LESSON TOPIC: Thread 1: Being Awake, Aware, and Alive
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How does descriptive language help us communicate information about nature observations.

STANDARDS: MA Vocational Technical Education Frameworks
2.F Environmental Sampling & Laboratory Services
2.F.01 Conduct environmental field sampling.
2.F.01.01 Keep records using field notebooks.

Objectives: Students will know or be able to...
- read Thoreau’s writing for descriptive language and observations.
- work as a group to create a “found poem.”
- practice careful observation using a field journal.

Assessments and Evidence of Understanding (what will I look/ listen for in my assessments?):
- 1-3 sentence answers to short answer questions in worksheet
- group participation in found poem activity
- highlights or underlines in the reading material

AGENDA: (teaching and learning activities with times)
10 mins: Brief introduction to who Thoreau is and time period.
10 mins: Out loud reading of short descriptive paragraphs from Walden.
20 mins: Silent reading of assigned chapter and journal entry.
10 mins: Time to re-read underline and pick favorite phrases for found poem
20 mins: Group creation of “Found Poem”
10 mins: Reading of group poems.
10 mins: Hand out with short answer questions or closing discussion.

Materials/Advanced preparation/Set Up:
- Sticky notes or note cards
- Copies of the chapter “Winter Animals”
- Copies of handout with short answer questions.

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

<table>
<thead>
<tr>
<th>Time (mins)</th>
<th>What will the teachers be doing/saying?</th>
<th>What will the students be doing/saying?</th>
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<tbody>
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<tr>
<td>Time</td>
<td>Activity</td>
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<tr>
<td>1-10:</td>
<td>Giving a brief background on Thoreau. If multimedia is available it's advisable to use a projector to show images of Thoreau, Walden, and Concord landscapes. Be sure to include time period and publications.</td>
<td></td>
</tr>
<tr>
<td>11-20:</td>
<td>Pick three short paragraphs or groups of sentences from the readings that you feel capture Thoreau’s use of descriptive language. Project them, or pass them out for students to read along. Ask for volunteers to read them aloud. Discuss with the students what about the language specifically is descriptive.</td>
<td></td>
</tr>
<tr>
<td>21-40:</td>
<td>Pass out assigned reading and assignment sheet. Give students time to read silently. Encourage them to underline or highlight descriptive or interesting phrases as they read.</td>
<td></td>
</tr>
<tr>
<td>41-50:</td>
<td>Have students check over highlighted phrase and decide on three favorites to transfer to sticky notes.</td>
<td></td>
</tr>
<tr>
<td>51-70:</td>
<td>Divide students into small groups (5-7 students seems to work well). Monitor group work and ensure full participation of all students.</td>
<td></td>
</tr>
<tr>
<td>71-80:</td>
<td>Have the groups select a spokesperson to read the poem out loud. Teacher may want to photograph or copy down the found poem for further use.</td>
<td></td>
</tr>
<tr>
<td>81-90:</td>
<td>Monitoring students completion of concluding activity of short answer questions from hand out. You may choose to have this activity as a discussion or use the question as formative assessment rather than graded work if you so choose.</td>
<td></td>
</tr>
</tbody>
</table>

**Department:** Environmental Technology  
**Course:** Forest Ecology  
**Teacher:**

**Date assigned:**
How we record our observations of nature with language is important and affects our ability to communicate experiences with other people.

Read the chapter “Winter Animals” in Walden by Henry David Thoreau.

1. Underline or highlight phrases or words that seem descriptive, interesting or you just like. Thoreau often uses long sentences, try not to include phrases of more than 7 words.
2. Using the three sticky notes passed out earlier copy out your three favorite words or phrases.
3. Meet up with your group.
4. Using the sticky notes you have, arrange the words or phrases into a “found poem”. Words or phrases may be repeated or used in multiple lines. Try to make a poem that captures the feeling of the reading.
5. Nominate one person from the group to read the poem out loud to the class.

After the activity answer the following questions on the next page:

1. Where in the reading does Thoreau use observation to describe the winter animals? Give two examples.

2. What senses does Thoreau use to describe his observations?

3. Give an example of a sound observation.

4. Give an example of a visual observation.
5. How could he have used other senses in his observations?

6. From your understanding of the reading is careful observation important to the skill of nature writing? Why or why not?
LESSON TOPIC: Thread 1: Being Awake, Aware, and Alive
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How are careful observations important to scientific understanding?

