*What is Your Code?*

*4th Grade*

*Amount of time for this lesson = 60 minutes in stations/groups*

*This lesson could become a multi-day lesson*

1. Standards and Safety and Materials:

 A. Standards – *Mathematics Grade 4* [CCSS.MATH.CONTENT.4.MD.B.4](http://www.corestandards.org/Math/Content/4/MD/B/4/)- Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

 *Science Grade 4-*

|  |  |
| --- | --- |
| 3-5-ETS1-2. | Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. |
|  |  |

|  |
| --- |
|  |

B. Safety Concerns- minimal safety concerns with regular class activity

 C. Materials – rulers, coordinate plane worksheets, Robot Turtles board game

2. Objectives:

 A. Students will **demonstrate** proper use of the ruler as a measuring instrument to connect given points on a coordinate plane.

 B. Students will **create** a picture using a given coordinates to identify their understanding of reading a coordinate plane system.

 C. Students will **list** the steps, algorithms, and used will participating in the board Robot Turtles.

 D. Students will **communicate** using mathematical terms.

3. Connections, Misconceptions, and Crosscutting Concepts:

 A. Real world connections: Astronomy, building, construction, and measurement

 B. Student background connections: tools used to measure, space, computer science, coding

 C. Misconceptions:

1. Students would be shown how to use a ruler properly (use of power point could be used here). Students should be encouraged to draw their own pictures using a ruler so that they see the importance of using a ruler properly.
2. Students would be shown the proper way to read a coordinate plane, a coordinate system, and have an introduction to computer science and coding.

 D. Crosscutting Concepts: Science- Astronomy, Math- measurement, algorithms, Language Arts- sentence structure
 E. Academic Language: ruler, coding, functions, variables, if statements, coordinates, coordinate planes, and

4. Catch/*Engagement*: We will begin by reviewing what we know about coding by having an introduction to this lesson with opportunity to play a whole group video game.

5. Pre-test: Essential Question: Explain the purpose of coding?

6. Activity/*Exploration*:

 Part 1: Lecture

 X – The lesson will begin with a review of the vocabulary. Students will **explain** what steps are taken in the coding process as a whole group. The class will also discuss what a coordinate plane is and what coordinates are. The teacher or a volunteer student will then place a dot on the coordinate plane to demonstrate how this process will work. The review will continue with discussion on what steps each column of coordinates represent. The students will be able to demonstrate their background knowledge by sharing what steps they take in t he coding process on the coordinate planes. Use this website to find an appropriate coordinate pair lesson for your students- <http://edhelper.com/ordered_pairs_coordinate_plane.htm>.

 Y – The teacher will explain what the lab will entail after the review is complete. This will be modeled for the students under the Elmo. They will complete the remainder of the coordinate plane worksheet in their station.

 Part 2: Lab

 M – Worksheets of coordinates planes, and the board game Robot Turtles.

 N – Procedures:

1. Students at the coordinate plane stations will **write/draw** (demonstrate) the coordinates on the coordinate plane and then connect each coordinate to the one before to produce a picture. This is included at the end of the lesson plan.
2. Students at the coordinate plane stations will receive their group’s coordinate plane and coordinates. A copy for each student.
3. Each student at the coordinate plane stations will **use** (demonstrate) the rule to measure the distance between the coordinates. They will then connect the coordinates as they go to produce a picture.
4. Each student at the Turtle Robot stations will **find** (list) the different types of algorithms and **record (**describe) their data in their science journals.
5. Within each group students will be collaborating with one another to compare and discuss answers.
6. Once students have completed their Robot Turtle game or coordinate plane they will then use the product they produced to discuss with their groups how this relates to what they know about coding.
7. Students within each group should be **collaborating** (communicating) to find the relationship between their activity and coding.

 Part 3: Reading

1. We will begin by reviewing what we know about space by reading the book, There is No Place Like Space, by Dr. Seuss.

 Part 4: Discussion

 1. Students within each group should be discussingtheir findings and the relationship between their activity and coding.

7. Review/Essential Questions/*Explanation*:

 A. Low Level – What is the purpose of coding?

 B. Middle Level – By using the data collected from each group what relationships to coding do these activities have?

 C. High Level – Explain the disadvantages of not following the directions within these activities.

8. Assessments (Post-test)/*Evaluation*:

 A. Formative: Review of vocabulary, teacher will observe the students using the appropriate steps within their groups, teacher will be observing and asking the following questions:

* How do you know what number you read on each axis?
* How do you know what coordinate points to connect?
* What step does that card represent in the coding process?
* Why would they introduce different blocks at different points throughout the game?

 B. Post-test: Students will **explain** the answer to the essential question on an exit card. They will also be asked on the exit card to list two things that they learned within the lesson. The expectations for exit cards will be that the answers must be **written** in complete sentences.

 C. Summative:
 Students will **demonstrate** their understanding of coding by completing a unit assessment where they will be asked to explain the steps of coding and their purpose.

 D. After review of the students exit cards and the values that they came up with on their constellations the teacher will decide if the class will proceed on.

9. Timeline: A. Catch 2 min

 B. Pre-test 3 min

 C. Activity – 4 parts 40 min

 D. Review and Post-test 8 min

10. Enrichment/*Elaboration*: Extra copies of all constellations so that if a group finishes early they are able to work on another constellation.

11. IEP Accommodations/Differentiation/Diversity:

 1. Students will be working within mixed ability groups.

 2. Allow each student his or her own physical space within the group.

 3. Pre-teaching vocabulary is especially important for ELL students.

 4. For students struggling to identify where the coordinates are to be placed provide a coordinate plane picture that has the coordinate marked and they list the points that were used. This will allow them to practice reading a coordinate plane and to understand the steps that are being repeated, which will help when they are asked to make the connection between this activity and coding.