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| **Lesson Title : Gathering Information** | **Unit #: 1** | **Lesson #:** **1** | **Activity #:****2** |
| **Activity Title: School Wide Survey** |

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| **Estimated Lesson Duration:** | **7 days** |
| **Estimated Activity Duration:** | **6 days** |

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| **Setting:** | **Classroom** |

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| **Activity Objectives:** Students will:* Develop a survey to gather information about the student population and cell phone usage
* Conduct an all school survey and analyze the data to draw conclusions and provide motivation for the challenge
* Use two way frequency tables to examine possible association between two categorical variables
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| **Activity Guiding Questions:*** Which applications on the cell phone does the student population use the most?
* What do we need to know about our own cell phone use to inform our behavior about using them?
* How many questions should a good survey have?
* What information do we need the survey to tell us?
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| **Next Generation Science Standards (NGSS)**  |
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| **Science and Engineering Practices (Check all that apply)**  | **Crosscutting Concepts (Check all that apply)** |
| ☒ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☐ Developing and using models | ☐ Cause and effect |
| ☒ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☒ Analyzing and interpreting data | ☐ Systems and system models |
| ☒ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☐ Structure and function.  |
| ☐ Engaging in argument from evidence | ☐ Stability and change.  |
| ☒ Obtaining, evaluating, and communicating information  |  |

| **Ohio’s Learning Standards for Science (OLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☐ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☐ Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Ohio’s Learning Standards for Math (OLS) and/or** **Common Core State Standards -- Mathematics (CCSS)** |
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| **Standards for Mathematical Practice (Check all that apply)** |
| ☐ Make sense of problems and persevere in solving them | ☒ Useappropriate tools strategically |
| ☒ Reason abstractly and quantitatively | ☒ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☐ Look for and make use of structure |
| ☒ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, OLS and/or CCSS):**S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.★ |

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies)* 12.1 Organizing Data Using Matrices (Pearson Algebra I Worksheet)
* 12. 2 Frequency Tables and Histograms (Pearson Algebra I Worksheet)
* 12. 5 Samples and Surveys (Pearson Algebra I Worksheet)
* PowerPoint to give instruction on how to make an effective survey and to guide discussion on making a class survey for the students in school to take
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| **Teacher Advance Preparation:*** Day to conduct school wide survey (during underclassman and upperclassman lunch bells)
* PowerPoints and Handouts
* Post It Notes for Survey Question Critiques
* Markers and Large Paper
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| **Activity Procedures:****Day 1**1. Begin by revisiting the guiding questions of the challenge
2. Lesson 12.1 from Pearson Algebra I book – Organizing Data Using Matrices

(organizing information into matrices, adding and subtracting matrices, scalar multiplication) 1. HW: 12.1 Organizing Data Using Matrices Worksheet

**Day 2**1. Revisit guiding questions
2. Lesson 12.2 Frequency Tables and Histograms

(This lesson provides students with ways to analyze data from survey responses to draw conclusions) 1. HW: 12.2 Frequency Tables and Histograms Worksheet

Day 3: 1. Revisit guiding questions
2. Think-pair-share: What makes a good survey question?
3. Lesson 12.5 Samples and Surveys
4. Focus on three ways to choose a sample from a population – random, stratified, and systematic
5. Learn to identify bias
6. Examine good and bad examples of survey questions
7. HW: 12.5 Samples and Surveys Worksheet

Day 4: 1. Revisit guiding questions
2. As a class, discuss which sampling method we want to use for the survey and the best way to execute the survey.
3. Think-pair-share: What are important information for us to know to complete the challenge? (i.e. what type of phone is most used by our student population, what apps or features on phone do students use the most…)
4. Share potential survey questions with team members. Team will pick 5 of the 9 to display for the class by writing on large papers around the room (8-10 min)
5. Teams will go around the room critiquing each other’s questions (8-10 min)
6. As a class discuss which questions will be used for field test.
7. Brainstorm and discuss how the survey should be administered to the whole school and a “pitch” to get student buy in and authentic responses
8. HW: Review each other’s questions in class and provide feedback. Is anything repetitive? Is there bias?

Day 5: 1. Take student feedback on potential survey questions and sort them by common characteristics i.e. phone settings, contact (text, phone, video messaging), social media, other apps, etc.
2. Give each group a set of questions to analyze. Create two to three final questions for each category.
3. Come together and create survey.
4. Finalize plan to execute survey.

Day 6- ongoing: 1. Collect responses from student population.
2. Analyze responses using matrices, frequency tables, histograms and bar graphs.
3. Based on survey responses, give groups a phone feature to explore for challenge.
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**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

* Creating the Survey
* Analyzing the survey responses

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

* 12.1 Organizing Data using Matrices Quiz
* 12.2 Frequency Tables and Histograms Quiz
* 12.5 Samples and Surveys Quiz

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.Refer to Activity Template for details. |

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson.This activity went very well! All students contributed in the process of creating the survey questions, collecting responses from their peers in the most effective way and analyzing the survey responses. Students gave of their lunch time to work on the survey. This activity was well paced. There were many breaks in the activity with days off of school but overall we were able to complete the survey in a reasonable time. Students were concerned that other students would not take the survey seriously. The goal was for students to be at the forefront of this and they were. The students chose to do a systematic sampling by class so those who were to complete the survey were randomly chosen beforehand. There was some frustration when the students who were chosen were absent. It was also beneficial to teach matrices, frequency tables and histograms before conducting the survey. Once the responses were collected, the students knew they could use these as tools to analyze the data without prompting from me. . |