STANDARDS: MA Vocational Technical Education Frameworks
2.F Environmental Sampling & Laboratory Services
2.F.01 Conduct environmental field sampling.
2.F.01.01 Keep records using field notebooks.

Objectives: Students will know or be able to...
- Practice careful observation using a field journal

Assessments and Evidence of Understanding (what will I look/ listen for in my assessments?):
- Completion of nature journal worksheet
- Participation in group discussion.

AGENDA: (teaching and learning activities with times)
10 mins: Intro to the concept of a nature journal
10 mins: Silent reading of Thoreau’s journal excerpts.
10 mins: Discussion comparing the journal to the chapter “Winter Animals” from Walden (read during previous class).
30 mins: Outdoor time to pick something to observe and write a journal entry about it. Use the nature journal template.
30 mins: Convert the journal entry into a short nature writing essay. (Three paragraphs at least).

Materials/Advanced preparation/Set Up:
- Copies of Thoreau Journal entries from Dec. 12, 16, 17, 18, 19, 20, 23 and Mar. 23 and 27 1846.
- Winter Animal’s chapter from Walden
- Nature journals (I recommend researching the Grinnell Technique to learn the real scientific method of keeping field notes and nature journals)

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

| Time | What will the teachers be doing/saying? | What will the students be |
| 1-10 | Showing and discussing various examples of nature journals (historical examples to modern spreadsheets) |
| 11-20 | Allowing students to read Thoreau’s journal excerpts. |
| 21-30 | Leading discussion comparing Thoreau’s journal excerpts to the Walden reading and to the examples of nature journals from the intro. |
| 31-60 | Leading students to outdoor area for nature journaling activity. Monitoring student progress. Encourage students to pick one item for “close observation.” For example don’t just say “I saw a tree,” describe the height, the width, the shape of the leaves, note if there is insect damage, how much sunlight the tree might receive, note the weather, the cloud cover, etc. Also each student should try to observe one animal. If you don’t live in a rural area there are still animals everywhere, find an ant or a bird to watch. If you’ve got instruments to measure temperature or other abiotic outdoor things bring them along. |
| 61-90 | Return to classroom. Lead the students in effort to convert journal entry to a nature writing piece. Students should now try to use descriptive language to capture the feelings and observations they took in the field. |

**Thoreau Journal Excerpts**

Dec. 12. Friday. The pond skimmed over on the night of this day, excepting a strip from the bar to the northwest shore. Flint’s Pond has been frozen for some time.

Dec. 16, 17, 18, 19, 20. Pond quite free from ice, not yet having been frozen quite over.

Dec. 23. Tuesday. The pond froze over last night entirely for the first time, yet so as not to be safe to walk upon.

March 26, 1846. The change from foul weather to fair, from dark, sluggish hours to serene, elastic ones, is a memorable crisis which all things proclaim. The change from foulness to serenity is instantaneous. Suddenly an influx of light, though it was late, filled my room. I looked out and saw that the pond was already calm and full of hope as on a summer evening, though the ice was dissolved but yesterday. There seemed to be some intelligence in the pond which...

**doing/saying?**

- Listening and taking notes
- Reading silently and taking notes on interesting passages.
- Joining in group discussion.
- Observing animals and plants in a natural setting. Writing down observations in journal template. Students should be encouraged to draw, write, use their senses and use instruments to measure outdoor information. Students should not move too fast on this. Careful observation includes patiences.
- Writing at least three paragraphs, converting journal observations into nature writing.
responded to the unseen serenity in a distant horizon. I heard a robin in the distance, - the first I had heard this spring, - repeating the assurance. The green pitch [pine] suddenly looked brighter and more erect, as if now entirely washed and cleansed by the rain. I knew it would not rain any more. A serene summer-evening sky seemed darkly reflected in the pond, though the clear sky was nowhere visible overhead. It was no longer the end of a season, but the beginning. The pines and shrub oaks, which had before drooped and cowered the winter through with myself, now recovered their several characters and in the landscape revived the expression of an immortal beauty. Trees seemed all at once to be fitly grouped, to sustain new relations to men and to one another. 'There was somewhat cosmical in the arrangement of nature. O the evening robin, at the close of a New England day! If I could ever find the twig he sits upon! Where does the minstrel really roost? We perceive, it is not the bird of the ornithologist that is heard,-- the Turdus migratorius.

