Authentic Assessment Workbook

Geometry
SOL G.8
Overview

This authentic assessment workbook provides performance tasks for student completion. All items focus on authentic, real-world situations that begin to prepare students for college and career readiness. Teachers are encouraged to engage with each student response to determine the ‘how’ and ‘why’ of the student’s thinking when responding to the task. In that regard, since multiple responses may be correct, no answer key is provided. A rubric for student and teacher use is provided with each task.

Additionally, the mastery of these tasks can provide documentation toward the completion of the essential knowledge, skills and processes, as outlined in Flexible Creativity’s Mathematics Observation Form for the given grade level. Further, when appropriate, material from previous grades is incorporated to build on the natural spiral of mathematics content.

This document represents the **essential knowledge, skills and processes** related to **Geometry G.8** – The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.

These tasks can be found on the following pages within this document:

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Task 1: Ladder Sales

Retail sales associates must be familiar with the products in their store and their applicable uses. The average salary for an entry level sales associate is usually at or above the localities minimum wage; however, advancement within the company may require an advanced degree in business courses or a related field.

As a sales associate at a local hardware store, customers often ask you about what height of ladder to purchase for use outside their home. You have decided that instead of repeating the same type of problem with each customer, you will find the common ladder heights most often requested and ensure they are stocked for customers to purchase quickly.

You recommend for customer safety that ladders be set 5 feet from the base of whatever the ladder is leaning against.

Part A: You determine that three most commonly requested ladder heights are for cleaning out the gutters on a house, building a tree house, and accessing a second-story roof. Determine the appropriate height of a ladder to reach each of the common requests identified.

A1. Many customers want to clean the gutters on their house, 20 feet off the ground. What height ladder would be needed? Show all your work, creating a diagram.

A2. Several customers have requested a ladder to build a tree house and need to typically reach up 30 feet. Create a diagram to show your work to find the height of the ladder needed.

A3. Some customers want to reach 40 feet to access the second-story roof of their house. What ladder height would you recommend be in stock for use? Show your work and create a diagram.
Task 1: Ladder Sales

Scoring Rubric

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Comments:

(Student Notes) | (Teacher Notes)
Task 2: String Bean Teepee

An agricultural cooperative, also known as a farmers’ co-op, is a cooperative where farmers pool their resources in certain areas of activity to hold down cost. You are the founding member of a community farming cooperative that has decided to add a string bean teepee to a new area of land. After some research, Jax, a cooperative member, found that optimal string bean growth occurs if the teepee is 12 feet across at the bottom and 12 feet on the slant of the teepee.

Part A: The cooperative needs to determine how tall the string bean teepee will be and has asked for your assistance.

A1. Based on the information the council has already collected, draw a diagram of the plan to ensure you understand what information needs to be found.

A2. Based on your diagram, calculate the height of the string bean teepee. Show all your work and provide a written justification to defend your answer.
## Task 2: String Bean Teepee

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Task 3: Sidewalk Committee

State College has a problem with students wearing paths in the grass in a rectangular lawn. The college has decided to pave two sidewalks, each traveling diagonally across the lawn. Before the plan can proceed, the Sidewalk Committee has requested two estimates for the job. The rectangular lawn is 125 yards by 75 yards.

The first company, Walk Along, offers to complete the job for $2.75 per linear foot of sidewalk. The second company, Smooth It, provides an estimate requiring a base fee of $100, plus $2.25 per linear foot of sidewalk.

**Part A:** As a member of the Sidewalk Committee, you are tasked with calculating the cost of the job based on the estimate received from each company.

A1. What would be the cost for Walk Along to complete the job? Create a diagram showing all your work.

A2. What would be the cost for Smooth it to complete the job? Create a diagram showing all your work.

A3. The committee has requested you present a written summary of your findings and justification for your calculations. Include which company you believe would be the best choice and why.
## Task 3: Sidewalk Committee

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Task 4: Quilting Design

Quilters create quilts, or blankets, by hand and they must have skills using measurement, fractions, geometry, and understand fabrics. Quilting is a tradition that often preserves historical events. On average, a quilter dedicated to the trade can earn up to $33,100 each year.

