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| **Lesson Title : Traffic Flow** | **Unit #:**  **1** | **Lesson #:**  **2** | **Activity #:**  **3** |
| **Activity Title: Let’s Take A Walk** |

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| **Estimated Lesson Duration:** | **6 days** |
| **Estimated Activity Duration:** | **1—regular period and 1—88 minute period** |

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| **Setting:** |  |

Honors Algebra I class will take a walking field trip to the intersection of Glenway, Warsaw, and Quebec Avenues. After data is collected we will proceed back to classroom.

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| **Activity Objectives:** |

Students will:

1. Collect data on number of vehicles that populate an intersection; data will be precise and accurate.
2. Students will analyze data; they will calculate arrival rate, departure rate and wait time at each street location.
3. Students will graph data using equations of lines.

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| **Activity Guiding Questions:** |

Students will be guided through this activity with the following questions:

1. What effects the travel time of vehicles?
2. What is the quickest distance between two points?
3. What improvements can be made to the intersections to increase the flow of traffic?

| **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 New Learning Standards for Science (ONLS)** |
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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)** |

| **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, ONLS and/or CCSS):** |

**CCSS.Math.Content.HSA.REI.C.6**

**Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.**

**CCSS.Math.Content.HSA.REI.D.10**

**Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).**

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

For the Walking Field Trip the following materials are needed: counters, timers, cameras, data collection handout. Powerpoint is created for lesson.

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| **Teacher Advance Preparation:** |

Field trip permission forms need to be completed prior to activity.

Also need to make copies of the data collection worksheet.

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| **Activity Procedures:** |

Activity procedures are outlined on the activity’s powerpoint. Here are the procedures to follow:

1. At the beginning of class I will have distribute materials to students. I will also separate students into their groups. I will also discussion the safety issues involved with this activity; must stay on sidewalks and do not solicit conversation with strangers.
2. Students will determine which their data collection location points.
3. We will then process outside to designated location points.
4. First day I hope to get through one location point and on second day I hope to get through other 2 location points.
5. Once all data is collected we will proceed back to the classroom to analyze our data.
6. Each student will be required to turn in activity worksheet.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

Each student is expected to complete the activity handout. These will be collected and assessed according to whether they followed the directions of the activity, accuracy of measurements and their final graphical representation.

**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.

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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. |

I can modify this activity for those students who want a greater challenge by asking them to choose a busier intersection to observe and data collect. If students are absent the day of the activity they could also implement the same activity using the school cafeteria as a model.

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| **Reflection:** Reflect upon the successes and shortcomings of the lesson. |

This activity was my biggest obstacle in the unit. At first my administrators did not want us to walk down to the intersection of Glenway, Warsaw, and Quebec. So as a compromise we used the intersection closest to school (Beech and Glenway). Students loved going outside!! Students were able to calculate the necessary rates (arrival and departure) but this particular intersection did not have as many “factors” as the intersection of Glenway, Warsaw, and Quebec. Students were able to conduct a brief traffic study which was beneficial to completing the challenge. Next year I might look into getting hard hats and vests so they can “act” play the part of traffic engineers. Weather was also a huge problem to the timing of this activity, plus it was important to me that all students be present for the activity. It was suggested to use google earth to observe other intersections. Also this could be an opportunity in the unit to invite a civil engineer to speak to the class in regards to traffic design.