The signs of fair weather are seen in the bosom of ponds before they are recognized in the heavens. It is easy to tell by looking at any twig of the forest whether its winter is past or not.

We forget how the sun looks on our fields, as on the forests and the prairies, as they reflect or absorb his rays. It matters not whether we stand in Italy or on the prairies of the West, in the eye of the sun the earth is all equally cultivated like a garden, and yields to the wave of an irresistible civilization.

This broad field, which I have looked on so long, looks not to me as the farmer, looks away from me to the sun, and attends to the harmony of nature. These beans have results which are not harvested in the autumn of the year. They do not mind, if I harvest them, who waters and makes them grow? Our grainfields make part of a beautiful picture which the sun beholds in his daily course, and it matters little comparatively whether they fill the barns of the husbandman. The true husbandman will cease from anxiety and labor with every day, and relinquish all claim to the produce of his fields.

The avaricious man would fain plant by himself. A flock of geese has just got in late, now in the dark flying low over the pond. They came on, indulging at last like weary travellers in complaint and consolation, or like some creaking evening mail late lumbering in with regular anserine clangor. I stood at my door and could hear their wings when they suddenly spied my light and, ceasing their noise, wheeled to the cast and apparently settled in the pond.

March 27. This morning I saw the geese from the door through the mist sailing about in the middle of the pond, but when I went to the shore they rose and circled round like ducks over my head, so that I counted them, - twenty-nine. I after saw thirteen ducks.
LESSON TOPIC: Thread 5: Living in Nature
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How were Thoreau’s observations and experimental living scientific?

STANDARDS: MA Vocational Technical Education Frameworks
2.B.01 Explain concepts fundamental to Environmental Systems and society.
2.B.01.01 Define the major goals of Environmental Science.
2.F Environmental Sampling & Laboratory Services
2.F.01 Conduct environmental field sampling.
2.F.01.01 Keep records using field notebooks.

Objectives: Students will know or be able to...
- explore Thoreau’s Kalendar and understand how his journal fed into the calendar

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
- completion of weekly data sheets
- completion of short answer questions

AGENDA: (teaching and learning activities with times)
30 min: Intro to seasons and the study of Phenology. (power point, what causes the seasons)
20 mins: Intro and exploration of The Kalendar Project. This is hard to understand well on your own, I suggest picking a month and walking the students through Thoreau’s observations as a group on an overhead projector.
20 mins: Students explore calendar project on their own, answering short answer questions and linking through to journals and writings of Thoreau.
20 mins: using class data instruments or online weather resources teach students how to gather daily weather observations.
- One month (at least): Observe daily temperature, wind, and leaf status. Feel free to add other categories.
- Try to make this a quick routine in your class, taking no more than 5-10 minutes of your lesson time. Alternatively you could assign this for HW.

Materials/Advanced preparation/Set Up:
- The Kalendar Project, Thoreau’s Kalendar online and digitized manuscripts
- NOAA National Centers for Environmental Information, Climate Data Online
- National Weather Service

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

<table>
<thead>
<tr>
<th>Time</th>
<th>What will the teachers be doing/saying?</th>
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</table>

<p>| What will the students be doing/saying? |</p>
<table>
<thead>
<tr>
<th>1-30</th>
<th>Showing powerpoint <a href="https://docs.google.com/presentation/d/1ILe6cgBQSe60cx9cgTYPAnYoRu2OVrjuzsqbUMv_Vcg/edit#slide=id.p">https://docs.google.com/presentation/d/1ILe6cgBQSe60cx9cgTYPAnYoRu2OVrjuzsqbUMv_Vcg/edit#slide=id.p</a></th>
</tr>
</thead>
</table>
| 31-50 | Showing selected portions of The Kalendar Project and leading students through a discussion. Important points to cover:  
1. How to read the Kalendar (columns are years, rows are phenomena)  
2. Manuscript vs digitized information  
3. How to use footnote and hotlinks to Journals and Writings.  
Monitoring students use of technology. Answering questions, and directing the use of Kalendar project resources.  
Explaining how to use weather instruments in available or showing how to gather daily weather data from the NOAA online resources. Modeling filling out day one of the Daily Observation Sheet |
| 51-70 | |
| 70-90 | Using classroom resources (computer lab, iPads or Chromebooks) exploring the Kalendar individually or in pairs and answering worksheet  
Copying down data into personal Observation Data Sheet.  |
| ng? | Taking notes  
Viewing Kalenda, participating in discussion |
Please explore the assigned section of the Kalendar online and answer the following questions with full sentences.

