

Methods unit plan



October 10, 2016

Courtney Kessler

EDU 410

University of Mary Division of Education

Lesson Plan (Day 1)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, rectangle graph copies, extra unit circle handouts (students should already have their own), notes, pen/pencil

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Have handouts of PowerPoint available for the students.
* Go over what the students already know about sine and cosine (Slide 2)
* What is sine?
  + SOH **=**
* What is cosine?
  + CAH **=**
* Discuss what the parent graph is.
  + The original graph of sine or cosine. {y=sin(x) or y=cos(x)}
* Determine domain and range of both sine and cosine. (Slide 2)
* Define the terms of the unit. (Slide 3)
  + - Amplitude: the distance from the midline to the highest or lowest point of the graph.
    - Horizontal Stretch: making the period larger.
    - Horizontal Shrink: making the period smaller.
    - Horizontal Shift: moving the starting point of the function right or left.
    - Vertical Shift: moving the midline of the function up or down.
    - Midline: horizontal axis that is used as the reference line about which the graph of a trigonometric function oscillates.
    - Period: one full cycle of the trig function.

**10 min Daily Activities:**

* Have students get out unit circle handouts.
* Pass out **two** rectangle graphs to each student, one for the **sine** graph and one for the **cosine** graph.
* Begin with sine. (Slide 5)
* Use one rectangle graph.
  + - 5 focus points:
    - 0 🡪 0
    - 90 🡪 1
    - 180 🡪 0
    - 270 🡪 -1
    - 360 🡪 0
* Have students plot the points and connect the dots.
* Point out that the period = 2, amplitude = 1, and midline = x-axis or x = 0.
* Move onto cosine. (Slide 6)
* Use the second rectangle graph.
  + - 5 focus points:
    - 0 🡪 1
    - 90 🡪 0
    - 180 🡪 -1
    - 270 🡪 0
    - 360 🡪 1
* Have students plot the points and connect the dots.
* Point out that the period = 2, amplitude = 1, and midline = x-axis or x = 0.

**25 min Work Time**

* Take students to the computer lab.
* If some students are still struggling with the concepts of the parent graph of sine and cosine, allow them to use Desmos to show them what the parent graphs look like. (Desmos.com)
* Have them look up the different applications for sine and cosine in the real world.
* **Assignment:** Have students find three different real world applications for sine graphs and/or cosine graphs. Student will then write a paragraph on each application explaining it in more detail. A paragraph consists of three sentences.

**45 min Final Announcements/Clean-Up Time:**

* Announce that the three paragraphs are due at the beginning of class tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The three paragraphs will serve as an assessment for this lesson plan. I will be able to see if students are understanding sine and cosine in the real world when they hand it in tomorrow.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 2)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, circular graph copies, rectangle graph copies, spaghetti, glue

Standards:

* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Objectives:

* Students will understand how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson:**

* Today we will be doing the Spaghetti Lab to emphasize the parent graphs of sine and cosine.
* Students will be paired up so that one student will do the sine graph and one student will do the cosine graph.
  + - **DI:** Pairs will be predetermined by me to ensure that students who are above or on-level will be paired with students who are under level.
* Each student will need a circular graph, a rectangular graph, 8 pieces of spaghetti.
* Each group of two will need a glue bottle.
* Have each group pick a partner to be sine and a partner to be cosine.

**7 min Daily Activities:**

* (Refer to powerpoint)
* **Sine Partner:**
  + On your circular graph, draw a perpendicular line segment from each angle measurement to the **x-axis**.
  + Lay spaghetti down and carefully break at the same length of each line (every 15) all the way around the unit circle (360).
  + Glue each spaghetti piece to the corresponding angle on the rectangle graph.
* **Cosine Partner:**
  + On your circular graph, draw a perpendicular line segment from each angle measurement to the **y-axis**.
  + Lay spaghetti down and carefully break at the same length of each line (every 15) all the way around the unit circle (360).
  + Glue each spaghetti piece to the corresponding angle on the rectangle graph.
* (Show students how the final product should look).
* Before leaving, students will complete and exit slip stating:
  + 2 things they learned
  + 1 thing they are still not sure of

**45 min Final Announcements/Clean-Up Time:**

* Make sure students put all materials back where they belong.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment:

The assessment I will use for this lesson is the completed product of the sine and cosine graphs as well as the exit slip. I will be able to see if the student understands the concepts by looking at the spaghetti graphs. The exit slip will help me to determine what concepts I should touch on again tomorrow before we move too far forward. At the end of the unit, there will be a test.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 3)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, graph paper, notes, pen/pencil, worksheets

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Quickly touch on the definitions of amplitude, period, and increment.
* Referring to the PowerPoint (Slide 12), show students where to look for the amplitude and how to find it.
  + - y = asin(bx-h) + k
    - a = amplitude (vertical stretch/shrink)
    - To find the amplitude, take the absolute value of a.
* Again, (Slide 12), show students how to find the period.
  + - y = asin(bx-h) + k
    - b = horizontal shrink/stretch
    - To find the period, divide 2π by b.
* (Slide 12) Show students how to find the increment.
  + - To find the increment, divide the period by 4.
* Go through all of the examples on PowerPoint as a class (Slide 13).
* Make sure students find amplitude, period, increment, domain, and range for each example.

