Life on Land: Python
Teacher Guide

Summary

- Web address: **tynker.com/hour-of-code/**
- Coding skill level: **Advanced**
- Recommended grade level: **Grades 6+ (U.S.), Years 7+ (U.K)**
- Time required: **50 minutes**
- Number of modules: **1 module**
- Coding Language: **Python**

Teacher Guide Outline

Welcome!
- How to Prepare

Activity
- Overview
- Getting Started (20 minutes)
- Tutorial (30 minutes)
- Extended Activities

Going Beyond an Hour
- Do More With Tynker
- Tynker for Schools

Help

Welcome!

Welcome to Hour of Code! This year, Tynker is incorporating meaningful coding projects that align with the United Nations Sustainable Development Goals. The Goals are intended to bring awareness to global challenges and provide a plan of action to achieve a more sustainable future for all. You can read about the 17 Goals and global challenges here:

https://www.un.org/sustainabledevelopment/sustainable-development-goals/

Note: Each Goal listed on the website also includes information on *Facts and figures*, *Goal targets*, and *Links*.

In this lesson, students are introduced to the importance of sustainably managing life on land (*Goal 15*) as they complete the activities in this teacher guide. The lesson is intended to be completed in two different parts (as described in the "Getting Started" section of this teacher guide). In Part 1, students will reflect on *Goal 15: Life on Land* by completing a variety of activities. Part 1 also includes an optional "Goal 15: Life on Land" assignment, which will allow you to assess your students' understanding.

In Part 2, students will follow a step-by-step Python tutorial in the Text Code Editor where they will create a project that creates a beautiful landscape with different trees. Wherever a student clicks on their screen, a tree will pop up. Students are provided code to get started, but are encouraged to add or change the code to make it their own. By the end of this lesson, students will have combined creativity with problem-solving skills while reinforcing coding concepts, Python syntax, and learning about *Goal 15: Life on Land*.

How to Prepare

This activity is designed for self-directed learning. Your role will be to help students individually and facilitate as students complete the coding activities on their own. The best way to prepare is to:

1. **Familiarize yourself with the material.** After selecting your Tynker lesson (e.g., Life on Land), read through this teacher guide and complete the activity before assigning it to students. This will allow you to troubleshoot anything in advance and plan for potential questions from your students.
2. **Get students excited about coding.** Inspire students and get them excited for the Hour of Code event. Here is a link to resources such as inspirational videos and posters from the Hour of Code website: https://hourofcode.com/us/promote/resources#videos
3. **OPTIONAL: Sign up for a teacher account.** Although an account is NOT required, creating a free teacher account will allow you to access teacher guides, answer keys, and tons of additional resources. You'll also be able to create free accounts for your students, monitor their progress, and see their projects.

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4. **OPTIONAL: Create student accounts.** From your teacher account, you can easily create free student accounts for all your students. This will allow them to save their projects and progress, so they can continue coding when they get home! Again, this is not necessary to complete the Life on Land lesson.

5. **OPTIONAL: Print certificates to hand out.** While signed in to your Tynker teacher account, you can print certificates by clicking on a classroom from your teacher dashboard, clicking the "Gradebook" tab, going to "Hour of Code," and clicking the "Print All Certificates" button. This will only print certificates for student accounts assigned to the selected classroom.

6. **Complete this lesson in two different parts.** Please refer to the "Getting Started" section of this teacher guide.

Activity

To begin Life on Land, have your students go to this URL: **tynker.com/hour-of-code**

Overview

Objectives

Students will...

- Apply coding concepts to create a Life on Land project using Python
- Read about the Sustainable Development Goals

Materials

- Computers, laptops, or Chromebooks (1 per student)

Vocabulary

- **Code:** The language that tells a computer what to do
- **Sequence:** The order in which steps or events happen
- **Function:** A set of known actions that the computer can perform
- **Variable:** Stores a value, such as a number or a string of text, at a named location
- **Argument:** Value passed into a function
- **Parameter:** An extra piece of information that is passed into a function
- **Loop:** An action that repeats one or more commands over and over