1. Which is easier for you to read the manuscript or the digitized Kalendar?

2. How many years does your calendar page span?

3. Give an example of an observation on the Kalendar that is linked to a journal entry.

4. Which date is it linked to and what is the journal entry?

5. Which is easier to understand, the journal observation or the Kalendar entry?
6. Which would be easier to make a graph from, the journal observation or the Kalendar entry?

Daily Observations

<table>
<thead>
<tr>
<th>Date</th>
<th>1/1/20</th>
<th>1/2/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precipitation type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precip amount</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf status (you could measure leaf growth here if you like)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LESSON TOPIC: Thread 5: Living in Nature
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How can we view past and present climate data?

STANDARDS: MA Vocational Technical Education Frameworks
2.B.01 Explain concepts fundamental to Environmental Systems and society.
2.B.01.01 Define the major goals of Environmental Science.
2.F Environmental Sampling & Laboratory Services
2.F.01 Conduct environmental field sampling.
2.F.01.01 Keep records using field notebooks.

Objectives: Students will know or be able to...
- create their own Kalendar from field journal observations

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
- completion of weekly data sheets
- completion of aggregate Kalendar

AGENDA: (teaching and learning activities with times)

- 20 mins. Modeling how to look up past data and create the Kalendar
- 30 mins. Sort through daily observations to find the extremes and note them with date and month on the Kalendar. Your current year should be the column furthest to the right.
- 40 mins. Look up past climate data from the NOAA Climate Data Online resource or the Statuses of Spring website. Find the data for the past 4 years that correspond with the time period of your observations.

Materials/Advanced preparation/Set Up:
- Statuses of Spring, the National Phenological Network
- NOAA National Centers for Environmental Information, Climate Data Online
- The Kalendar Project, Thoreau’s Kalendar online and digitized manuscripts
- Kalendar Template
- Access to an outdoor thermometer or other weather instruments in class

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

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</table>
Show students how to access past weather data on the Climate Data Online Portal (for younger classes or if you pressed on time you can pre-print this data. However, it’s useful computer skill so I encourage the students to look up data on their own if possible)

Show students how to look through their own daily observation sheets to find the extremes for each event and record it in the Kalendar. If you have extra time you could also digitize all the observation sheets and teach them how to find these extremes with spreadsheet functions.

Monitor student use of online data resources and answer questions as they try to fit into Kalendar

Looking up climate data for the phenomena they have included in their Kalendar

Looking through their own data sheets and identifying extremes or first instances of data.

Looking through online data for local phenological info from the past 4 years.

### Your Own Personal Kalendar

<table>
<thead>
<tr>
<th>Category</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>First freeze</td>
<td>day/month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First thaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First leaf</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Winds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Temp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest Temp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild Card</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
LESSON TOPIC: Thread 5: Living in Nature
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How can careful observation reveal important trends?

STANDARDS: MA Vocational Technical Education Frameworks
2.B.01 Explain concepts fundamental to Environmental Systems and society.
2.B.01.01 Define the major goals of Environmental Science.
2.F Environmental Sampling & Laboratory Services
2.F.01 Conduct environmental field sampling.
2.F.01.01 Keep records using field notebooks.

Objectives: Students will know or be able to…
- analyze the Kalendar for environmental trends.

