Building Construction: A Practice Understanding Task

Purpose: In this activity, you will explore how adhering to building codes while keeping construction costs within a client's budget impacts the overall building process. Students will need to find the area of irregular shapes, apply a formula to determine anticipated speed, static pressure, and power required for the adjusted airflow of a fan system, and use the Pythagorean theorem.

Career Field: Architecture, Interior Design

WTCC Associate Program of Study and Contact Person:

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NC Math 4 Standards:

This activity may be a good review of the Pythagorean Theorem leading into the trigonometry unit
NC.M4.AF.2 Apply properties of trigonometry to solve problems

Unit Alignment:

NC Math 3 - Unit 4 Modeling with Geometry
WTCC Math 172
WTCC Math 121
WTCC Math 110

Common Core State Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Prerequisite Skills

These skills could be reviewed in a warm-up and are addressed in the Desmos activity.

- Applying Pythagorean Theorem
- Determining the area of a rectangle
- Evaluating literal equations

Time Required
The time required to complete this activity is approximately 90 minutes.

Materials Needed
- Access to the Desmos activity and launch video
- Student Activity Sheet
- Calculator

The Teaching Cycle:
Launch:
(20 minutes for Desmos Activity and Launch Video)

When completing the Desmos activity, please copy the assignment to your account. Feel free to make any edits you want.

"When constructing buildings, considerations must be made regarding the building code requirements along with a client's budget and preferences. If a building is not constructed to code, it will not pass inspection and will have to be redesigned. This can be costly with respect to both time and finances. In addition, certain options for construction may be more expensive than others. Finding a balance between cost and durability is essential for serving a client's needs."

(Begin Desmos activity or begin Prerequisite Skills Sheet)

Desmos activity: https://teacher.desmos.com/activitybuilder/custom/62deb7709c012b6687a9f5bf
Create a class code and add the code to the Student Activity Sheet.

Prerequisite Skills Sheet:
https://docs.google.com/document/d/1tkdn4PU4OTKBYA_WhuJcbEAY1jj3_PEp/edit?rtpof=true

When appropriate, discuss answers to the Desmos/Prerequisite questions as a class.

(Play Launch Video)

Explore:

(50 minutes)

Students will work in groups (ideally or 2-3). They will complete the attached Activity Sheet as they continue practicing the ideas already established during the previous lecture. The teacher will facilitate this group activity by monitoring student participation, observing student interactions, and checking for mistakes in work as the teacher moves around the room. Guidance will be provided as determined necessary.

Potential questions and mistakes:

- Note that in Task 1, the building height and width are given in feet but the pitch ratios are given in inches.

- The lifespan of the roof materials in Task 1 should be part of the students' discussion of the material they selected.

Discuss:

(30 minutes)

Once the activity is complete, review the answers for each question as a class. Ask groups to share their answers for any specific questions you would like to discuss.

Have students share their lighting layouts for question 2 from Task 2. There is a great opportunity for creative answers here that should be accompanied by justification for the layout.

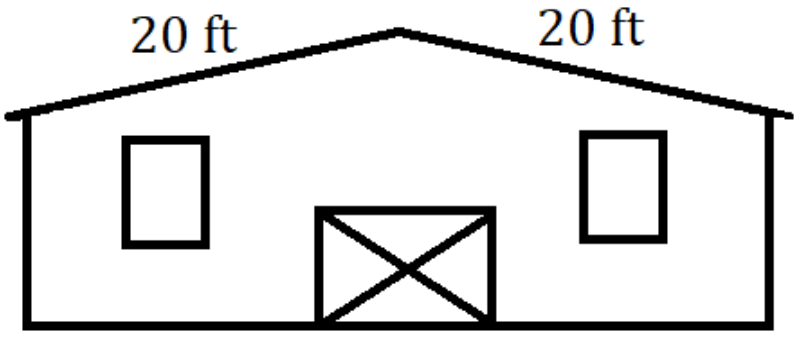
Allow students the opportunity to identify any errors in their work and provide a chance to correct them before concluding the activity.

Task 3 is likely to be the hardest task for students, so spending a little more time reviewing the answers here will likely be helpful for students.

Exit Ticket:

Suppose that a new metal roof needs to be installed on the barn shown below. The roof must meet the following requirements:

- pitch is 3":10"
- building is 50 feet long
- cost is $3.50 per square foot of material



Determine the total cost for the new roof.

Two example assessments for testing:

A roof made with asphalt shingles with a roof slope of 2":12" is installed on a 45 ft tall building that is 60 feet wide.

Question 1: Determine the total height of the building including roof construction.

Question 2: If local building ordinances state that the maximum height for this type of building is 65 feet, will this building pass local inspection?

Student Activity Sheet

Link: https://docs.google.com/document/d/1O2KLqTbuo4tcGLhlP-qZV4BXQDiToHvt/edit

Answer Key

Link: https://docs.google.com/document/d/1ryuVxlIx5UESnizkK73iVfkMBtjqCnZ2/edit?rtpof=true