LIPSCOMB UNIVERSITY | Ayers Institute for Teacher Learning & Innovation

Standards-Aligned Lesson Plan

Middle School Mathematics: Edmondson Park (Nashville, TN)

Developed in partnership with the Metropolitan Nashville Arts Commission.

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Planning and Presenting a Mathematics Lesson Based on CCSS

Middle School Math
7th Grade

Section I: Planning

Overview: This section focuses on the elements to consider when planning for a CCSS lesson, such as content standards, mathematical practice standards, clear learning targets, task objectives, new learning for students, anticipated learning challenges, scaffolding, opportunities for differentiation, ways to prompt student thinking through assessing and advancing questions, instructional strategies to be used in the lesson, and materials and resources.

Lesson Topic: Students will examine directly proportional relationships via a lens of artistic creativity.	**Time Frame/Lesson Length:** **One (90 minute) class period**

Math Content Standards	**Mathematical Practice Standards**	**Assessments** ✓ **Formative**
7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction* $^{1/2}/_{1/4}$ *miles per hour, equivalently 2 miles per hour.* 7.RP.2 Recognize and represent proportional relationships between quantities. 7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	• Make sense of problems and persevere in solving them. • Reason abstractly and quantitatively. • Construct viable arguments and critique the reasoning of others. • Model with mathematics • Use appropriate tools strategically. • Attend to precision • Look for and make use of structure.	✓ Compare & Contrast: Students will compare measurements of pieces created by both William Edmonson and Lonnie Holley in order to determine proportionality. ✓ The students will present their solutions to each other. The students will analyze and critique the solutions and provide constructive feedback ✓ Students will be expected to explain which scale drawings are accurate/proportional based the equations that they derive. ✓ The students will be precise about labeling their tables and providing detail in relation to the construction of their

7.RP.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. 7.G.1 Draw construct, and describe geometrical figures and describe the relationships between them		equation. ✓ The students will look for the patterns in the problem in order to create the structure of the equation. ✓ Exit slip will include review of new vocabulary as well as an opportunity to solve to problems in order to prove that students have mastered the day's topic of direct proportionality. Summative assessments regarding this skill would come later in the form of a written assessment.

Planning Element	**Description**
Clear Learning Targets	• I can compute unit rates associated with ratios. • I can recognize and represent proportional relationships between quantities. • I can identify a table as being proportional or not proportional. • I can use the proper formulas to identify proportional relationships. • I can use slope formula.
Task Objectives (steps to reach mastery of clear learning targets)	• Determine whether two quantities are proportional by examining the relationship given in a table, graph, equation diagram, or as a verbal description. • Identify the constant proportionality when presented with a proportional relationship in the form of a table, equation, or diagram. • Write an equation that represents a proportional relationship. • Use words to explain the relevance of a specific point on the graph of a proportional relationship, • Including, but not limited to (0,0) and (1,r).
New Learning	• Determining proportionality • Creating Equations • Slope formula
Anticipated Learning Challenges	• Some students may initially struggle with understanding the formula for slope (m= y2- y1/ x2- x1) .They may try to put the x variable on top. • Some students may struggle with understanding the attributes of a directly proportional

	relationship. In previous years students were taught that same direction automatically means direct. Students must now learn to apply the formula: Y= mx • Some students will not arrive at the correct conclusion because they will not ensure that the equation works for all the points.
Scaffolding opportunities (to address learning challenges)	• The teacher will emphasize that students must read graphs as y per x, in addition to labeling the first two order pairs of all tables. • The teacher will provide students with a variety of opportunities to encourage the learning of the equation for direct proportionality. These opportunities will include practice problems (converting tables to equation), direct application (applying skills to real world examples), and fun acronyms to assist students with the learning (example: the equation for direct is y= mx so an example memory device is "demarco young equals mr extraordinary-- to remember the order of the letters in the equation). • The teacher will have students check to make sure that their equations work with all of the tables and revise as needed.
Opportunities to Differentiate Learning (explain how you address particular student needs by differentiating process, content, or product)	The teacher will group students based on mastery of perquisite skills with groups ranging from 3-4 students. Students will be placed according to ability levels. The groups will remain the same for the duration of the lesson. Students who struggle with note-taking and keeping up with the pace of the lesson will be provided with graphic organizers.
Questioning: Planning to Illuminate Student Thinking	*Assessing questions:* • What can you tell me about the table? What do you see? • Based on the measurements of William Edmonson's piece, what can you tell me about the table? • How do you know that your equation fits the pattern? *Advancing questions:* • How can ratios and proportional relationships be used to determine unknown quantities (scaling up or down). What makes you think that? • How can we determine the accuracy of a given scale? Why do you say that?
Instructional Strategies	• Accountable Talk • Summarizing and Note taking • Cooperative Learning • Generating and Testing Hypothesis Activities include: • Artist Assignment Task • Whole group discussion