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
- trend graphs and analysis

AGENDA: (teaching and learning activities with times)
20 mins: Model how to create trend graphs from data. The National Phenological Network has some good graphs on their portal for trends.
50 mins: Help students create one graph per phenomena of their Kalendar
20 mins: Students create analysis paragraph of their graphs and observation data

Materials/Advanced preparation/Set Up:
- Statuses of Spring, the National Phenological Network
- NOAA National Centers for Environmental Information, Climate Data Online
- The Kalendar Project, Thoreau’s Kenldar online and digitized manuscripts
- Kalendar Template
- Access to an outdoor thermometer or other weather instruments in class

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

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</tbody>
</table>
Showing how to create graphs of trends (when line, bar, histograms and scatter plots are most appropriate). Show online graphs representing climate data

Helping students create graphs. Each student or student group will need access to either a compute resources such as excel or Google Sheets, or you will need to distribute graph paper.

Helping students discuss their analysis. This is an important step of the scientific process and a standard section of a scientific report. The graphs are the analysis section, now we discuss them. What do the trends mean? What do we think are possible causes? Have the students answer the short answer questions below.

<table>
<thead>
<tr>
<th>Environmental Technology</th>
<th>Ms. Gallant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course:</strong> Forest Ecology</td>
<td><strong>Date assigned:</strong></td>
</tr>
<tr>
<td><strong>Assignment:</strong> The Kalendar (part 3)</td>
<td><strong>Points:</strong></td>
</tr>
<tr>
<td><strong>Goal:</strong> Discuss graphs and analysis of Kalendar data</td>
<td><strong>Due date:</strong></td>
</tr>
</tbody>
</table>

1. Create one graph per phenomena in your Kalendar.

2. What are three trends your data reveals? (ie. is first frost happening earlier each year? Is March always the windiest month?)

3. Chose one trend. What do you think is the possible cause or causes of this trend?
4. Choose one cause and design a possible experiment to test this cause?
   a. Write out your experimental hypothesis statement. Remember this statement should be in the format of “If, then.”

   b. List your required materials, time, location, and measurements and anything else you would need to conduct this experiment. Be creative and don’t limit yourself to classroom resources. If had unlimited resources, what would be the best way to conduct this experiment.
LESSON TOPIC: Thread 4: Living in Society
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: Where does Thoreau fit in the history of the American Environmental Movement?

STANDARDS:
2.B Environmental Systems
2.B.01 Explain concepts fundamental to Environmental Systems and society.
2.B.01.01 Define the major goals of Environmental Science.
2.B.01.03 Distinguish among the roles of conservation, preservation and multiple use management practices.
2.B.01.04 Differentiate between renewable and non-renewable resources.
2.B.01.06 Define sustainability as it relates to the economy, environment and society (e.g. sustainable agriculture, aquaculture, environmental justice, and environmental ethics).

Objectives: Students will know or be able to…
- explain the significance Thoreau’s writing had on later generations of scientists and environmental thinkers.
- understand the difference between conservation and preservation
- research a national park and create a national park poster

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
- completion of national park poster project (rubric attached)

AGENDA: (teaching and learning activities with times)
30 mins: lecture on the history of conservation in America and the key figures involved.
60 mins: students research a national park and create a poster.

Materials/Advanced preparation/Set Up:
- access to the internet for students
- power point on the History of Nature Writing

SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

<table>
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<tr>
<th>Time</th>
<th>What will the teachers be doing/saying?</th>
<th>What will the students be doing/saying?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-30</td>
<td>Talking about the historical context of conservation and the ecological movement</td>
<td>Taking notes</td>
</tr>
<tr>
<td>31-60</td>
<td>Helping students choose a national park and create a</td>
<td></td>
</tr>
</tbody>
</table>
Researching a national park and creating a poster.

<table>
<thead>
<tr>
<th>Name of Park</th>
<th>State</th>
<th>Region</th>
</tr>
</thead>
</table>

Abiotic characteristics of your park (temp, climate, soil type, rain fall etc)

Biotic characteristics of your park: 4 examples (typical animals, typical vegetation)
Human factors (how many visitors a year, what is the history of the development, has the park moved?)

<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>Course:</strong> Forest Ecology</td>
<td><strong>Date assigned:</strong></td>
</tr>
<tr>
<td><strong>Assignment:</strong> National Park Profile Poster</td>
<td><strong>Points:</strong></td>
</tr>
<tr>
<td><strong>Goal:</strong> To create a promotional poster of a National Park.</td>
<td><strong>Due date:</strong></td>
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</tbody>
</table>

Once you have created a graphic organizer profile of your park, use some of that information to create a promotional poster to convince tourists to visit your park. You can make a digital poster in google slides or a physical one using paper and craft tools around the classroom.

