

# Destination 2018: Sustainability Lesson Plan

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CAMPUS: EAST

DISCIPLINE: MATHEMATICS

The goal of this lesson plan is to help you decide why and where you will infuse sustainability to improve student learning. Remember that sustainability is not an "add-on" content area; rather, sustainability can be integrated into already existing lessons as in-class examples of concepts and as a context for activities and problem sets that promote critical thinking.

## Week 1: Needs Assessment

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This week you will write a needs assessment for your lesson, learn about SDG goals, and identify 3 goals that could align with your course and topic.

### Needs Assessment

#### 1. Write your Needs Assessment:

*(examples)*

*Many students don't value algebra or advanced mathematics because they don't necessarily use it in their everyday lives. Students challenge their teachers to explain why they need to learn math, yet they cringe at the thought of word problems (real life applications). Students have a hard time creating and solving models of real life data.*

#### 2. Explain why you think infusing sustainability will help this need:

*(examples)*

*If students value sustainability, they may take an interest in its mathematical applications. I can use sustainability applications to help students see the value in algebra.*

#### 3. State where (course or area) you are infusing sustainability and the topic:

*(examples)*

*I would like to infuse a sustainability activity or project into MAT1033c.*

### Research SDGs

Visit the [Sustainable Development Knowledge Platform](#) to research the Sustainable Development Goals.

4. Choose at least 3 of the SDGs of interest that could align with your topic and share why:  
([examples](#))

*8: Decent Work and Economic Growth*

*10: Reduce Inequalities*

*13: Climate Action*

*I chose these three because they span the 3 pillars of sustainability. I think these three are relatable to the traditional college student.*

## Week 1 Reflection

5. Now that you have completed this week's portion of the template, reflect on the following:

- I'm excited about...finding resources to help me build an active learning lesson that applies one or all three of my chosen SDGs.
- I have questions about...the articles I found in AASHE. They want me to purchase access!

## Week 2: Learning Outcomes/Research

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This week you will write the student learning outcome for your lesson, explore lesson plan examples, look at a variety of classroom assessment techniques, and consider how you could incorporate the 3 Pillars of sustainability with a learning activity.

### Student Learning Outcome(s)

The Student Learning Outcome is a statement of what the student will learn or be able to do because of this lesson. For more information on how to write a measurable learning outcome, review the following resources:

[How to write a Student Learning Outcome \(Slides 1 to 5\)](#) | Bloom's Taxonomy Resources - [Bloom's Taxonomy Action Verbs](#), [Bloom's Interactive Graphic](#), [Bloom's Taxonomy of Learning Domains](#)

6. Write your Learning Outcome:  
([examples](#))

*Students will be able to model sustainability data with appropriate equations.*

*Major Topics/ Concepts/ Skills from MAC 1105*

*Applications (such as Curve Fitting, Modeling, Optimization, and Exponential Growth and Decay)*

*Linear, Quadratic, and Rational Functions*

# Sustainability Lesson Plan Samples

Explore the following resources for lesson plan ideas:

- [Sustainability teaching activities across the disciplines](#) (Repository developed by Carleton College)
- Lesson plans organized according to conceptual Sustainability Systems: [Water](#), [Energy](#), [Food](#), [Waste](#), [Landscape & Ecosystem](#), [Supply Chain](#), and [Quality of Life](#) (Developed by ASU faculty)
- [AASHE Curriculum Resources Hub](#) (requires login)

7. Of the lesson plans you've explored, pick 3 and share why you selected those:  
[\(examples\)](#)

*Estimating our Carbon FOODprint. This activity uses data on the carbon emitted from the production of the most common foodgroups and asks students to model the data and make projections by writing, graphing, and solving equations. I selected this activity because it doesn't TELL students whether the model should be linear, quadratic, or other, rather it has them determine this on their own through guided questions. This activity is thorough and doesn't need much adjusting.*

*Plastic Waste Production. This activity uses data on the amount of plastic going into landfills each year. It asks students to model the data and make projections by writing and solving equations. I selected this activity because of the data analysis provided. The student portion of this activity could use some more detailed instructions.*

*Energy Cost of Engine Idling. This activity cites a movement in Tallahassee, FL that city vehicles would have to follow a no-idling policy and asks students to analyze the effects of such a policy. Since I want students to practice modeling, I would likely build them a worksheet to record their data findings. I liked that this activity hypothetically takes place in Florida.*

# Classroom Assessment Techniques

Explore the following resource for Classroom Assessment Techniques:

- [101 Strategies to Demonstrate the Essential Competencies](#) – a college of classroom assessment techniques aligned to the essential competencies of a Valencia educator prepared by Valencia faculty Donna Colwell and Kevin Colwell
- [50 CATs by Angelo and Cross](#)
- [Classroom Assessment Techniques](#) by Northwest Evaluation Association