	• Small Group Work
Materials and Resources	• LCD Projector • Ruler • Artist Assignment Task • Poster board • Clay, blocks, string, colored pencils, and cardstock will be provided to students as option; however, students will not be limited to such materials. • Exit Slip • Freedom Notes

Section II: Presentation

<u>Overview:</u> This section focuses on the steps involved in presenting the lesson. The lesson presentation is divided into segments, such as "Framing the Lesson," "Exploring the Task," "Sharing, Discussing, and Analyzing Solution Paths" and "Closing the Lesson," and "Extending the Learning." For each of these lesson elements, there is an explanation of the procedure, teacher actions, and student outcomes.

🔔 **Framing the Lesson (10-12 minutes)**		
Detailed Procedure	**Teacher Actions**	**Student Outcomes**
• Students will engage in introductory activity.	• Teacher will distribute Freedom Notes graphic organizer and will introduce the lesson by reading Blurb A and B (included in appendix), while displaying William Edmondson's photo (optional) and image of his art on the overhead screen. • Teacher will guide students in a discussion about Edmondson's *Crucifixion* (image A in the appendix). What does this piece say? What exactly do we see? What does it tell us about Edmondson? What connections can we make to this piece?	• Students will become familiar with Edmondson's art, as well as with the idea of patterns across measurements of like items.
• Students will measure each of the images provided within small groups.	• Teacher will provide students with a small image of *Crucifixion* as well as	• Students will work in groups to determine accuracy of measurements

• Students will engage in class discussion. • Students will complete Freedom Notes graphic organizer.	one approximately, three sizes bigger. • Teacher will have students organize measurements in the table and discuss what they see (hopefully the see a pattern). • Teacher will facilitate discussion: Questions could include: What do you see when you compare each feature? How do the sizes compare? What patterns do you recognize? • Teacher will monitor and observe student measurements and creation of tables on Freedom Notes.	• Students will begin to demonstrate understanding of lesson goals. • Students will be formatively assessed.
Exploring the Task (10-12 minutes)		
Detailed Procedure	**Teacher Actions**	**Student Outcomes**
• Students will observe and compare Edmondson's *Crucifixion* with a similarly themed piece by a trained artist (images A and B in appendix). • Students compare/contrast the pieces with four minutes of private think time.	• Teacher will display images A and B (appendix) and instruct students to compare and contrast the two pieces individually. • The teacher circulates the room and provides feedback as necessary. • The teacher provides students with guiding questions to assess and advance their thinking.	• Students will compare and contrast two images. • Students will work with partner collaboratively and respectfully to discuss similarities and differences.

• Students have five minutes to share their ideas with a partner. • Students are introduced to the work of another self-taught artist, Lonnie Holley.	• Teacher facilitates partner time and determines which groups will share out. • The teacher will read Teacher Blurb C (included in appendix).	• Students will understand the attributes of a self-taught artist, versus a trained artist. • Students will become familiar with Holley's art.
☺ **Sharing, Discussing, and Analyzing Solution Paths (60 minutes)**		
Detailed Procedure • Students will examine a piece created by Holley as they engage in new learning. • Students will engage in private think time (2 minutes). • Students will engage in whole group discussion (5 minutes). **Practice:** • 5 minutes of determining direct proportionality • 10 minutes with partner • 10 minutes to explore new concept individually	**Teacher Actions** • Teacher will read Teacher Blurb D (appendix). • Teacher will facilitate modeling activity as students take notes. • Teacher will focus on key concepts like slope and direct proportionality • Teacher will ask questions, allow for private think time and will facilitate discussion. • Teacher will extend learning through advancing questions. Teacher will give students several practice problems to apply new skill	**Student Outcomes** • Students will engage in new learning regarding slope and direct proportionality while taking notes. • Students will work with shoulder partner to apply new concept (slope formula)