U.S. Standards

- **CCSS-ELA:** RI.6.4, RI.6.7, SL.6.1, RI.7.4, SL.7.1, SL.8.1, RI.8.4, RI.9-10.5
- **CCSS-Math:** MP.1
- **K12CS:** P1.1, P1.3, P2.1, P2.3-2.4, P3.2-3.3, P4.4, P5.1-5.2, P6.1-6.2, P7.2-7.3
- **CSTA:** 2-AP-13, 2-AP-17, 3A-AP-17, 3B-AP-11
- **CS CA:** 6-8.AP.13, 6-8.AP.16, 6-8.AP.17, 9-12.AP.12, 9-12.AP.16
- **ISTE**: 1.c, 1.d, 4.d, 5.c, 5.d, 6.b

U.K. Standards

National Curriculum in England (computing):

- **Key Stage 3 (Years 7-9)**
  - Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
  - Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns
- **Key Stage 4 (Year 10)**
  - Develop their capability, creativity and knowledge in computer science, digital media and information technology
  - Develop and apply their analytic, problem-solving, design, and computational thinking skills
  - Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to report a range of concerns

Getting Started (20 minutes)

The lesson is intended to be completed in two different parts:

Part 1

Introduce students to *Goal 15: Life on Land* by completing the following activities:

- Play this short video that explains the 17 Sustainable Development Goals: https://youtu.be/0XTBYMfZyrM
- Ask students to read about *Goal 15: Life on Land*: https://www.un.org/sustainabledevelopment/biodiversity/
  Optional: Tell students to create "true/false" statements about the information they just read, then quiz a friend.
- Inform students that they're going to use Tynker in an upcoming activity to create their own project where they will create a Life on Land project using Python.
  Optional: Before students start coding, ask them to complete the "Life on Land" assignment (located on the next page) as an in-class activity.

Name _____

Date _____

Goal 15: Life on Land

Directions: Answer the questions below. Here are some helpful links you can use:
- https://www.un.org/sustainabledevelopment/biodiversity/
- https://www.un.org/sustainabledevelopment/sustainable-development-goals/
- https://www.un.org/sustainabledevelopment/be-the-change/

Questions:
1. List 3-5 interesting facts you learned about *Goal 15: Life on Land*.

   _____

   _____

   _____

   _____

2. What benefits do forests provide?

   _____

   _____

   _____

3. Do you have any lingering questions? If not, what do you believe is the greatest challenge of Goal 15?

   _____

   _____

   _____

   _____

4. There are different ways you can help achieve the Sustainable Development Goals. For example, you can start by reading more information to educate yourself on topics. You can also start thinking of a plan of action. Reflect on the Goals and what they mean to you by answering the questions below:

    Which Goal interests you the most? Why?

    _____

    _____

    _____

    _____

    List at least three helpful websites, books, or documentaries that you can use as a resource to learn more information.

    _____

    _____

Part 2:
- Now that your students know more about the Sustainable Development Goals, they're ready to move on to the Tutorial and create a meaningful coding project inspired by *Goal 15: Life on Land*.
- *Optional:* Model for your students how to utilize the tutorial and Text Code Editor. For suggestions, please refer to the "Help" section of this lesson plan and read "What does the tutorial include?"
  - Play this short video (starting at 00:27 seconds) on how to create a Python project: https://www.youtube.com/watch?v=EXTvJVyER3w
  - Play this short video (starting at 00:11 seconds) on how to create art using Python turtle graphics: https://www.youtube.com/watch?v=ugeecs_ICuU

Tutorial (30 minutes)

This lesson has one tutorial. Facilitate as students complete the Life on Land tutorial on their own:

Life on Land (Tutorial)
- Students will follow a step-by-step Python tutorial in the Text Code Editor, where they will create a project that creates a beautiful landscape with different trees!
- Activities include using the graphics library; drawing trees; programming a tree to appear when the user clicks their screen; and customizing their project.
- Make sure students select the **main.py** file (located on the left side of their screen) before they start coding their project:

- Do students need help running their program?
  - Students can run their code's output by selecting this Play button, located at the top right corner of their screen:

- Are students struggling with their code?
  - Check that they're carefully reading the provided tutorial instructions, then ask them to compare their code with the provided "Your code should look similar to this" sections.
- Did students finish early? Direct their attention to the "Bonus Challenges" section of the tutorial, which provides different activities for your students to customize their project.

