WAMC Lab Template

Math Concept(s): Geometry; Square roots
Source / Text: Big Ideas Math
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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):

Using a string stretched across the front of the room students will place their randomly assigned square root card to indicate/approximate its rational equivalent. The string line will be marked concurrently with and integers to duplicate a double number line; comparing the squares roots to the integer values. Then, in color-coded assigned groups, students will divide the distance between integers into half and quarter decimal intervals to better approximate square root values. Finally, students will articulate a process by which to calculate the square root of any number to the nearest tenth.

Lab Plan

Lab Title: Get Radical!

Prerequisite skills: How to square a number and how to find a perfect square.

Lab objective: To develop a process that students can use to approximate the square root of any number.

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

Mathematics K–12 Learning Standards:
- 8G.B.7, 8G.B.8

Standards for Mathematical Practice:
- MP1, MP2, MP4, MP6

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):
- CCSS.ELA.Literacy.SL.8.1 (A,C,D); CCSS.ELA.Literacy.SL.8.4

K-12 Science Standards
- MS.PS2.4, MS.ETS1-3

Technology
- None

Engineering

- None

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
x Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
x Reason Effectively
☐ Use Systems Thinking
☐ Make Judgments and Decisions
☐ Solve Problems
Communication and Collaboration
x Communicate Clearly
x 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
x 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
- string, index cards (cut in half lengthwise) marked with the square roots from 1-64
- student notebooks
- calculator

Set-Up Required:
- index cards labelled, string stretched out and integers placed in equivalent intervals along the string number line.

Lab Organization Strategies:

Leadership (Connect to 21ˢᵗ Century Skills selected):
-

Cooperative Learning:
- Work cooperatively in groups of 3 or 4 to place cards and develop a process for calculating roots

Expectations:
- Students will place root card and develop a process by which to approximate square roots

Timeline:
- one class period

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab
- Ask students to generate scenarios where the process might be used.
- Solve distance problems associated with follow-up lesson plan

Career Applications
- Construction, agriculture, surveying, welding, machining

Optional or Extension Activities
- Have students assist those who may be struggling
- Have students approximate square roots of complex numbers and offer those as challenge problems for classmates

Attachment 1: **Lab Instructions**

1. Teacher stretches a string/clothes line across a large expanse of wall or white board.
2. Use painter's tape or sticky notes to indicate integer intervals along the string from 1-8; suggested intervals is 24"
3. Hand out premade, color-coded, square root folded index cards: $\sqrt{1}$-$\sqrt{64}$
4. Randomly assign index cards to students
5. Ask students to take some private think time to decide where, on the string number line, their square root falls in relation to the integer intervals.
6. Call on students, one group at a time to place their cards on the string- remain standing near the line.
7. Once students have all placed their cards, they should see that all the cards between the integers are matched in color.
8. Students then collaborate to use painter's tape to note .25, .5, and .75, dividing the roots into further subgroups.
9. Students then return to their seating groups to collaborate in order to develop a process for approximating the square root of a number. This process is to be written in their Math notebooks.
10. Finally, students test their process to approximate $\sqrt{137}$

Attachment 2: **Student Handouts**

1. Folded half index cards marked with square roots from 1-64
2. Get Radical sheet (see assessment tool)

Attachment 3: **Rubric/Assessment Tool**

Students, in groups, generate square root problems for each other to solve and use a calculator to verify accuracy. Students will submit a half-sheet of examples for

Get Radical!!   Name: _____

Each group member selects a square root to approximate and includes it in the table. Add the root, the approximation and the calculated answer.

1.	2.
3.	4.