• Students will engage in culmination activity for the lesson (25 minutes): **Prompt:** *Our challenge today is to create an image that you believe represents the class of 2015. What stands out about you? What is monumental to your time period? You can pick an event to focus on or specific person, but it must have some link to you.* *You must begin by creating your image in the three by three squares on your paper then you will construct a larger model using any of the tools in the back of the classroom. Your model and the image created in three by three square are expected to be directly proportional and this must be proven in your work. Remember the art should speak for itself without explanation.*	• Teacher will introduce the culminating assignment by reading Teacher Blurb E (appendix) and further explaining the assignment. Students may work with partners. • Circulate the classroom in order to fill in any gaps in understanding	• Students will work with partners to apply new concept and to demonstrate mastery of learning goals.
☐ **Closing the Lesson (5 minutes)**		
Detailed Procedure • Students will engage in a reflection of the lesson by completing an exit slip	**Teacher Actions** • Teacher will direct students to reflect on the objectives/ advancing questions and the different patterns seen in today's lesson. • The teacher will circulate the classroom to check for students exhibiting signs of a lack of understanding.	**Student Outcomes** • Students will reflect on their own learning • Students will demonstrate progression toward mastery of learning goals and will be formatively assessed.
🕮 **Extending the Learning** • Future lesson suggestions would include the creation of a scaled replica of Edmondson Park (using graph paper) based on a scale provided by teacher. Example 1sq unit= 3 feet • The virtual tour referenced in Blurb C can be facilitated through images found at: http://www.nashville.gov/Arts-Commission/Public-Art/Find-An-Artwork/Projects-in-Progress/Edmondson-Park.aspx • Additional Learning Extensions: After the class creates a scaled replica of Edmondson Park, the Class of 2015 scaled image could be included as part of the model.		

Appendices (attach resources used, such as handouts, etc…):

- **Suggested Teacher Blurbs**
- **Artist Images**
- **Freedom Notes**
- **Directly Proportional Relationship Guided Notes Sheet (student and teacher edition)**
- **Exit Slip**
- **http://www.nashville.gov/Arts-Commission/Public-Art/Find-An-Artwork/Projects-in-Progress/Edmondson-Park.aspx**

Name_____ Date _____

Directly and Inversely Proportional Relationships

Let's review directly proportional and indirectly proportional relationships:

Directly Proportional → *As x increases, y increases OR as x decreases, y decreases – same change (y= mx)*

X	Y
1	4
2	8
3	12

X	Y
1	6
2	3
3	2

One of these tables is directly proportional and one is inversely proportional. How can we decide which one?

STEPS:

1. **Write a + if the column values are *increasing***
2. **Write a – if the column values are *decreasing***
3. **In order to find the slope, we use the formula** $m = \frac{y2-y1}{x2-x1}$
   a. **Label your table**
   b. **Plug the numbers into the formula**
4. **Multiply the numbers in your x column by your slope. If the solution matches the numbers in your y column then the table is direct.**

Name_____ Date _____

Example 1: Directly Proportional: Yes or No

X	Y
3	21
5	35
6	42
8	56

Example 2: Directly Proportional: Yes or No

X	Y
3	2
6	4
9	6
12	8
15	10

Example 3: Directly Proportional: Yes or No

X	Y
-2	5
0	1
2	5
4	17

The slope must work for ALL ORDERED PAIRS

Name_____ Date _____ Group_____

Directly Proportional Relationships

Let's understand directly proportional relationships:

Directly Proportional → _____

_____

_____

X	Y
1	4
2	8
3	12

X	Y
1	6
2	3
3	2

One of these tables is directly proportional and one is not. How can we decide which one?

STEPS:

1. **Determine directions**

   Write a ____ if the column values are _____

   Write a ____ if the column values are _____

2. **If the change is the same _____**

   Find the _____ and test the _____.

