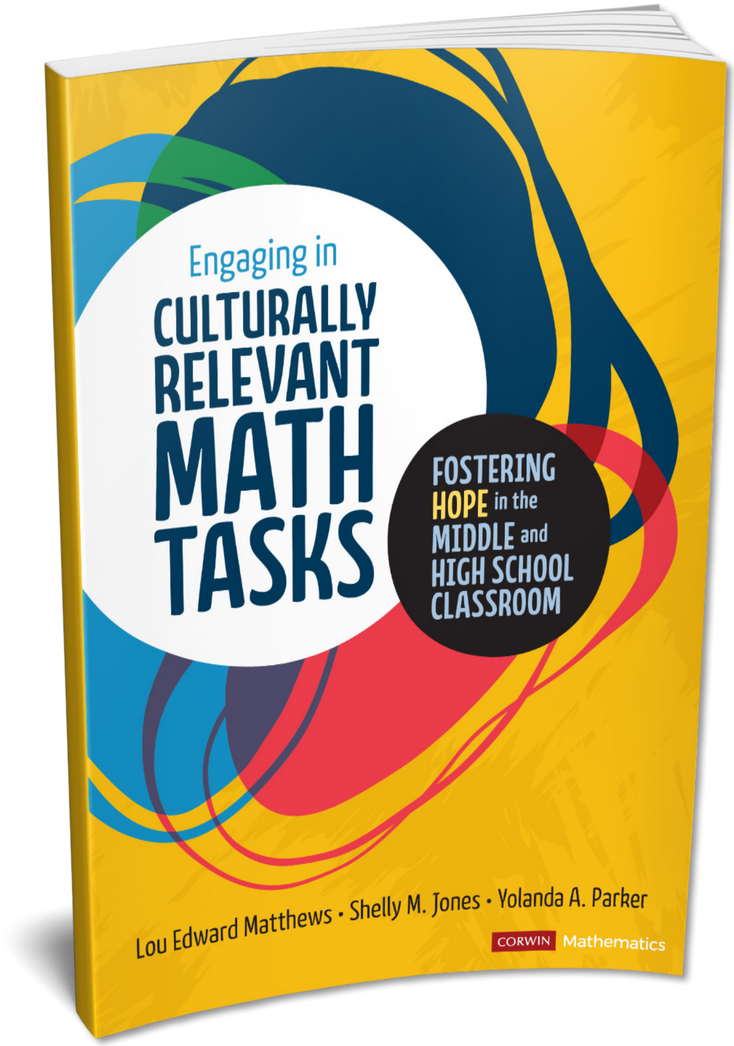

Thank you

FOR YOUR

INTEREST IN

CORWIN

Please enjoy this complimentary excerpt from Engaging in Culturally Relevant Math Tasks, 6-12.

LEARN MORE about this title!

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Octagonal Tessellation in Islamic Architecture

Goal: Describe the desired movement on the CRCD math task rubric (Emerging to Developing to Exemplary).

I wanted to move the original task, "Octagonal Tessellation in Islamic Architecture," from Emerging to Developing/close to Exemplary. The original task(s) was cognitively demanding but was "culturally neutral." By incorporating a "mirror" for a student in the class and "windows" for others, it became a culturally relevant task.

Original Task (Should be a cognitively demanding task)

The original tasks were a hexagon perimeter task and a pattern tile task.

Task 1. Each figure in the pattern below is made of hexagons that measure 1 centimeter on each side. If the pattern of adding one hexagon to each figure is continued, what will be the perimeter of the 25th figure in the pattern? Marcy has to determine the perimeter of the 25th figure, but she does not want to draw all 25 figures. Explain or show how she could do this and give the answer that Marcy should get for the perimeter.

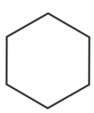


Figure 1
Perimeter = 6 cm

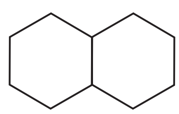


Figure 2
Perimeter = 10 cm

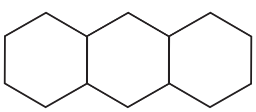


Figure 3
Perimeter = 14 cm

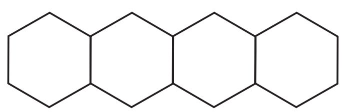
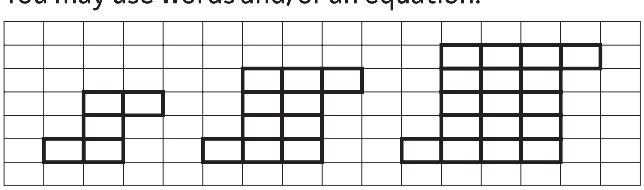


Figure 4
Perimeter = 18 cm

Task 2: The first three figures in a pattern of tiles are shown below. Describe the 20th figure in this pattern, including the total number of tiles it contains and how they are arranged. Then, explain the reasoning that you used to determine this information. Write a description that could be used to define any figure in the pattern. In other words, generalize the pattern. You may use words and/or an equation.



Math Content (Grade level State Standards)

CCSS.MATH.CONTENT.6.EE.A.2

Write, read, and evaluate expressions in which letters stand for numbers.

CCSS.MATH.CONTENT.6.EE.A.3

Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

CCSS.MATH.CONTENT.6.EE.A.4

Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

(*Continued*)

(*Continued*)

Why did you choose this task? What aspect of the task was the focus?

I used octagons instead of hexagons (because it fit the context better) and related it to Islamic architecture. I considered the "mirror/window" as I wanted to address a specific student in the class who is Muslim and was more withdrawn/not confident or participating in class much. I wanted to address her power/participation (Aguirre & Zavala, 2013) and math identity. For other students in the class, I wanted to create a "window" to learn about a different culture.

Using the CRCD math task rubric, describe how the math task was revised.

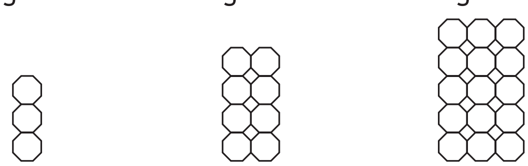
The original tasks had no context. Creating the context of tessellations in Islamic architecture addressed the "world around them" and cultural knowledge of Muslim/Islamic culture. Students also were able to connect this to their own lives/community by considering where there might be geometric patterns in their own community. I employed the Concrete-Representational-Abstract/Connections strategy throughout the lesson by first having students re-create the first three stages of a pattern using green and yellow octagons and extend it to the fourth stage (concrete), then students drew (colored) in the pattern on their paper and created a T-chart to show numerically how the pattern grew (representational). Next, students considered what the 20th stage would be and the "nth" stage using an expression (abstract). Finally, we compared how students saw the pattern and analyzed equivalent expressions (connections).

Revised CRMTask

Octagonal Tessellation in Islamic Architecture

The octagonal designs in the Alhambra in Spain show various growth patterns in the tessellations. Each figure below demonstrates one such pattern that can be made with octagons. The first 3 figures represent sections of the complete tessellation. What would be the 4th figure (stage) of the pattern in this tessellation? What would the 20th figure be? Develop an explicit rule for any stage of the pattern in this tesselation.

Figure 1 Figure 2 Figure 3



How will this empower students?

It will empower students to learn more about their community by looking for geometric patterns in town. Also, as part of a closure/reflection in the lesson, the following question was proposed: How can we help our school learn more about the influences of Islamic culture on architecture in our community? This will help empower them by understanding the importance of learning about different cultural influences. It also empowers them because they are left to make the decision of how we could do this.-