The poster should include the following information:
1. basic information about your park (location, name)
2. three abiotic physical characteristics
3. Four examples of biotic characteristics
4. Three facts about the human interactions in your park.

Your poster should be visually oriented with attractive pictures of the park and few words. Think of infographics, charts, bullet points or other visual ways to explain your information.

You will be graded with the attached rubric:
LESSON TOPIC: Thread 7: Practising Simplicity
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How did Thoreau try to live in a more sustainable way?

STANDARDS
2.B Environmental Systems
2.B.01 Explain concepts fundamental to Environmental Systems and society.
2.B.01.01 Define the major goals of Environmental Science.
2.B.01.03 Distinguish among the roles of conservation, preservation and multiple use management practices.
2.B.01.04 Differentiate between renewable and non-renewable resources.
2.B.01.06 Define sustainability as it relates to the economy, environment and society (e.g. sustainable agriculture, aquaculture, environmental justice, and environmental ethics).

Objectives: Students will know or be able to…
-Compare excerpts from the chapter “Economy” in Walden to modern zero waste lifestyle blogs.
-Create their own blog post about one sustainable choice they choose to make.

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
-Completion of blog post about sustainable choice

AGENDA: (teaching and learning activities with times)
10 mins: intro to Thoreau’s efforts to live more simply at Walden. Show pictures of his Walden House and the surrounding area. (if possible you could schedule a field trip to view the actual area)
20 mins: Time to read excerpts from Walden, specifically the sections relating to what he built his house of and how much it cost.
20 mins: read zero waste blog posts.
10 mins: discussion comparing and contrasting the modern zero waste movement with the Thoreauvian quest for simplicity. I suggest using a pedagogical method like a group mind map, or compare contrast chart on the board.
30 mins: Time to choose one sustainable practice that the student hopes to adopt. Have them write a blog post telling others how they did what they did and why. This can either be done as an “imaginary” post. Or it can be done several weeks later after the student has actually tried the sustainability practice.

Materials/Advanced preparation/Set Up:
Tiny House Life Style blog: https://thetinylife.com/what-is-the-tiny-house-movement/
- no plastic straws
- using reusable grocery bags
- avoiding take out containers
- avoiding plastic water bottles
- starting to compost food scraps
- starting to recycle
- switching to LED light bulbs
- shopping for clothing at thrift stores

**SCRIPT OF TEACHING AND LEARNING ACTIVITIES:**

<table>
<thead>
<tr>
<th>Time</th>
<th>What will the teachers be doing/saying?</th>
<th>What will the students be doing/saying?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>Background on Thoreau’s Walden house and his efforts to live “simply.” Aka it’s hermitage not a wilderness experience. Show pictures of Walden and the house if at all possible.</td>
<td>Listening and taking notes</td>
</tr>
<tr>
<td>11-30</td>
<td>Silent reading of excerpts from the chapter Economy in Walden.</td>
<td>Reading and taking notes</td>
</tr>
<tr>
<td>31-50</td>
<td>Reading of zero waste blog posts. You can do this together on the projector or allow students to explore links on their own via classroom technology.</td>
<td>Reading or following along with overhead projector.</td>
</tr>
<tr>
<td>51-60</td>
<td>Leading discussion on sustainable choices and helping students decide on one they will choose to enact or write about</td>
<td>Participating in class discussion. Researching sustainable choices they can make.</td>
</tr>
<tr>
<td>60-90</td>
<td>Helping students compose a blog post about their sustainable choice. The post should include the following information.</td>
<td>Researching a writing a blog post. This can be done on an actual blogging platform, or something like Google Slides for ease of grading.</td>
</tr>
</tbody>
</table>
LESSON TOPIC: Thread 5: Living in Nature
UNIT’S ESSENTIAL QUESTION: How did Thoreau’s writing and work influence the American Environmental movement?
DAILY ESSENTIAL QUESTION: How did Thoreau use his knowledge of surveying to better understand the natural world?

