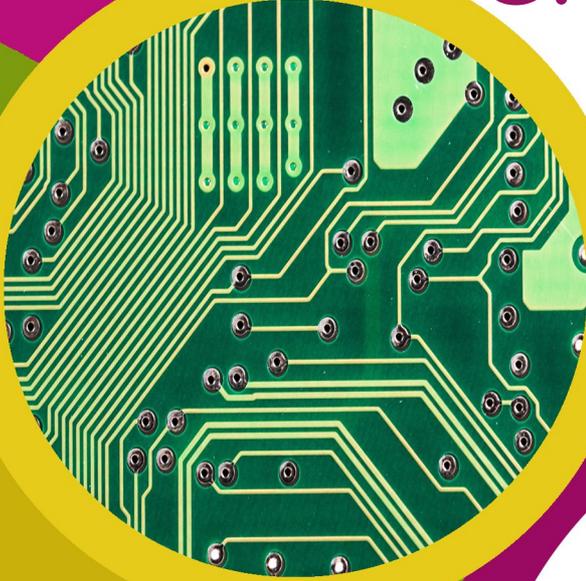


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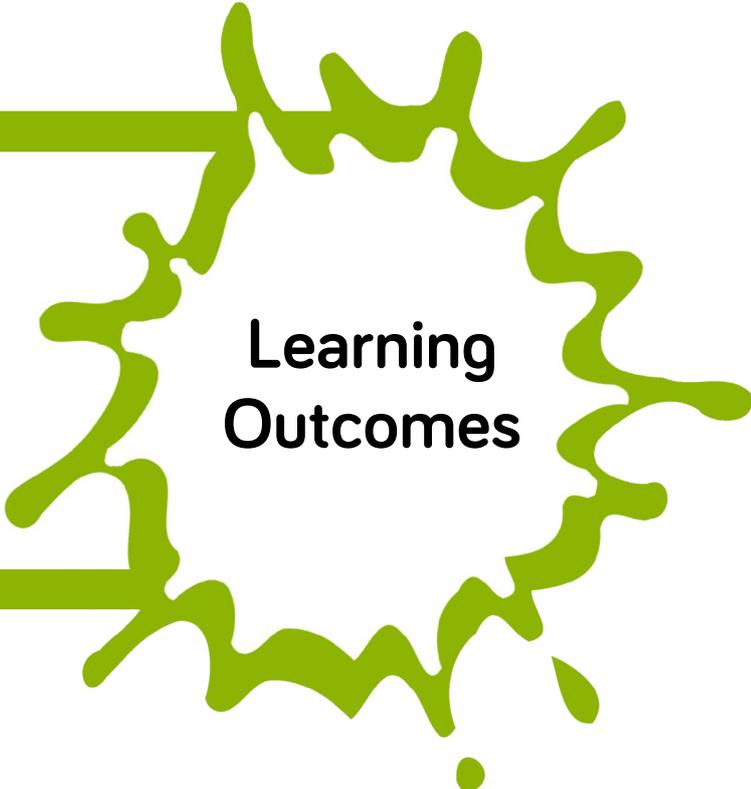
## Greenfoot Ecosystems Workbook



## Overview

This workshop aims to develop your knowledge of object oriented programming, focusing on the Java-based Greenfoot environment. Through creating a series of games, students will strengthen their understanding of how object oriented programs are structured.

1. Good understanding of Ecosystems and Habitat.
2. Basic experience of programming in Greenfoot.



## Learning Outcomes

## Attendee Prerequisites

1. No previous Greenfoot experience required.

## What are Food Chains?

In your own words, write down what you think a food chain is:

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## Energy Source

What is the ultimate source of energy for most living things?

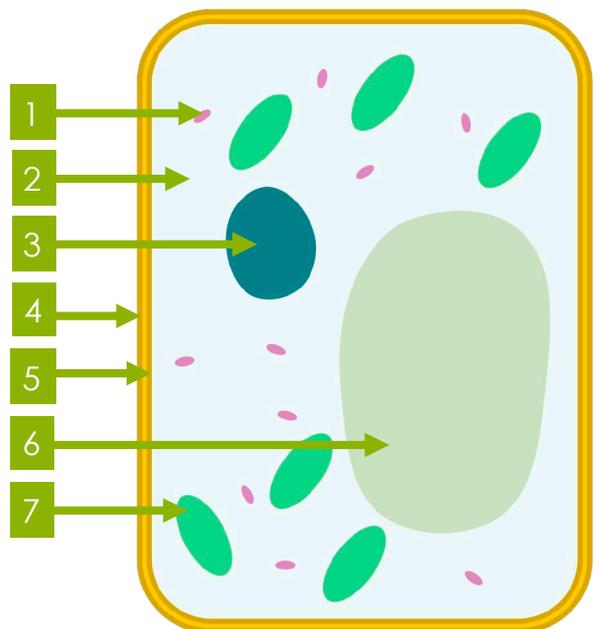
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What kind of cell is shown below?