**25 min Daily Activities:**

* Hand out the worksheets.
  + - **DI:** Group students in groups of students that are fully ready to move on and students that might need a little more help with the parent graphs.
* Students may work together on the worksheet but each student must show their own work and hand in their own worksheet.
* I will walk around and assist the students who have questions.

**45 min Final Announcements/Clean-Up Time:**

* Make sure to announce that the worksheets are due at the beginning of class tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The worksheet will serve as the assessment for this lesson. Once the worksheets are turned in, I will be able to see who needs more help and who is understanding the content.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 4)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, computers or smart devices, extra unit circle handouts (students should already have their own), notes, pen/pencil, scratch paper

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Have students grab a computer on their way into class.
* Instruct students to grab a computer to use for the Quizizz game, a piece of paper for their scratch work, and a pencil or pen.
  + - **DI:** Have paper copies of the quiz for any student that would prefer them.
* Inform students that the Quizizz game has questions focused on everything cover thus far in the unit.

**6 min Daily Activities:**

* ***Teacher Notes:*** (slide 14)
  + - Go to Quizziz.com
    - Log in with username: courtneykessler & password: CourtKess5234
    - Click the ‘My Quizizz’ tab
    - Click on the ’Graphing Sine & Cosine’ game
    - Click ’Play Live’
    - Under game settings, turn off timer and music
    - Click proceed and have students enter the code to join.
    - Start quiz when everyone has joined.
* Have each student log onto the computers and go to the website quizizz.com
* Once they are on the site, have them click *Join a Game* in the top right corner of the page.
* Now they must enter the code to join.
* Next, students enter a nickname. *Be sure to remind them that their nicknames must be appropriate.*
* Once all students have joined, begin the quiz. *Remind students that all work must be shown on the scratch paper to be turned in for a grade.*
* When finished with this quiz, students should play two other Graphing Sine & Cosine quizzes.
* After that, if there is time left in class, students may play whatever quiz they choose. *Don’t mention this until students have completed Sine & Cosine quizzes so that they don’t rush.*

**45 min Final Announcements/Clean-Up Time:**

* Announce that tomorrow we will be covering vertical shifts.
* Homework: read about vertical shifts in the book to prepare for class tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The assessment for this lesson is the quiz. I will look over the results of the class as well as the scratch paper handed in and evaluate if the students are understanding the first section of the unit. If not, I will make time in tomorrow’s lesson to reteach the material.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 5)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, graph paper, notes, pen/pencil, worksheets

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Start by doing the problem **y = 6sin(3x)** on the board.
* Move on to vertical shifts.
* Walk through the definition and explain how to shift the midline (Slide 15).
* “Imagine taking the x-axis and moving it up or down.”
  + - y = asin(bx-h) + k
    - k = vertical shift (midline)
    - If y = asin(bx-h) + k
    - Shift parent graph up k units.
    - If y = asin(bx-h) – k
    - Shift parent graph down k units.
* Go through all of the examples on PowerPoint as a class (Slide 13).
* Make sure students find vertical shift, amplitude, period, increment, domain, and range for each example.

**20 min Daily Activities:**

* Hand out the worksheets.
  + - **DI:** Group students in groups of students that are fully ready to move on and students that might need a little more help with yesterday’s concepts.
* Students may work together on the worksheet but each student must show their own work and hand in their own worksheet.
* I will walk around and assist the students who have questions.

**45 min Final Announcements/Clean-Up Time:**

* Make sure to announce that the worksheets are due at the beginning of class tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The worksheet will serve as the assessment for this lesson. Once the worksheets are turned in, I will be able to see who needs more help and who is understanding the content.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 6)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, graph paper, notes, pen/pencil, worksheets

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Start class with the problem **y = cos(2x) – 4** on the board.
* Move on to going through horizontal shifts.
* Start with the definition and where to find it (Slide 17).
  + - y = asin(bx-h) + k
    - h = horizontal shift
    - If y = asin(bx-h) + k
    - Shift the parent graph to the right h units.
    - If y = asin(bx+h) + k
    - Shift the parent graph to the left h units.
* Move on to the examples on the PowerPoint (Slide 18).
* Make sure students find horizontal shift, vertical shift, amplitude, period, increment, domain, and range for each example.