STANDARDS:
2.D Mapping and Geospatial Analysis
2.D.01 Navigate local terrain using industry practices and techniques.
2.D.01.01 Describe the technology of data acquisition through remote sensing.
2.D.01.02 Interpret topographic maps.
2.D.01.03 Utilize map coordinate systems.
2.D.01.04 Utilize a compass.
2.D.01.05 Utilize a Global Positioning System (GPS) Unit.
2.D.02 Utilize technologies and resources associated with effective land use planning.
2.D.02.01 Create a base map using data such as aerial images, conservation lands, farm land, open space, areas of critical environmental concern (ACEC’s), and vernal pools.
2.D.02.02 Determine and set the scale for the base map of a study area.

Objectives: Students will know or be able to…
- measure Walden on Google Earth
- compare this Thoreau’s survey

Assessments and Evidence of Understanding (what will I look/listen for in my assessments?):
- Completion of personal map of Walden
- completion of short answer worksheet.

AGENDA: (teaching and learning activities with times)
10 mins: Intro to Walden Pond. Show Google Earth Images, Thoreau’s Survey. Project images from the state reservation. Visit the site if possible. The goal is get the students familiar with the layout of the pond and surrounding area.

10 mins: Explain that Thoreau’s “day job” was as a land surveyor. He surveyed many properties and areas in and around Concord. His survey of Walden Pond is often included with the book in print.

Materials/Advanced preparation/Set Up:
- access to Google Earth and classroom technology
- Walden Pond a Reduced Plan 1846 print out
### SCRIPT OF TEACHING AND LEARNING ACTIVITIES:

<table>
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<tbody>
<tr>
<td>0-10</td>
<td>Explaining the local are of Walden pond. Show images of Walden throughout the years, how it was built up and then back down. Show current State reservation information.</td>
<td>Viewing photos and asking questions.</td>
</tr>
<tr>
<td>11-20</td>
<td>Explaining Thoreau’s work as a surveyor. Show some examples of his survey work including the survey of Walden.</td>
<td>Listening and viewing survey images.</td>
</tr>
<tr>
<td>50-90</td>
<td>Show students how to use Google Earth to create their own survey of Walden. They tools they will need are the Ruler Tool, and the sub tools Line and Polygon. Show them how to use the correct tools and units.</td>
<td>Measuring Walden in Google Earth.</td>
</tr>
<tr>
<td>Environmental Technology</td>
<td>Ms. Gallant</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td><strong>Course:</strong> Forest Ecology</td>
<td>Date assigned:</td>
<td></td>
</tr>
<tr>
<td><strong>Assignment:</strong> Google Earth Map of Walden</td>
<td>Points:</td>
<td></td>
</tr>
<tr>
<td><strong>Goal:</strong> To measure Walden on Google Earth and Create Printable Map</td>
<td>Due date:</td>
<td></td>
</tr>
</tbody>
</table>
Please answer the following questions as you work.

Thoreaus uses the unit “rod” as unit of length and area. When using it as area he really means “square rods.” Use online resources to look up the “rod” and convert it to standard units.

1. How many yards is rod?

2. How many feet is a rod?

3. How many square rods are in an acre?

4. What is the area of Walden according to Thoreau? (just copy the units he uses)

5. Convert this number to decimal acres. (hint your numerator should be the square rods Thoreau measured and your denominator should be the number of square rods in an acre. The result is your decimal portion of an acre.)

6. What is the greatest length of Walden according to Thoreau?

7. Convert this length into feet.

Using the Ruler tool in google complete the following measurements.
8. Measure the greatest length of Walden using the “line” too. Use the unit “feet”. What is your measurement?

9. How does your measurement compare to Thoreaus? (is it longer? Shorter? Really close?) Please calculate the difference in your measurements.

10. Using the Polygon tool measure the circumference of Walden and the area, at the same time. How does your measured area compare to the decimal acres Thoreau measured? (hint you calculated this in question 5)
11. How does your measured circumference compare to Thoreau’s? Can you think of anything that may have changed the circumference of the pond over the years?
What is Phenology?

By Laura Gallant
What is Phenology?

the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life.
What is Causes Seasons?

- All seasons on the earth are driven by solar energy.
- The local timing and temperature and seasonal activity may vary and studying these can reveal information about climatic shifts.
The Earth's axis is always tilted at an angle of about 23.45 degrees.

