.</p>
Solution	<pre>for i in range(4): move() if balls_present(): take_ball() turn_left() for i in range(6): move() if balls_present(): take_ball() turn_right() for i in range(5): move() if balls_present(): take_ball()</pre>
Common Questions and Tips	<p>Tips:</p> <ul style="list-style-type: none">• Students can copy and paste their code from Clean Up Challenge Level 2 instead of starting from scratch. By starting with their previous code, students can identify where they need to add an if statement.• Make sure students test their code in each world!• Pay close attention to the indentation! The if statement should be independent within the for loop, and the <code>take_ball()</code> command should be indented within the if statement.



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What does the “ParseError” error message mean?

Students are working with both if statements and for loops in this exercise, which increases the opportunities for syntax errors. This message could refer to the following syntax errors:

- For loops: the student did not include the colon or parentheses, did not use the entire phrase “for i in range”, or did not properly indent the commands to be repeated.
- If statements: the student did not include the parenthesis in the `balls_present()`, did not include the colon, or did not properly indent the `take_ball()` command.

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Ultimate Clean Up Challenge	
Description	<p>It's the moment you've been working towards - the Ultimate Clean Up Challenge! Karel has put together a community litter pick up event for her neighborhood. For the next three weeks, Karel will work with other community members to pick up the litter in the park.</p> <p>Write a program that has Karel walk around the park and pick up all of the litter. Your program should work regardless of which week it is.</p> <p>Hint: Use what you've learned about if statements and for loops!</p>
Motivation	Students use everything they've learned (basic commands, for loops, and if statements) to complete a challenge.
Solution	<p>Basic Solution with just for loops and if statements:</p> <pre>turn_left() move() move() turn_right() # first row for i in range(5): if balls_present(): take_ball() move() if balls_present(): take_ball() # move to second + second row turn_left() move() turn_left() for i in range(5): if balls_present(): take_ball() move() if balls_present(): take_ball() # move to third + third row turn_right() move() turn_right() for i in range(5): if balls_present(): take_ball() move() if balls_present(): take_ball()</pre> <p>(cont'd on next page!)</p>



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```
# move to fourth + fourth row
turn_left()
move()
turn_left()

for i in range(5):
    if balls_present():
        take_ball()
    move()

if balls_present():
    take_ball()

# move to fifth + fifth row
turn_right()
move()
turn_right()

for i in range(5):
    if balls_present():
        take_ball()
    move()
if balls_present():
    take_ball()

# move to sixth + sixth row
turn_left()
move()
turn_left()

for i in range(5):
    if balls_present():
        take_ball()
    move()

if balls_present():
    take_ball()

turn_around()
```



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Solution using nested for loops and if statements that has Karel go back to the start of each for before removing up a row:

```
turn_left()
move()

for i in range(6):
    move()
    turn_right()
    for i in range(5):
        if balls_present():
            take_ball()
        move()
    if balls_present():
        take_ball()
    turn_around()
    for i in range(5):
        move()
    turn_right()
turn_right()
```

Solution using nested for loops and if/else statements that has Karel zig zag up the park:

```
turn_left()
move()
move()
turn_right()

for i in range(5):
    for i in range(5):
        if balls_present():
            take_ball()
        move()

        if balls_present():
            take_ball()

        if facing_east():
            turn_left()
            move()
            turn_left()
        else:
            turn_right()
            move()
            turn_right()

for i in range(5):
    if balls_present():
        take_ball()
    move()

if balls_present():
    take_ball()

