Numbers in Science

5 x 50 min periods

Authors

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SUBJECT/GRADE LEVEL

Subject: Science
Grade: 9-12

Materials

- Top loader/Triple Beam, Digital Scale
- Objects to weigh
- 10 mL and 25 mL graduated cylinders
- Calipers
- Construction paper
- Blank computer paper

STANDARDS

Next Generation Science Standards

- Science and Engineering Practices: Planning and Carrying Out Investigations, Analyzing and Interpreting Data, Using Mathematics and Computational Thinking, Engaging in Argument from Evidence.

Mathematics Standards | Common Core State Standards

- S-IC Making Inferences and Justifying Conclusions - Make inferences and justify conclusions from sample surveys, experiments, and observational studies

English Language Arts Standards | Common Core State

- CCSS.ELA-LITERACY.RST.11-12.1.A Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas

LESSON OBJECTIVE(S)

Students will use argumentative driven inquiry (ADI) to create a poster presentation on scientific notation, accurately report data using correct significant figures, accurately select and/or use the correct lab equipment (related to measurement) required during an experiment.

ENGAGEMENT

Brief Description: Students will be asked to bet their grade.

Procedures:

1. Obtain a 10 ml graduated cylinder.
    a. On countertop, have a digital scale, distilled water bottle,
    b. Ask students if they could fill it with 10ml in one try.
        i. Students who can will raise their grade one letter grade.
        ii. Students who cannot, will lose a letter grade.
        iii. f you are uncomfortable doing grade, do a treat, sticker, toy.
2. Allow about 5 students to try.
3. Ask students how scientists ensure measurements are accurate, how they report data.
4. Students complete essential questions. See linked document.

EXPLORATION

Brief Description: Students will create a foldable.

Procedures:

Students will use guided notes to create a foldable for accuracy and precision, scientific notation, significant figures. See linked documents for help with creating foldable and guided notes for completing foldable.

EXPLANATION

Brief Description: Task Card practice. For this, use either sample problems or homework and have students write out problem, answer, and show work.

Procedures:

1. Obtain sample problems for students to work. Look through Numbers in Science Folder for practice problems.
2. Give each student a sample problem to work. Only give them one.
    a. I have them work on small whiteboards, write on their desks with chalk (chalk markers), or use a sheet of notebook paper. Make sure students write big.
3. Give students time to work problems.
4. Have all students get up and move to a new problem. They will check the problem to see if it is correct.
    a. If student is unsure if it is correct, have them raise their hand to have you check it.
    b. If the student believes it is correct, they place a check mark. Sometimes I have students do a yes/no next to their answer and have students put tally marks in yes if correct and no if incorrect.
5. Have students clean up and then do another round.

ELABORATION

Brief Description: Complete Argument Driven Inquiry (ADI) Best Practices for Lab Equipment. I found this activity publicly available online. I included it and other handouts related to completing this activity in the linked folder.

Procedures: Students will follow the ADI Best Practices for Lab Equipment and complete the tasks. After completing the tasks, students will then prepare a poster sharing their groups results.

EVALUATION

Brief Description: Students will have a poster session. During this time, students will present their poster using the ADI format in the linked folder and be evaluated using the peer review. These poster sessions are done in lab teams.

Procedures:

1. Review ADI material in linked folder.
2. Make copies of rubrics.
3. Have students present their poster.
4. After poster presentation, have students complete quiz in linked folder.

REFERENCES

- Numbers in Science Folder: Look in shared folder for more labs, worksheets, interactive notebook book (digital), etc.