3. **In order to find the slope, we us the formula _____.**

   a. **Label your table**

   b. **Plug the numbers into the formula**

4. **Multiply the numbers in your_____by your slope. If the solution matches the numbers in your_____then the table is_____.**

Name_____ Date _____ Group_____

Example 1: Directly Proportional: Yes or No

X	Y
3	21
5	35
6	42
8	56

Example 2: Directly Proportional: Yes or No

X	Y
3	2
6	4
9	6
12	8
15	10

Example 3: Directly Proportional: Yes or No

X	Y
-2	5
0	1
2	5
4	17

The slope must work for ALL _____.

Image A

Image B

Image C

Image C Enlarged

Documentation Sheet

Interesting Information

Name.

Suggested Teacher Blurbs

Day 1

Intro *Read the following*:

Teacher Blurb A Many of you want to be musicians, artists, dancers, etc. Many people go to college and universities to train themselves in their crafts. If your family can't afford school you can apply for scholarships, grants, or loans. However there was time when these great opportunities for advancement were not available to all. This man (reveal a picture of William Edmonson) did not have the pleasure of attending a school like Nashville School of the Arts, Julliard, or an art institute. However, his art now sells for thousands of dollars. How is this possible? William Edmondson is a self-taught artist. His struggles in life created the visions that he needed to become one of the greatest artist of all time.

William Edmondson, son of Tennessee slaves, did not consider himself an artist when he began carving around 1932, after retiring from his job as a laborer. Inspired by a vision, he emphasized his divine calling, claiming, "Jesus has planted the seed of carving in me" and describing his works as "mirkels." While he lay asleep, God appeared at the head of his bed and talked to him, like a natural man, concerning the talent of cutting stone He was about to bestow. He talked so loud He woke me up. He told me He had something for me." Edmondson was instructed to make chisels and other sculpting tools.

Have the students examine a picture of William Edmonson's Crucifixion (image A) as you read the following blurb:

Teacher Blurb B In several sculptures entitled *Crucifixion,* Edmondson celebrated Christ as the Savior, the most popular figure in the spiritual tradition of African-American art. This example is an early version, once also called *Baby Jesus.* Its rectangular silhouette and upright frontality suggest the gravestone tablets that Edmondson saw in his original vision. *Crucifixion* retains a strong sense of the block's shape and texture in its minimally articulated form and detail. Only the emphatic curves of the lower torso reveal Edmondson's attempt to break away from the block, suggesting that he executed *Crucifixion* soon after he turned from carving gravestones to more imaginative, free-standing subjects. Compact and stylized, the sculpture conveys its spiritual message with the authority and immediacy of an archaic monument.

(image A and image B) Compare Edmonson's depiction of Christ to a depiction created by a trained artist? How are they different? How are they similar?

Teacher Blurb C We can see that there are benefits to being self-taught and professionally trained. Tomorrow we will take a virtual tour of a park created in Mr. Edmondson's honor. Let's take a look at another artist. His work will also be displayed in the park. His name is Lonnie Holley. Holley began his artistic life in 1979 by carving tombstones for his sister's two children who died in a house fire.[1] Holley became so depressed that he almost committed suicide. In the weeks that followed, he decided to do something constructive with his grief. As the family could not afford to buy tombstones for the children, he decided to make them himself.

"I asked God to give me something so that I may go to the top in life, and he did. I use the setting sun, the stars, the hills--all that has affected my imagination and what I put in my work. He believes that divine intervention led him to the material and inspired his artwork. He shares messages through his artwork but interpretation can be subjective.

(display image C)

Teacher Blurb D Let's compare the image on the projector to the one on your paper. To do that, we will create a table. On one side we will describe parts of the image on your paper and on the other side we will describe the same parts but using the image on the projector.
What do you see?
A pattern again. What's a happening on one side and on the other? (as x increases, y increases and vice versa) This is what we would describe as a directly proportional relationship. As one side goes up so does the other. However, sometimes there's more to it the numbers than meets the eye so use a formula. $M = \frac{y2-y1}{x2-x1}$

Give students three similar problems to answer yes or no, is this directly proportional?