turn_around()
```



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Common Questions and Tips

Tips:

- Students may find that they're repeating code and begin to copy and paste. This is fine and an excellent observation on the student's part! If you want to challenge students who do this, have them identify what commands they are repeating and see if they can avoid repeating code by using a loop *inside* of a loop. This is also known as a nested for loop.
- Due to the length of this challenge, encourage students to test their program as they go.
- There are many ways to solve this challenge. This is a great opportunity to have students compare and contrast the different ways they approached the problem.
- Ensure that students test their program in each world!

When I try to use a loop inside of a loop, I don't know how to get Karel to move to the next row.

This is a tricky piece of the puzzle! There are two ways to go about solving this issue:

- Use another for loop to have Karel go back to the start of the row. This way, she will start each new loop at the beginning of the row.
- Use an if/else statement that uses the conditions `if facing_west()` and `if facing_east()` to determine which way Karel should turn depending on which side of the park she is on.

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Exercise Solutions: Web Design for a Litter-Free Community

Say Hello!	
Description	<p>Create an HTML web page to introduce yourself to the world! Be sure to use the <code><h1></code> tag on your page.</p> <p>For example, if your name was Karel, your page may say “Hello, my name is Karel!”</p> <p>HINT: If you are using blocks, the <code><h1></code> tag can be found in the green “Formatting” section in the block tool box.</p>
Motivation	Students get practice using HTML tags and see how adding the <code><h1></code> tag changes how a line of text is formatted.
Solution	<pre><h1>Hello, my name is Karel!</h1></pre>
Common Questions and Tips	<p>Tips:</p> <ul style="list-style-type: none"> • Student programs will still run even if their syntax isn't exact. Circulate to ensure that students are using both an opening tag <i>and</i> a closing tag and aren't forgetting <code>'/'</code> in the closing tag. • Make sure that students are putting the tags <i>around</i> the text they want to markup.

Explore: <code><hr></code> , <code><p></code> , and heading tags	
Description	<p>This example shows a few other tags you can use to format text. Use the following questions to guide your exploration:</p> <ul style="list-style-type: none"> • What is the difference between the different heading tags (<code><h1></code>, <code><h2></code>, etc.)? • What is the difference between an <code><h></code> tag and a <code><p></code> tag? • What does the <code><hr></code> tag do? <p>When you have a good understanding of the heading tags, <code><hr></code> tag and the <code><p></code> tag, click “Continue” to move on.</p>
Motivation	Through exploring the example, students learn about the <code><hr></code> tag, <code><p></code> tag, and the different heading tag options.

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Solution	<p>While there is not “solution” to this activity because it is an example, students should understand the following concepts before moving on:</p> <ul style="list-style-type: none"> • The different heading tags make different sized headings, with <code><h1></code> tags being the largest text and <code><h6></code> being the smallest. • <code><p></code> tags are used for paragraphs. They wrap text to the next line and create spaces between other paragraphs. • The <code><hr></code> tag draws a horizontal line.
Common Questions and Tips	<p>Because this is an example, students might be tempted to skip it. Ensure students use the guiding questions to explore the different tags because they will need to use them in the next activity.</p>

Litter-Free Website: Draft	
Description	<p>Hour of Code Project: Over the course of this Hour of Code you will create a website that addresses the issue of litter in your community. You may want to take a moment and research the impact of litter on your community as well as any current litter-free initiatives that are available. Here are some potential ideas for the purpose of your website:</p> <ul style="list-style-type: none"> • Provide details about recycling, trash pickup, and composting in your community • Provide details about community cleanup opportunities • Increase awareness of the importance of not littering • Create an organization that works to make your community litter-free <hr/> <p>Directions: In this activity, you will start your website! Complete the following tasks to create the foundation of your website:</p> <ul style="list-style-type: none"> • Add the title of your website using an <code><h1></code> tag. • Organize your webpage! Create at least three sections using the <code><hr></code> tag. • Add text to each section using subheader tags and <code><p></code> tags. Each section should include at least one well-constructed sentence. <p>You can view your website as you go by clicking “Run” and “See HTML in new window.”</p>
Motivation	<p>Students apply the tags they’ve learned (heading tags, <code><p></code> tags, and the <code><hr></code> tag) to start work on their own website.</p>