8. Of the CATs you've explored, pick 3 and share why you selected those:  
[\(examples\)](#)

*Wrapper survey. Give each student a piece of wrapped candy and ask them to hold on to their wrapper. When the time comes, ask them a multiple-choice question (i.e. "Which topic gave you the most trouble today?"), and have them deposit their wrapper in the mini-trash can under their chosen response. Requires pre-printed responses for each mini-can. I think this is fun, quick, and different.*

*Debate. Many sustainability issues are debatable and students might find value in justifying their conclusions to their classmates.*

*Letters Home. I like the idea of asking students to share what they've learned about sustainability with others in their home.*

## 3 Pillars Activity Idea

Review the 3 Pillars Worksheet.

9. Describe an activity that incorporates the 3 pillars:  
([examples](#))

*When introducing our sustainability topic, as a class, we can discuss the social, environmental, and economic impact that our choices have on the topic at hand.*

## Week 2 Reflection

10. Now that you have completed this week's portion of the template, reflect on the following:

- a. I'm excited about...putting it all together.
- b. I have questions about...nothing, right now.

## Week 3: Putting it All Together

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The goal for this week is to create an activity that incorporates the SDG, CAT, and connection to the 3 Pillars of sustainability.

## SDG Selection

11. Choose the SDG that aligns best with your Needs Assessment/Student Learning outcome and explain why:  
([examples](#))

*Responsible Consumption & Production*

## CAT Selection

12. Choose the CAT that aligns best with your Needs Assessment/Student Learning out come and explain why:  
([examples](#))

*Debate.*

*I think a great way to start the activity would be for students to debate their ideas surrounding Responsible Consumption and Production (specifically with regards to the three pillars). After the analysis of data, and conclusions drawn, students could debate their conclusions.*

## 3 Pillars Activity

13. Describe how you will incorporate the 3 Pillars into your activity:

*(examples)*

*Students will debate their ideas and examples surrounding Responsible Consumption and Production and how certain problems and solutions relate to the three pillars.*

## Activity Draft

14. Create a draft of the activity using the SDG, CAT, and 3 Pillars:

*(examples)*

*After an initial introductory presentation on Sustainability, the 3 Pillars, and the SDGs, I will put students into groups of 3-4 and provide the prompts below to talk about in their groups. Then, each group will join the class debate.*

*What do you think Responsible Consumption and Production refer to?*

*Can you think of some examples of Responsible Consumption and Production problems in our society?*

*How can you be more responsible in your consumption and production? Describe some possible solutions to some of the stated examples.*

*Can you describe how these examples effect each pillar?*

15. Explain how the activity aligns with your Needs Assessment/Student Learning Outcome

*(examples)*

*This activity gets students to brainstorm various sustainability problems and solutions before we dive into the math. Hopefully, this will spark their interest, bring out their passions, and help them feel invested in the application we will use for modeling.*

## Week 3 Reflection

16. Now that you have completed this week's portion of the template, reflect on the following:

- a. I'm excited about...trying this out the first time, and expanding it beyond a single lesson.
- b. I have questions about...nada.

## Week 4: Lesson Plan Draft

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This week you will finalize your activity and create directions for students.

17. Prepare a set of instructions on how to facilitate this activity.

*(examples)*

*Answer the following questions:*

What prior knowledge will students need to be successful with this activity?

*Students should have completed their first media assignment (video lesson with notesheets) prior to class.*

What needs to be setup prior to delivering the lesson?

*Short powerpoint on Sustainability, 3 pillars, and SDGs.*

*Student worksheets need to be printed.*

What resources and materials will you need?

*Student worksheets.*

How do you plan to introduce the topic?

*Powerpoint introduction, followed by class debate.*

How will you keep students engaged?

*Students will discuss in groups, debate as a class, work on the application in groups, and again debate their conclusions as a class.*

Step-by-step run of the activity

*Now that you have addressed the questions above, include directions in the draft of your activity*

1. *Introductory presentation on Sustainability, the 3 Pillars, and the SDGs.*
2. *Put students into groups of 3-4 and provide the prompts below to talk about in their groups.*

*What do you think Responsible Consumption and Production refer to?*

*Can you think of some examples of Responsible Consumption and Production problems in our society?*

*How can you be more responsible in your consumption and production? Describe some possible solutions to some of the stated examples.*

*Can you describe how these examples effect each pillar?*

3. *Class debate reflecting on above prompts.*
4. *Introduction to Estimating our Carbon FOODprint.*
5. *Group work on activity.*
6. *Class debate on conclusions.*

## Week 4 Reflection

18. Now that you have completed this week's portion of the template, reflect on the following:

- a. I'm excited about...Seeing how my activity goes with students.
- b. I have questions about...the necessity of this commercial! Eeeeeek. Discomfort.