○ Are students struggling with the "Draw Multiple Trees at Once" bonus challenge? Part of their solution might look something like this:

```python
10  def mousePressed():
11     drawTree(random.randint(0, 2), mouse.x, mouse.y)
12     drawTree(random.randint(0, 2), mouse.x+random.randint(-80,80), mouse.y+random.randint(-80,80))
13     drawTree(random.randint(0, 2), mouse.x+random.randint(-80,80), mouse.y+random.randint(-80,80))
```

Extended Activities

Outdoor Explorer
● Encourage students to connect with nature by taking them on a short trip to the school's courtyard or field area.
● As students are exploring, ask them to point out different plants (e.g., flowers, trees) and animals (e.g., squirrel, bird, ant). *Optional:* Tell students to use their notebook and pencil to create an annotated sketch of a tree or flower.

Going Beyond an Hour

If your students enjoyed an Hour of Code, they're sure to enjoy the rest of what Tynker has to offer! Tynker offers a complete premium solution for schools to teach computer science. Over 400 hours of lessons are available to take K-8 students from block coding to advanced text coding. We offer tons of resources for teachers, including comprehensive guides, free webinars, and a forum to connect with other educators.

More Hour of Code Activities
Tynker offers many other tutorials for the Hour of Code, including STEM Hour of Code lessons that you can integrate into the subjects you already teach. Check out the main Tynker Hour of Code page to see all the tutorials!

Do More with Tynker

With Tynker, kids don't just acquire programming skills—they explore the world of possibilities that coding opens up. Tynker has several interest-driven learning paths that make coding fun, both inside and outside the classroom:
● **Coding and Game Design:** Your students can use Tynker Workshop, a powerful tool for crafting original programs to make games, stories, animations, and other projects. They can even share their work with other kids in the Tynker Community.
● **Drones and Robotics:** Tynker integrates with connected toys, including Parrot drones and Lego WeDo robotics kits, so kids can see their code come to life.
● **Minecraft:** Tynker integrates with Minecraft so your students can learn coding through a game they love. Tynker offers skin and texture editing, as well as a custom Mod Workshop that lets kids try their original code in Minecraft.

Tynker for Schools

Used in over 90,000 schools, our award-winning platform has flexible plans to meet your classroom, school, or district needs. All solutions include:
- Grade-specific courses that teach visual coding, JavaScript, Python, robotics and drones
- A library of NGSS and Common Core compliant STEM courses that are great for project-based learning
- Automatic assessment and mastery charts for whole schools and individual classes and students
- Easy classroom management with Google Classroom and Clever integration
- Professional training, free webinars and other teacher training resources

Need help getting Tynker started at your school? Contact us to learn more about teaching programming at your school with Tynker!

Help

Need help? Below you'll find answers to frequently asked questions about using Life on Land.

What is Hour of Code?

The Hour of Code is a global learning event in which schools and other organizations set aside an hour to teach coding. No prior coding experience from you or your students is needed! The event is held every December during Computer Science Education Week. You can also organize an Hour of Code year-round. The goal of the Hour of Code is to expand access to computer science education for people of all backgrounds. Learning computer science helps students develop logic and creativity, and prepares them for the changing demands of the 21st century. Tynker has been a leading provider of lessons for the Hour of Code since the event began in 2013. Since then, over 100 million students from 180 countries have finished an Hour of Code.

How do I prepare for Hour of Code?

1. **Familiarize yourself with the material.** After selecting your Hour of Code lesson (e.g., Life on Land), read through the teacher guide and complete the activity before assigning it to students. This will allow you to troubleshoot anything in advance and plan for potential questions from your students.
2. **Get students excited about coding.** Inspire students and get them excited for the Hour of Code event. Here is a link to resources such as inspirational videos

and posters from the Hour of Code website:
https://hourofcode.com/us/promote/resources#videos

3. **OPTIONAL: Sign Up for a teacher account.** Although an account is NOT required, creating a free teacher account will allow you to access teacher guides, answer keys, and tons of additional resources. You'll also be able to create free accounts for your students, monitor their progress, and see their projects.

