WAMC Lab Template

Math Concept(s): Measuring length, creating inequalities
Source / Text:
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Attach the following documents:

- Lab Instructions
- Student Handout(s)
- Rubric and/or Assessment Tool

Short Description (Be sure to include where in your instruction this lab takes place):

Students will read ADA Compliant building codes and write an inequality to represent each code. Then, students will find examples of each throughout the building and measure the required parts to assess if the building is ADA compliant.

Lab Plan

Lab Title: Is the School up to Code?

Prerequisite skills:

- Writing inequalities from words
- Using a ruler/measuring tape
- Using a protractor

Lab objective: Students will use inequalities to assess if certain parts of the building is ADA compliant.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- A-REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality) and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Standards for Mathematical Practice:

- Model with mathematics
- Use appropriate tools strategically
- Attend to precision

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions define in the text.

- RST.9-10.4 Determine meaning of symbols, key terms, or other domain specific words and phrases as they are used in specific technical context.
- RST.9-10.7 Translate quantitative or technical information expressed in words in a text into visual form and translate information expressed verbally or mathematically into words.

K-12 Science Standards

- HS-ETS1-1 Analyze a major global challenge to specify qualitative criteria and constraints for solutions that account for societal needs and wants.

Technology

- 1.2.1 Communicate and collaborate to learn with others.

Engineering

- HS-ETS1-1 Analyze a major global challenge to specify qualitative criteria and constraints for solutions that account for societal needs and wants.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☒ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
☐ Think Creatively
☐ Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☐ Reason Effectively
☐ Use Systems Thinking
☒ Make Judgments and Decisions
☐ Solve Problems
Communication and Collaboration
☒ Communicate Clearly
☒ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☐ Access and Evaluate Information
☒ Use and manage Information
Media Literacy
☐ Analyze Media
☐ Create Media Products
Information, Communications and Technology (ICT Literacy)
☐ Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
☐ Adapt to Change
☐ Be Flexible
Initiative and Self-Direction
☒ Manage Goals and Time
☐ Work Independently
☒ Be Self-Directed Learners
Social and Cross-Cultural
☐ Interact Effectively with Others
☐ Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
☐ Produce Results
Leadership and Responsibility
☐ Guide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Student handouts
- Rulers/measuring tapes
- Protractor

Set-Up Required:

- Create an answer key
- Identify elements that fit into each category that students can measure

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students will be in pairs or small groups and share responsibilities of identifying objects, measuring, and recording
- Students will need to identify scenarios to evaluate for ADA compliance without help from teacher
- Students will have to complete measuring one location per situation in roughly 30 minutes to leave time for discussion and exit ticket

Cooperative Learning:

- Students will work with a partner or in a small group to identify, measure, and evaluate several locations in the building

Expectations:

- Each group will create inequalities to represent each situation listed on the ADA Code handout. Once the inequalities are written, groups will leave the classroom to identify each type of situation and measure items to evaluate whether the situation meets the requirements. Students will return to the classroom to engage in a discussion about the codes and finish class with a formative assessment by way of exit ticket.

Timeline:

- The lab can be completed in a 30-minute time period. Requirements can be adjusted by assigning groups to each situation.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Why are these codes required? What determines the lengths/distances outlined?
- What other considerations do construction teams need to consider when building?

Career Applications

- Construction
- Building Inspector

Optional or Extension Activities

- Researching other ADA building codes for other types of places—golf courses, swimming pools, playgrounds, etc.—and design a layout with essential structures that is ADA compliant.

ADA Codes:

Doorways:

404.2.3 Clear Width. Door openings shall provide a clear width of 32 inches (815 mm) minimum. *Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees.* Openings more than 24 inches (610 mm) deep shall provide a clear opening of 36 inches (915 mm) minimum.

Inequality: _____ Did it pass? _____

Bathrooms:

606.3 Height. Lavatories and sinks shall be installed with the front of the higher of the rim or counter surface 34 inches (865 mm) maximum above the finish floor or ground.

Inequality: _____ Did it pass? _____

Circulation Paths/Common Areas:

308.2.1 Unobstructed. Where a forward reach is unobstructed, the high forward reach shall be 48 inches (1220 mm) maximum and the low forward reach shall be 15 inches (380 mm) minimum above the finish floor or ground.

307.2 Protrusion Limits. Objects with leading edges more than 27 inches (685 mm) and not more than 80 inches (2030 mm) above the finish floor or ground shall protrude 4 inches (100 mm) maximum horizontally into the circulation path.

Inequality: _____ Did it pass? _____

Water Fountains:

602.6 Water Flow. The spout shall provide a flow of water 4 inches (100 mm) high minimum and shall be located 5 inches (125 mm) maximum from the front of the unit. *The angle of the water stream shall be measured horizontally relative to the front face of the unit.* Where spouts are located less than 3 inches (75 mm) of the front of the unit, the angle of the water stream shall be 30 degrees maximum. Where spouts are located between 3 inches (75 mm) and 5 inches (125 mm) maximum from the front of the unit, the angle of the water stream shall be 15 degrees maximum.

Inequality: _____ Did it pass? _____

Outside Ramps:

405.2 Slope. Ramp runs shall have a running slope not steeper than 1:12.

EXCEPTION: In existing sites, buildings, and facilities, ramps shall be permitted to have running slopes steeper than 1:12 complying with Table 405.2 where such slopes are necessary due to space limitations.

Slope	Maximum Rise
Steeper than 1:10 but not steeper than 1:8	3 inches (75 mm)
Steeper than 1:12 but not steeper than 1:10	6 inches (150 mm)

Inequality: _____ Did it pass? _____