- June solstice: 92.8 days
- December solstice: 89 days
- Other positions: 93.6 days and 89.8 days
January Perihelion
147.1 million km
91.4 million mi

July Aphelion
152.1 million km
94.5 million mi

© timeanddate.com
Dec. Solstice
June Solstice
Autumnal Equinox
Vernal Equinox

The Sun’s Rays

North Pole

Equator

© timeanddate.com
Polar Vernal Equinox (Sun rises for the first time)
Polar Summer Solstice (sun never sets)
1. Difference between weather and climate

**Weather**: describes the atmospheric conditions in a particular place at a particular time. Example: *today it is hot in Seville*.

**Climate**: refers to atmospheric conditions that exist in a region over a long period of time. Example: *the Mediterranean climate is mild*.
Climate Change Impacts

1) Longer Growing Season
2) Shorter Winters
3) Potential for Summer Drought
4) CO₂ Fertilization
5) Changes in Suitable Habitat
6) Extreme Events
7) Wildfire Risk
8) Forest Pests and Diseases
9) Invasive Plants
1990 Map

After USDA Plant Hardiness Zone Map, USDA Miscellaneous Publication No. 1475, Issued January 1990

2006 Map

National Arbor Day Foundation Plant Hardiness Zone Map published in 2006.

Zone

© 2006 by The National Arbor Day Foundation®
Other Causes of Climatic Shifts

![Graph showing CO2 concentration over time]

- Actual concentration
- Seasonally corrected data

Years: 1960 to 2010

CO2 Concentration, ppm

March 2016
https://www.youtube.com/watch?v=DD_8Jm5pTLk

http://highered.mheducation.com/sites/007299181x/student_view0/chapter2/seasons_interactive.html
The of American Environmentalism

Nature Writing, Nature Art, and Conservation vs Preservation

By Laura Gallant
John James Audubon

- Years: 1785-1851
- Famous for:
  - American ornithologist, naturalist, and painter.
  - Notable for extensive studies documenting American birds and detailed illustrations of birds in natural habitats
- Best known work:
  - Birds of America
Susan Fenmore Cooper

- Years: 1813-1894
- Famous for:
  - Mother of American Nature Writing
  - American writer and amateur naturalist.
  - Illustrated her own writings with water colors
- Best known work:
  - Rural Hours
Henry David Thoreau

- **Years:** 1817-1862
- **Famous for:**
  - Father of American nature writing
  - Father of American Environmentalism
  - American essayist, poet, and practical philosopher, renowned for having lived the doctrines of Transcendentalism as recorded in his masterwork.
- **Best known work:**
  - Walden
John Muir

- Years: 1838-1914
- Famous for:
  - Advocate of Preservation
  - Father of the National Park System
  - Founder of the Sierra Club
  - Scottish-born American naturalist, writer, and advocate of U.S. forest conservation,
  - largely responsible for the establishment of Sequoia National Park and Yosemite National Park, which are located in California.
- Best Known Work
  - Wilderness Essays
Aldo Leopold

- Years: 1887-1948
- Famous for:
  - father of wildlife ecology
  - Father of the United States' wilderness system
  - conservationist, forester, philosopher, educator, writer, and outdoor enthusiast.
  - Among his best known ideas is the "land ethic."
- Best known work:
  - The Sand County Almanac
Rachel Carson

- Years: 1907-1964
- Famous For:
  - Mother of the American Environmental Movement
  - an American marine biologist, author, and conservationist whose book
- Best known work:
  - Silent Spring
Preservation Vs Conservation

Preservation

- Advocate: John Muir
  - Started the Sierra Club
  - Helped establish Yellowstone National Park
- National Park System
  - Preserves land in as natural a system as possible
  - Limits human interaction
  - Allows some recreation
  - No harvest.
  - Goal is to limit industrial profit from federally protected lands

Conservation

- Advocate: Gifford Pinchot
  - Argued with Muir for the use Hech Heche valley
  - Started and was the first chief of the US. Forest Agency
- National Forest System
  - lands owned by the federal government used for recreation
  - Also used for:
    - Logging
    - mining
    - scientific research
Preservation vs Conservation

President Theodore Roosevelt agreed that conservation was the best practice for the majority of federally owned lands.

However, today many National Forests surround National Parks, allowing the two agencies to work together.