4. **OPTIONAL: Create student accounts.** From your teacher account, you can easily create free student accounts for all your students. This will allow them to save their projects and progress, so they can continue coding when they get home! Again, this is not necessary to complete an Hour of Code.

5. **OPTIONAL: Print certificates to hand out.** While signed in to your Tynker teacher account, you can print certificates by clicking on a classroom from your teacher dashboard, clicking the "Gradebook" tab, going to "Hour of Code," and clicking the "Print All Certificates" button. This will only print certificates for student accounts assigned to the selected classroom.

How do I open Life on Land?

Have your students go to this URL: tynker.com/hour-of-code/

Who is this activity for?

Life on Land is intended for students in grades 6+ (U.S.) or years 7+ (U.K.) with some coding experience.

Do I need to create Tynker accounts for my students?

No, you do not need to create Tynker accounts for your students.

What devices do I need?

Computers, laptops, or Chromebooks (1 per student) with an internet connection.
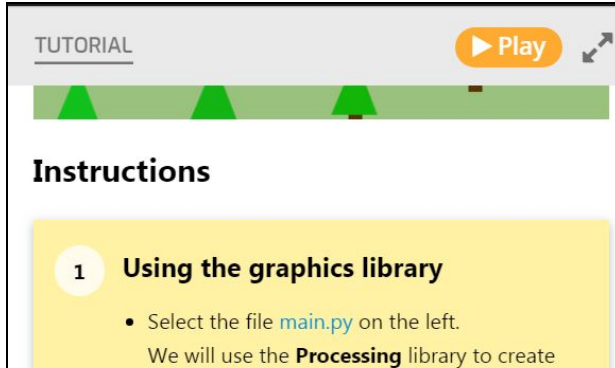
What will my students learn?

Students will combine creativity, originality, Python syntax, and coding concepts to create a Life on Land project. In this process, students will develop debugging and logical reasoning skills. Additionally, students will learn about the United Nations Sustainable Development Goals, specifically *Goal 15: Life on Land.*

How can Tynker help me manage my Hour of Code?

Tynker has several free features for registered teachers that will help you manage your Hour of Code. If you set your students up with a Tynker classroom, you will be able to track their progress and print Hour of Code completion certificates for them to keep.

What does the tutorial include?

The tutorial includes several features and resources to help your students get started! Here's what you will find:

- Step-by-step directions to help your students create a Life on Land project using Python.
- 3 different Bonus Challenges, with help to get started.
- A "Processing Functions Reference Guide" that includes a list of functions with examples and descriptions.
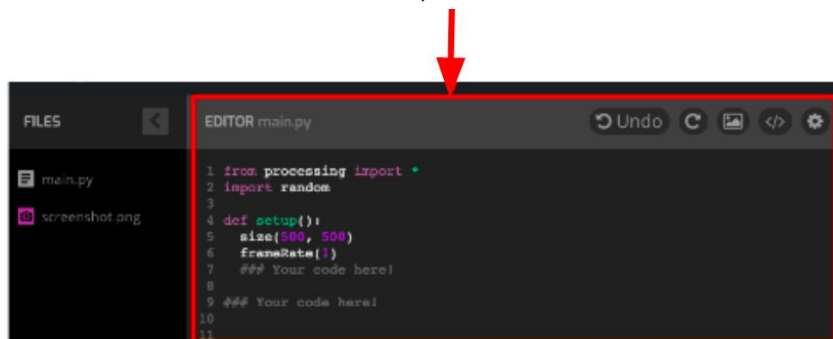
How do my students run their code?

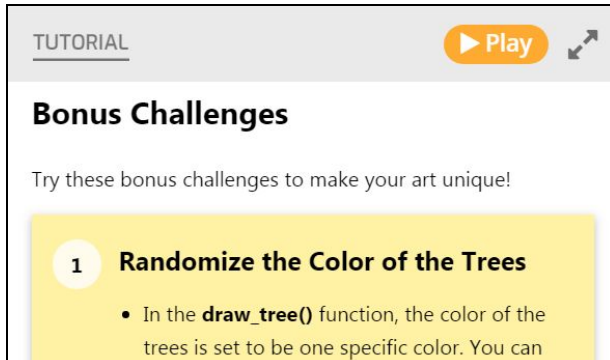Tell students to select the "play" button:

Where do my students edit their code?

