

Angles, Degrees, Protractors....Oh My!

4th Grade

Amount of time for this lesson = 60 minutes

1. Standards and Safety and Materials:

A. Standards – *Mathematics Grade 4 Geometric measurement: understand concepts of angle and measure angles.5.*

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| SC4.1.5 | <u>Objects in the Sky</u> : Students describe observable objects in the sky and their patterns of movement. |
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B. Safety Concerns- minimal safety concerns with regular class activity

C. Materials –protractors, printouts of constellations, pencils, math journals

2. Objectives:

A. Students will **demonstrate** proper use of the protractor as a measuring instrument.

B. Students will **create** a chart to identify what types of angles are in their constellation.

C. Students will **list** the amount of each angle type found within a constellation and **describe** the constellations worth according the values given.

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: names of angles, space, planets, and constellation

C. Misconceptions:

1. Students would be shown how to use a protractor properly (use of power point could be used here). Students should be encouraged to draw their own angles so that they see the importance of using a ruler. They should measure various angles in different orientations.
2. Students would be shown 4 different angles and asked to identify which angle it is, depending on the ability of the student, the named angle could be given and students asked to match up the angle with the label. They would then be asked to come up with a definition of how to identify each angle. Angle Types – Acute, right, obtuse, straight angle, reflex.

D. Crosscutting Concepts: Science- Astronomy, Math- measurement, Language Arts- sentence structure

E. Academic Language: protractor, angles, planets, constellations, horizontal, vertical, diagonal, acute, obtuse, straight, right angle, center mark, inner scale, outer scale

4. *Catch/Engagement*: We will begin by reviewing what we know about space by reading the book, There is No Place Like Space, by Dr. Seuss.

5. Pre-test: Essential Question: What is the purpose of a protractor?

6. Activity/*Exploration*:

Part 1: Lecture

X – The lesson will begin with a review of the vocabulary. Students will **explain** what an acute, obtuse, straight, and right angles are as a whole group. The class will also discuss what a vertical, horizontal and diagonal lines are. The teacher or a volunteer student will then draw an example of each angle and line on the board. The review will continue with discussion on what makes a constellation. The students will be able to demonstrate their background knowledge by sharing some of the constellations that they know.

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 estimate the worth of the different constellations that they are shown before they are able to calculate them.

Part 2: Lab

M – Worksheets of constellations will depend upon the teacher.

N – Procedures:

1. Students will **write** (demonstrate) the values of the angles and lines down in their science journals so that they are able to reference them as they add up the value of their constellation. This is included at the end of the lesson plan.
2. Students will receive their group's constellation and protractor. A copy for each student.
3. Each student will **use** (demonstrate) the protractor to measure the angles within the constellation. They will record their answers in their science journal.

4. Each student will **find** (list) the different types of lines 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 measuring they will then use the value chart to find the value of their constellation.
7. Students within each group should be **collaborating** (communicating) to find the value of their constellation.

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 will discuss the values of their constellation within the whole group. Each group should come to an agreed upon answer.

7. Review/Essential Questions/*Explanation*:

- A. Low Level – What is the purpose of a protractor?
- B. Middle Level – By using the data collected from each group what constellation had the highest value?
- C. High Level – Explain the disadvantages of measuring using a protractor that you noticed while working within your groups.

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

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

- How do you know what number line or scale to read on the protractor?
- How do you know where to place the center mark?
- What is the difference between a horizontal and vertical line?
- How do you know if an angle is acute or obtuse?

- 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 measuring with a protractor by completing a unit assessment where they will use a protractor to measure angles.

- 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:

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| 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 angles, provide additional pictures of real-life objects with the angles highlighted or bolded in the picture. Have these students identify the type of angle and then show the students a similar object in the classroom. Have each student run a hand along the angle in the picture and then along the angle of the real object.

Angle Value

Acute angles = 10 cents each

Obtuse angles = 8 cents each

Right angles = 5 cents each

Vertical lines = 3 cents each

Horizontal lines = 2 cents each

Diagonal lines = 1 cent each