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Extension: What do the labels 1-7 correspond to in the diagram?

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_



## What is a Producer?

In your own words, write down what you think a producer is:

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## Actors and World

For the Super Mario example, list in the table below which objects you think are part of the Actor class and which objects you think are part of the World class?

Actor	World

## Name the Process

What is the name of the process through which a **producer** makes food?

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Extension: Discuss how this process works.

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## Consumer Positions

The grasshopper, mouse and owl are all consumers in this food chain. Match the consumer position to the correct animal in the chain:

Tertiary  
consumer

Primary  
consumer

Secondary  
consumer

Producer



Grass



Grasshopper



Mouse



Owl

## Food Chain

Group the organisms shown into **producers, consumers, herbivores** and **carnivores**.

Form some example food chains from the provided organisms.

Group the organisms shown into **primary consumers, secondary consumers, tertiary consumers**.

## Food Web

Using the food web shown in the slides:

- Create a food chain with a length of three.
- Create a different food chain with the length of four.
- What is the longest food chain possible in this food web?

## Energy Transfer

In a food chain only around 10% of the energy is passed onto the next level.

Say we have a producer (mushrooms) whose total energy intake is 5000kJ (kilojoules). What amount of energy would be passed on to the next consumer if it were eaten?

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## Object Interaction: Step 1

We will now attempt to program our game objects to interact with each other. For example, what if we want to make it so that if two primary consumers touch then they produce an offspring.

To do this, in your 'Habitat' add the following code:

```
public void createPrimaryConsumer()
{
    PrimaryConsumer newMouse1 = new PrimaryConsumer();
    addObject(newMouse1, getRandomNumber(3,5), getRandomNumber(3,5));
}
```

This will create a method in our Habitat subclass that will allow us to create new PrimaryConsumer objects.

## Object Interaction: Step 2

In your PrimaryConsumer subclass, add the following highlighted code:

```
import greenfoot.*;

/**
 * Write a description of class PrimaryConsumer here.
 *
 * @author (your name)
 * @version (a version number or a date)
 */
public class PrimaryConsumer extends Actor
{
    /**
     * Act - do whatever the PrimaryConsumer wants to do. This method is called whenever
     * the 'Act' or 'Run' button gets pressed in the environment.
     */

    private int REPRODUCE_DELAY = 7;
    private int reproduceTimer = 0;

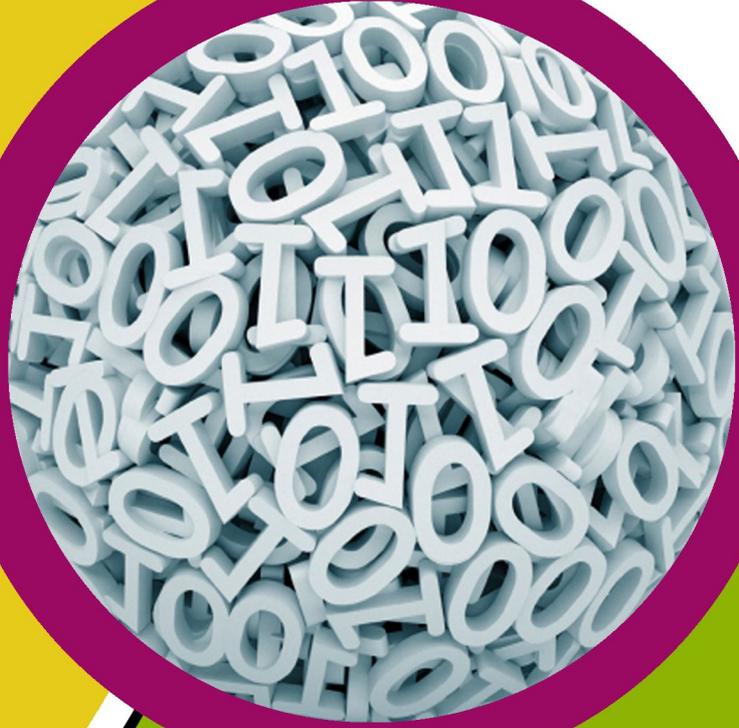
    public void act()
    {
        // Add your action code here
        turn(Greenfoot.getRandomNumber(4*90));
        move(Greenfoot.getRandomNumber(2));
        if (isTouching(Producer.class))
        {
            removeTouching(Producer.class);
        }

        // Delay
        if (reproduceTimer > REPRODUCE_DELAY && isTouching(PrimaryConsumer.class))
        {
            Habitat habitat = (Habitat)getWorld();
            habitat.createPrimaryConsumer();
            reproduceTimer = 0;
        }

        reproduceTimer = reproduceTimer + 1;
    }
}
```

When two PrimaryConsumer objects touch, they will call a method called 'createPrimaryConsumer()' and will automatically instantiate and add a new PrimaryConsumer object to the world.

The variables 'REPRODUCE\_DELAY' and 'reproduceTimer' delay how quickly offspring can be made.



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