This is the code editor section, where students can make changes to their code:

How do my students customize their project?

- Tell students to scroll down to the "Bonus Challenges" section of the tutorial, which includes directions to help your students make their project unique! Here's what it looks like:
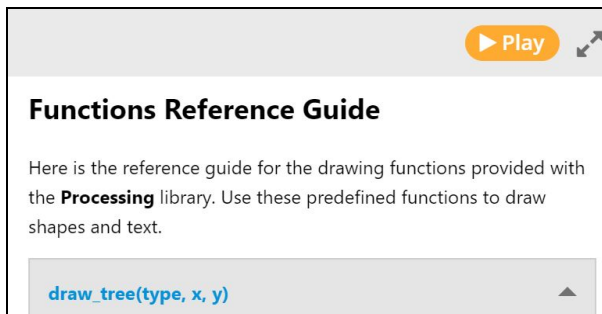
How can I help my students understand their code?

- Check that students are carefully reading the tutorial, which describes each step of the Life on Land project.

- Tell students to read the comments (noted with the "#") symbol. Here's an example that tells students where to type their code:

- If students need help with the syntax, tell them to use the code in the "Functions Reference Guide" as a reference:

- By the end of the project, their code should look similar to this (please see image on next page):

```python
 1 from processing import *
 2 import random
 3
 4 # This function runs once at the beginning
 5 def setup():
 6   size(800, 500) # Creates the screen
 7   frameRate(30) # Sets the frame rate of the game
 8
 9   background(155, 193, 127) # Draws the background color
10   textSize(50) # Sets font size
11   fill(0) # Sets font and draw color
12   text("Click to plant trees!", 170, 100) # Writes given text at given (x, y)
13
14 # This function is run whenever the mouse is pressed down
15 def mousePressed():
16   drawTree(random.randint(0, 2), mouse.x, mouse.y)
17   drawTree(random.randint(0, 2), mouse.x+random.randint(-80,80), mouse.y+random.randint(-80,80))
18   drawTree(random.randint(0, 2), mouse.x+random.randint(-80,80), mouse.y+random.randint(-80,80))
19
20 #####################
21 # draw_tree(type, x, y)
22 #
23 # This function will draw a tree of the given type at (x,y)
24 # There are three types of trees:
25 # Circle, Triangle, and Multi-Triangle
26 #####################
27 def drawTree(type, x, y): # Draws one of three types of trees at the given (x, y)
28   noStroke()
29   if type == 0: # Circle Tree
30     fill(84, 54, 4)
31     rect(x, y, 12, 40)
32
33     fill(19, 175+random.randint(-30, 30), 5+random.randint(-30, 30))
34     ellipse(x+6, y, 50, 50)
35
36   elif type == 1: # Triangle Tree
37     fill(84, 54, 4)
38     rect(x, y, 12, 40)
39
40     fill(19, 175+random.randint(-30, 30), 5+random.randint(-30, 30))
41     triangle(x + 6, y - 20, x + 25, y + 30, x - 15, y + 30)
42
43   elif type == 2: # Multi Triangle Tree
44     fill(84, 54, 4)
45     rect(x, y, 11, 40)
46
47     fill(19, 175+random.randint(-30, 30), 5+random.randint(-30, 30))
48
49     triangle(x + 6, y, x + 20, y + 30, x-10, y + 30)
50     triangle(x + 6, y - 10, x + 20, y + 20, x-10, y + 20)
51     triangle(x + 6, y - 20, x + 20, y + 10, x-10, y + 10)
52
53 def placeTrees(number, x_lo, x_hi, y_lo, y_hi): # Randomly draws trees in the given x and y range
54   y_coordinates = [random.randint(y_lo, y_hi) for i in range(number)]
55   y_coordinates.sort()
56   for i in range(number):
57     drawTree(random.randint(0, 2), random.randint(x_lo, x_hi), y_coordinates[i])
58
59 run()
```

How can I contact the Tynker support team?

If you have any issues or questions, send us an email at support@tynker.com.