

Data Activities Portfolio

The Data Portfolio is a compendium of particle physics classroom activities organized by Data Strand, Level of student engagement, Curriculum Topics and NGSS Standards. Follow the links provided for information about using the Data Portfolio to plan your students' experience. [Level descriptions](#) explain the data analysis skills that students apply at each level: tasks in Level 0 are simpler than those in Levels 1 and 2. While each level can be explored individually, students who start in one level and progress to more complex levels experience increasingly engaging and challenging tasks. These activities are aligned with [NGSS Standards](#), particularly [NGSS Practices](#).

Each Curriculum Topic provides connections between topics routinely covered in physics class and particle physics content and methods. Use the menus to find activities related to the content you are currently covering. Watch this [screencast](#) to learn more about sorting these activities.

We are making Spanish Language versions of the activities. To find the activities with Spanish versions, use the Curriculum Topics menu, scroll to the bottom, select Spanish Language then Apply. Special thanks to Danelix Cordero-Rosario from the Puerto Rico Center for providing these translations.

QuarkNet has entered the world of data science. Use the Curriculum Topic menu to locate the Skill: Coding option then Apply.

We want your feedback on how the activities worked for you. Please complete the [feedback form](#) to help us improve our activities.

Data Strand Level Curriculum Topics NGSS Practices Apply

ACTIVITY NAME	DATA STRAND	LEVEL	CURRICULUM TOPICS	NGSS PRACTICES
 Mass of U.S. Pennies Students create and interpret a histogram of penny masses.	Cosmic Ray, LHC	Level 0	Skill: Developing Models, Skill: Histograms, Skill: Uncertainty	1, 2, 3, 4, 5, 6, 7, 8
 Quark Workbench 2D/3D Students use Standard Model rules to build hadrons and mesons from quarks.	Cosmic Ray, LHC	Level 0	Conservation Laws, Nature of Matter, Standard Model, Skill: Developing Models	1, 2, 4, 5, 6, 7

Search Site Content

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Strand

- Cosmic Ray (19)
- LHC (30)
- Neutrino (11)

Level

- Level 0 (10)
- Level 1 (14)
- Level 2 (11)
- Level 3 (2)
- Level 4 (1)

Recently Read

Energy, Momentum, and Mass Mean Lifetime Part 3: MINERvA



Data Activities Portfolio

In the Beginning

In the Beginning	Now
14 Activities	38 Activities
Variety of structures	Specific structure
No Protocol	Protocol Aligned with PD Criteria
Level 1-3	Level 0 - 4
No Teacher Answer Key	Teacher Answer Key Provided
No Coding Activities	2 Coding Activities
No Spanish Language Versions	Spanish Language Posted for 5 Activities



Data Activities Portfolio

Guiding Principles

Improvements

- **Accessibility for all teachers**
- **Activities tied to curriculum topics**
- **Linked activities of increasing challenge**
- **Ultimate goal: Student Research**



Data Activities Portfolio

Improvements

Data Strand

Level

Curriculum Topics

NGSS Practices

Curriculum Topics

- ✓ - Any -
- Conservation Laws
- Diversity & Inclusion
- Electricity & Magnetism**
- Half-Life/Mean Lifetime
- Instrumentation
- Waves & Interference
- Kinematics
- Nature of Matter
- Quantum Mechanics
- Special Relativity
- Standard Model
- Skill: Coding
- Skill: Developing Models
- Skill: Graphing
- Skill: Histograms
- Skill: Uncertainty
- Spanish Language