**15 min Daily Activities:**

* Hand out the worksheets.
  + - **DI:** Group students in groups of students that are fully ready to move on and students that might need a little more help with yesterday’s concepts.
* Students may work together on the worksheet but each student must show their own work and hand in their own worksheet.
* I will walk around and assist the students who have questions.

**45 min Final Announcements/Clean-Up Time:**

* Make sure to announce that the worksheets are due at the beginning of class tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The worksheet will serve as the assessment for this lesson. Once the worksheets are turned in, I will be able to see who needs more help and who is understanding the content.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 7)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, graph paper, notes, pen/pencil

Standards:

* **F.TF.8** Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Objectives:

* Students will be able to prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Put the Pythagorean Identity on the board.
* Split the class up into groups of four.
  + - **DI:** Group students in groups of students that are fully ready to move on and students that might need a little more help with yesterday’s concepts.
* Each group needs to brainstorm a proof of the Pythagorean Identity.
* After about 10 minutes of brainstorming, the class will then be allowed to look up the proof.
* Each group will then walk through their proof to the front of the class.

**40 min Daily Activities:**

* Start by reviewing the unit circle once again.
* Equation for a circle is **x2 + y2 = r2**
* Unit circle has a radius of 1, so the equation for the unit circle is **x2 + y2 = 1.**
* **Proof:**
* x2 + y2 = r2 🡪 equation of a circle
* x2 + y2 = 12 🡪 radius of unit circle is 1
* x2 + y2 = 1 🡪 calculation
* 🡪 substitution
* 🡪 commutative property of addition

**45 min Final Announcements/Clean-Up Time:**

* **No Homework.** Come to class tomorrow ready to learn ☺

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The assessment for this lesson will come tomorrow when the students are to complete a worksheet working with the Pythagorean Identity.  
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 8)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, Worksheets, notes, pens/pencils, extra calculators

Standards:

* **F.TF.8** Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Objectives:

* Students will be able to prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Put the Pythagorean Identity on the board.
* Have students quickly review the different proofs of the Pythagorean Identity as well as the different properties.

**10 min Daily Activities:**

* Hand out worksheet to the students.
  + - **DI:** Group students in groups of students that are fully ready to move on and students that might need a little more help with yesterday’s concepts.
* Allow students to work with a partner but remind them that each student must complete their own worksheet.

**45 min Final Announcements/Clean-Up Time:**

* If you a student does not complete the worksheet in class, he or she must complete it as homework.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The assessment for this lesson will be the worksheet completed in class that focuses on the Pythagorean Identity.   
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 9)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** PowerPoint, review worksheets, notes, pens/pencils, extra calculators

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
* **F.TF.8** Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.
* Students will be able to prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Announce that we are having a test tomorrow and today we will be spending the day working on a review worksheet.

**10 min Daily Activities:**

* Hand out worksheet to the students.
* Allow students to work with a partner but remind them that each student must complete their own worksheet.
* I will be walking around to different groups to make sure they are understanding the concepts and answering any questions they might have.

**45 min Final Announcements/Clean-Up Time:**

* If you a student does not complete the worksheet in class, he or she is encouraged to finish it before the test tomorrow.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The assessment for this lesson will be the test to follow tomorrow.   
Reflection:   
To come after I have taught the lesson.

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Lesson Plan (Day 10)

**Name:** Courtney Kessler

**Grade Level:** 11

**Subject(s) Area:** Algebra II

**Materials Needed:** Copies of tests, extra calculators, extra pencils

Standards:

* **F.TF.1** Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* **F.TF.2** Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* **F.TF.5** Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
* **F.TF.8** Prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Objectives:

* Students will understand the radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
* Students will be able to explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
* Students will be able to model periodic phenomena with specified amplitude, frequency, and midline.
* Students will be able to prove the Pythagorean identity sin2(θ) + cos2(θ) = 1 and use it to find sin (θ), cos (θ), or tan (θ), given sin (θ), cos (θ), or tan (θ), and the quadrant of the angle.

Learning Activities:

(PowerPoint slide/exemplar references) [*Potential student responses*]

**0 min Introduce lesson/review:**

* Have students arrange desks into rows and columns.
* Make sure they all have pencils and calculators and a piece of scratch paper.
* Hand out test and remind students to write their names on them.

**3 min Daily Activities:**

* Students will be taking the unit test.

**45 min Final Announcements/Clean-Up Time:**

* I will be grading the tests tonight and will get them back to you tomorrow.
* Tomorrow we will be starting a new unit.

**50 min Dismiss Class**

* **HAVE A FABULOUS DAY ☺**

Assessment: The assessment for this lesson will be the test to follow tomorrow.   
Reflection:   
To come after I have taught the lesson.