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Solution	<p>The solution below is an example. The main goal of this HOC is for students to have fun and think about how they can create a website to positively impact their community. Encourage them to be creative and research some ideas before getting started.</p> <p>When looking at student work, you should check to make sure they have the following:</p> <ul style="list-style-type: none">• An <code><h1></code> tag• A different heading tag for each section• <code><p></code> tags for the text in each section• An <code><hr></code> tag between each section to create lines <pre data-bbox="305 781 1510 1270"><h1>Help keep Nashville clean!</h1> <h3>The Facts</h3> <p>Did you know that it costs us at least \$15 million annually to pick up litter in Tennessee?</p> <hr> <h3>How You Can Help</h3> <p>Make sure you don't litter! Set an example for others by throwing away trash.</p> <p>Schedule a neighborhood cleanup day.</p> <p>Adopt a street through the Adopt-a-Street Program.</p> <hr> <h3>Learn More</h3> <p>Want to see what else you can do? Check out the Community Beautification webpage on Nashville's website</p></pre>
Common Errors and Tips	<ul style="list-style-type: none">• Students will commonly forget to close tags. As you circulate, double check for closing tags. Although some browsers automatically close tags when they counter the start of a new tag, this may cause student's web pages to behave in unexpected and incorrect ways.• Note that the horizontal line tag (<code><hr></code>) does not have a closing tag.

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Photo Collage	
Description	<p>Add four images to this web page using the <code></code> tag. Image links are provided below, or you can find your own! The height should be set to 150px.</p> <p>If you are using your own pictures, make sure to use pictures that are free for public use. Here are some websites that have collections of free images:</p> <ul style="list-style-type: none"> • https://unsplash.com/ • https://www.pexels.com/ • https://www.shutterstock.com/photos
Motivation	Students practice incorporating images in their webpages.
Solution	<pre> </pre>
Common Errors and Tips	<ul style="list-style-type: none"> • If the images aren't showing up or aren't changing size, this is due to a syntax error: <ul style="list-style-type: none"> ○ Make sure that the width and height properties are placed <i>inside</i> of the image tag. ○ Check that students use quotation marks and include 'px' when assigning a value to the width and height. ○ Check that students use quotation marks around the source URL. • Encourage students to look for images they may want to include on their website. This will make the final exercise easier!

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Litter-Free Community Website: Final	
Description	<p>Activity Directions: Copy and paste your code from the <i>Litter-Free Website: Draft</i> exercise. Now it's time to finalize your website!</p> <ul style="list-style-type: none"> • Add a few images to your website to make it more engaging. • Finalize your text and organization to make your website easy to understand. • Consider exploring other HTML tags (like the <code><a></code> tag for links or <code></code> tag for bulleted lists) in the DOCS tab to add extra style and pizzazz! <p>When choosing which images to add to your website, make sure to use pictures that are free for public use. Here are some websites that have collections of free images:</p> <ul style="list-style-type: none"> • https://unsplash.com/ • https://www.pexels.com/ • https://www.shutterstock.com/photos <hr/> <p>Share It! Creating websites is all about communicating ideas with others. Once you're done with your website, you can share it with your community! Check out this article to learn how.</p>
Motivation	Students finalize their website by adding in images and exploring other advanced tags.
Solution	<p>The solution below is an example:</p> <pre> <h1>Help keep Nashville clean!</h1> <h3>The Facts</h3> <p>Did you know that it costs us at least \$15 million annually to pick up litter in Tennessee?</p> <hr> <h3>How You Can Help</h3> <p> Here are some things you can do to help out: Make sure you don't litter! Set an example for others by throwing away trash. Schedule a neighborhood cleanup day Adopt a street through the Adopt-a-Street Program </p> <hr> <h3>Learn More</h3> <p>Want to see what else you can do? Check out the <a href="https://www.nashville.gov/Public-Works/Commu </p> </pre>



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Common Errors and Tips

- **Images:** If the images aren't showing up or aren't changing size, this is due to a syntax error:
 - Make sure that the width and height attributes are placed *inside* of the image tag.
 - Check that students use quotation marks and include 'px' when assigning a value to the width and height.
 - Check that students use quotation marks around the source URL.
- **Closing Tags:** Students will commonly forget to close tags. As you circulate, double check for closing tags. Although some browsers automatically close tags when they counter the start of a new tag, this may cause student's web pages to behave in unexpected and incorrect ways.
- **<hr>:** Note that the horizontal line tag (<hr>) does not have a closing tag.
- **<a>:**
 - Syntax: When adding an href attribute it's important to remember to put quotes around the website the student is linking to. For example: href="https://codehs.com/"
 - Https vs http: Students need to make sure that the links they are linking to start with https not http. Otherwise the links won't load. This is for security reasons. URLs that start with https are secure, and links that start with http might not be secure.