Data Strand

- ✓ - Any -
- Cosmic Ray**
- LHC
- Neutrino

Level

- ✓ - Any -**
- Level 0
- Level 1
- Level 2
- Level 3
- Level 4

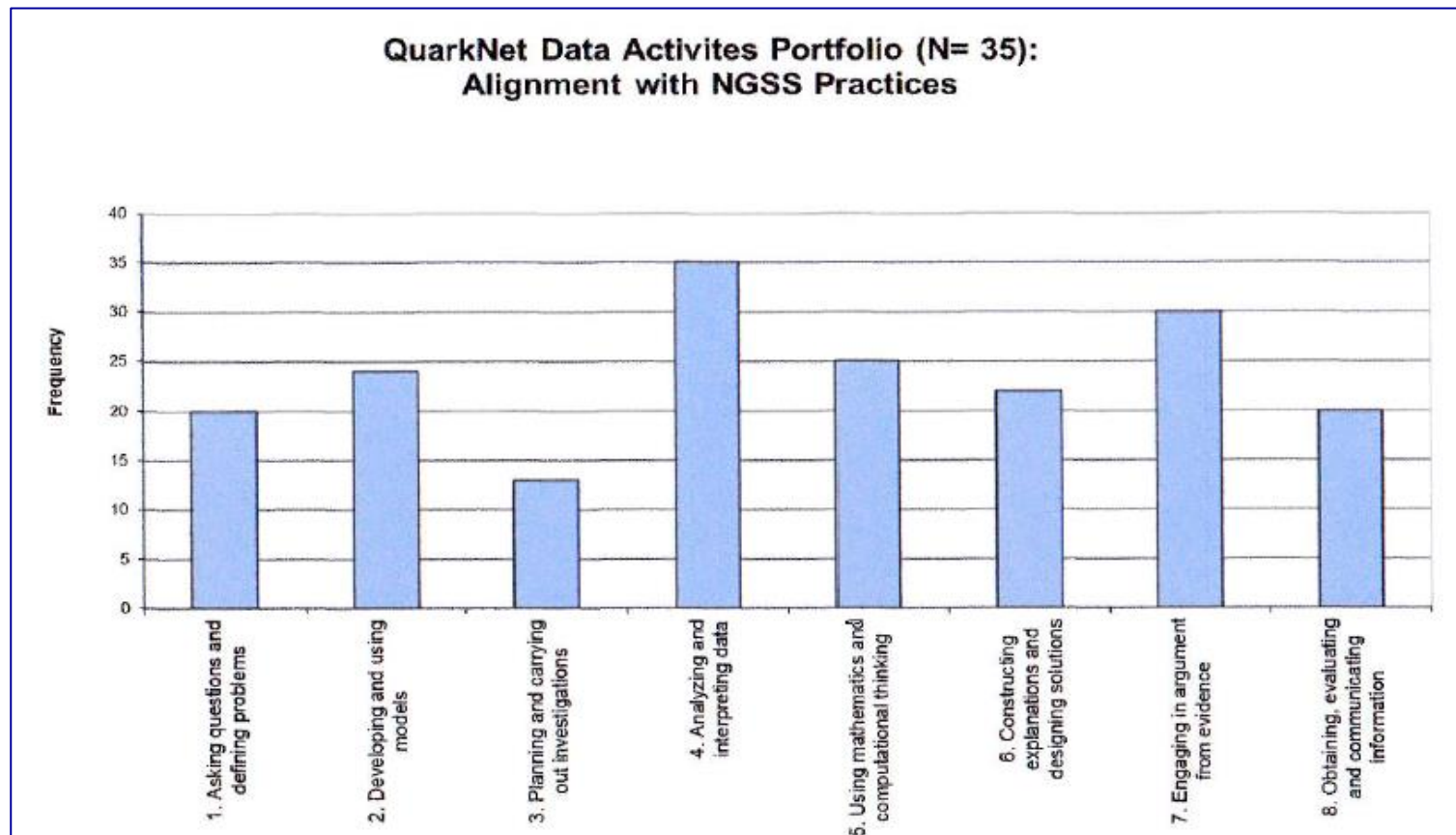
NGSS Practices

- ✓ - Any -
- 1**
- 2
- 3
- 4
- 5
- 6
- 7
- 8



Data Activities Portfolio

NGSS Best Practices





Data Activities Portfolio

Most Used Activities

2019	2020
Rolling with Rutherford	Rolling with Rutherford
Quark Workbench	Dice, Histogram and Probability
Mass of U. S. Penny	Calculate the Z Mass





Data Activities Portfolio

Connections

Data Activities Portfolio Supports:

- **Workshops**
- **Camps**
- **Masterclasses**
- **Broadening Participation**



Data Activities Portfolio

Initiatives

- **Infuse Data Science into existing activities.**
- **Implement using coding notebooks.**
- **Add Spanish language versions to existing activities.**



Data Activities Portfolio


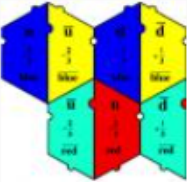
The Future

Goals:

- **Infuse Data Science where appropriate.**
- **Implement coding activities accessible to all teachers.**
- **Add Spanish language versions to all activities.**
- **Continue to develop accessible activities explaining new discoveries.**



Data Activities Portfolio

Data Strand	Level	Curriculum Topics	NGSS Practices	
- Any -	- Any -	- Any -	- Any -	Apply
<p>1 2 3 4 NEXT › LAST »</p>				
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