Teacher Blurb E We can agree that the art says something about each artist. Our challenge today is to create an image that you believe represents the class of 2015. What stands out about you? What is monumental to your time period? You can pick an event to focus on or specific person, but it must have some link to you. You may work with a partner.

(4 minutes of private think time)

You must begin by creating your image in the three by three squares on your paper then you will construct a larger model using any of the tools in the back of the classroom. Your model and the image created in three by three square are expected to be directly proportional and this must be proven in your work. Remember the art should speak for itself without explanation.

Tomorrow we will vote as a class on the best image that depicts your time.

Possible Learning Extensions: Create a scale model of Edmondson Park and include this Class of 2015 scaled image in the model of the park.

Name _____ Date _____ Group_____

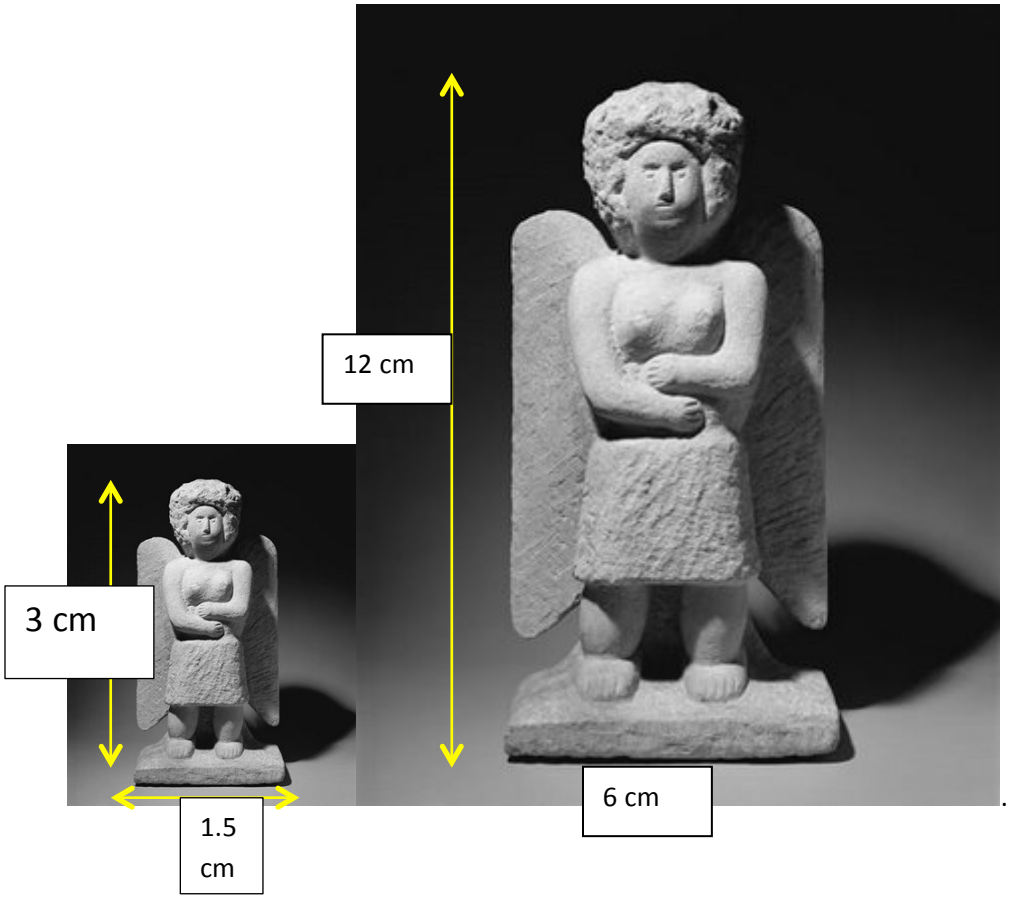
Exit Slip

1. During today's lesson we examined:
   a. several hard rock artist
   b. proportional relationships
   c. Two famous mathematicians

2. Is the following table directly proportional?

wood	4	6	10
glue	2	3	5

3. The following images are based on a piece by William Edmondson. Are these two images directly proportional? Why or why not? Explain by using a table to support your answer.



4. Do you have any questions regarding today's lesson? If not, what do you think was interesting about today's lesson?

_____

Thank you for sharing your time and talent! Have a great day!