As a quilter, you have decided you are going to make a quilting pattern using the standard block shown below. The pattern requires 20 blocks to be arranged in a rectangle with 4 blocks across and 5 blocks down. Each block, as shown in the pattern, is 16 inches on the diagonal.

Part A: You want to ensure that the quilt you create will cover a twin size bed. The typical dimensions of a twin bed quilt are 65 inches by 88 inches.

A1. Determine if the quilting pattern will create a quilt that is the right size for a twin bed. Show all your work.

A2. If the pattern will fit a twin bed quilt, explain your reasoning. If the pattern will not fit a twin bed, provide a suggestion on how to modify the pattern.
## Task 4: Quilting Design

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Task 5: Escalator Regulations

Building inspectors inspect buildings and other structures to determine their structural soundness and their compliance with specifications and building codes. Elevator inspectors inspect elevators, escalators, and other related equipment. Greenfield Mall plans to install an escalator over an existing staircase. The mall design team creates the diagram below of the rise and length of the escalator.

![Diagram of escalator rise and length]

Part A: As the building inspector, it is your responsibility to ensure the plan design meets the necessary regulations before granting permission to build the escalator. To meet regulations, the escalator cannot have an angle of elevation stepper than 35 degrees.

A1. Based on the mall design team diagram, determine the angle of elevation of the escalator. Be sure to show your work and label the diagram.

A2. Does this design meet regulations? If so, prepare a written justification supporting the design. If not, make a recommendation on how the design team can modify their plan to meet the regulation.
## Task 5: Escalator Regulations

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Task 6: Tree Slide

You have started working as an intern with a local general contractor. A general contractor contracts with organizations or individuals for the construction of a building, road, or other structure. The Cooper family has requested a tree slide be installed in their backyard. They want to have their children climb a ladder 24 feet to a platform in a tree, then slide to the ground. The angle of elevation of the slide from the ground against the tree is 55°.

The contractor accepts the job and you both return to the office. The contractor explains that the first step is to draft a plan and find the unknown measurements. You create the diagram plan below.

Part A: The contractor requests that you find the missing measurements.

A1. Determine the distance from the bottom of the slide to the base of the tree. Show your work and include a written summary explaining your calculations to the contractor.

A2. Find the length of the slide. Show your work and prepare a written summary explaining your mathematical calculations.

Part B: After considering the final plans for the tree slide, the Cooper family decides to change the ladder height to 18 feet.

B1. How will this change impact the length of the slide? Will the slide be longer or shorter? Provide evidence for your reasoning.
## Task 6: Tree Slide

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Task 7: Climbing Pyramid

Rock climbing provides a total body workout with an emphasis on core muscles, cardiovascular systems, and mental insight and perception. This form of exercise increases stamina, endurance, and weight loss.

Healthy Endeavors Fitness is hiring a contracting company to build a pyramid structure with climbing walls on each of the faces of the pyramid. The gym provides the plans below to the contracting company.

![Pyramid with climbing walls](image)

**Part A:** As the contracting company planner, you are assigned the task of determining the height and slant height of the pyramid so construction can begin.

A1. Determine the height of the pyramid. Show all your work and provide a written justification for your calculations.

A2. Find the slant height of the pyramid. After showing your mathematical calculations, write a summary defending your answer.
## Task 7: Climbing Pyramid

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Task 8: Wheelchair Compliance

The American with Disabilities Act (ADA) is a law passed in the United States that gives civil rights protections to individuals with disabilities, guaranteeing equal opportunity in employment, public accommodations, transportation, government services, and telecommunications. For example, this law ensures that public restaurants do not have physical barriers that prevent individuals with disabilities from using the restaurant’s services – including entering the establishment and reading the menu.

The Pancake House needs to install a wheelchair ramp to maintain their ADA compliance. The height of the ramp needs to be 22 inches to reach the top of the entryway. Based on regulations, the rise of the ramp cannot be any steeper than 20 degrees. The Pancake House determines that the ramp must meet the following plans.

Part A: You are working with the builder hired by The Pancake House. The site supervisor has asked you to find the missing dimensions in the plan: the length of the slanted ramp and the horizontal length of the ramp.

A1. Determine the length of the slanted ramp and show your work. Provide a written justification of your mathematical calculations.

A2. What is the horizontal length of the ramp? Show your work and write a summary defending your answer.
## Task 8: Wheelchair Compliance

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