NTTI Media-Rich Lesson

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NAME

The Polly Express
LESSON TITLE

9th graders
GRADE LEVELS

One class period/approximate length of class period is 90 minutes
TIME ALLOTMENT

BACKGROUND/OVERVIEW

Too often students are not provided a connection between the mathematics they are learning in class and their everyday life. Sometimes the mathematical concept or lesson being taught is completed, and the opportunities for connections are never provided for the student. The introduction to the study of polynomials is an excellent opportunity to demonstrate an algebraic connection through an application in biology relative to population control.

Teacher Directives

Begin the lesson with a class discussion/activity. Ask the students to sit in pairs (twos). Ask the question: Suppose your city supported herds of deer in their metropolitan parks, supplying them with food, medical care, shelter in winter, and protection from predators. Remember, students cannot understand the true meaning of polynomial without first recognizing and understanding a real life connection. Next, guide your class through the introductory activity. In this lesson, students get their first exposure to working with polynomials through a biology connection activity. After students are able to demonstrate their understanding of what a polynomial is through identification and definition, then begin the exploratory activity.

SUBJECT MATTER

Algebra 1 (Introduction to the study of Polynomials)

LEARNING OBJECTIVES

Students will be able to:

- Solve problems by looking for a pattern
- Recognize and define a monomial
- Determine the different kinds of polynomials (binomial, trinomial…)
- Find the degree of a monomial
- Determine the degree of a polynomial
- Arrange the terms of a polynomial in order

- Arrange the terms of a polynomial so that the powers of a certain variable are in ascending order

STANDARDS

Georgia Core Curriculum for grades 9-12

http/www.glc.k12.ga.us

Standards # 3 Topic: Communication

Communicates mathematical ideas by using language and symbolism; reflects upon and clarifies thinking about mathematical ideas and relationships; formulates mathematical definitions and expresses generalizations discovered through investigation; expresses mathematical ideas both orally and in writing; interprets written presentations of mathematics; asks clarifying and extending questions related to mathematics about which they have read or heard.

Standard # 10 Topic: Polynomials

Identifies polynomial expressions and determines the degree, leading coefficients, constant, and number of terms of a polynomial.

MEDIA COMPONENTS

Videos:

Algebra Action #110 "What are Monomials, Binomials, and Polynomials?"

MATERIALS

Per Student:

- Polynomial Family Packet
- Vocabulary List
- Video discussion questions

Per Group:

- One packet of arranging terms of a polynomial according to leading coefficient

PREP FOR TEACHERS

Prior to teaching this lesson:

- Preview video and prepare focus activity for media interaction.
- Prepare Vocabulary List
- Prepare vocabulary words for "Word Wall".
- Obtain TV Monitor/Gateway/video player
- Prepare individual Polynomial Family Packets-each packet should contain five different kinds of polynomials/different relative to degree and type. Make sure each packet contains the same kinds of polynomials with the same degrees. You may use different variables.
- Prepare Group Activity packets for no more than 4 groups. The group packets must be identical.
- Prepare transparency for culminating activity-Description of Polynomials Activity

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INTRODUCTORY ACTIVITY: SETTING THE STAGE (Engage).

Begin the lesson with a class discussion/activity.

Step 1: Divide the class into four groups**.**

Step 2: Pose this scenario: Suppose your city supported herds of deer in their metropolitan parks, supplying them with food, medical care, shelter in winter, and protection from predators**.**
Step 3: Discuss with your group the possible problems that may arise from such a city initiative/project.
Step 4: Ask the groups to make a list to summarize the possible problems discussed in their groups. Time this activity. Tell the groups that they will have 5 minutes for discussion**.**
Step 5: Stop the discussion after 5 minutes and tell the groups to select a recorder and the person to report out for the group. Tell the groups that they will 5 minutes to make their list of possible problems.
Step 6: Have each group to share with the entire class their possible problems.
Step 7: As each pair reports out, on the board, have one student list the possible problems,.
Step 8: Have the student at the board underline or circle those problems, which are common to each group**.**
Step 9: If overpopulation does not appear as a possible problem, then you add it to the list. Most likely, overpopulation will be one of the problems on the students' list. Finally, guide your class into a short discussion on uncontrolled animal population and how this growth develops polynomially. Explain that if one animal has x offspring, then it will have an average of x^2 grand offspring, x^3 great-grand offspring, x^4 great-great-grand offspring, and so on, assuming that each animal has an average of x babies in its lifetime.
Step 10: Write on the overhead the polynomial x+x^2+x^3+x^4+…while saying… we can represent the number of descendants of one animal with this polynomial expression. Say that this polynomial is continued only if none of the animals die early. Through this "talking mathematics" and biological connection activity, students will gain comprehensive background knowledge through a "real life" example of what a polynomial looks like and how a polynomial may be represented. This kind of introductory activity is needed for all students to be truly successful in working with polynomials.

LEARNING ACTIVITY 1

Step 1: Tell the students that they will now watch and listen to segments from a video about polynomials. Tell the class that the title of the video is "What are Monomials, Binomials, and Polynomials?"
Say to the class that they will now move from the practical application relative to polynomials to learning how to identify specific types of polynomials; additionally, they will obtain some needed facts, which they will need while solving problems involving polynomials in future lessons.
Step 2: FOCUS FOR MEDIA INTERACTION: Distribute the vocabulary list to each student. Tell them to listen for two specific things while viewing the video: the definition of each vocabulary word and examples of each term**. Cue** the video to the beginning. **Play**. **Pause the video** after the lady says, "As long as it is all multiplying." **Class Discussion: CHECK FOR COMPREHENSION** by asking the class to give you some more examples of monomials. After you have received several (2-3) correct responses, ask if someone would define the term monomial in their own words for the class.

Resume Play. **Pause the video** after the lady says: x^2yz+5. **Class Discussion:** Ask the class to give you an example of a binomial. After you have received 2-3 correct responses, ask if someone would define the term binomial in their own words for the class. Ask the class what they think the definition of a trinomial would be. Allow the class to give several examples of a trinomial. You will probably receive several correct responses. Write the student responses on the board. Say, now let us see if we are correct. **Resume Play. Stop the video** after the lady says, "This is another example of a monomial." Ask the class why is the term the lady wrote a monomial when it does not look like the other monomials.

Step 3: Ask the students if they have questions. Review all definitions by allowing students to summarize what they learned from the video.

LEARNING ACTIVITY 2

Before beginning this activity, you should place the words monomial, binomial, trinomial, and polynomial around the classroom. This activity will serve as an informal assessment as well as a review of the content learned from the video activity. Tell the class that the group grade will be their individual grade so they must agree and what together to derive their final responses.

Step 1: Tell the class that now they will earn their first grade for the day by participating in a group activity called, "Polynomial Family". Tell them to get in their cooperative groups. Give each group a Polynomial Family Packet.

Step 2: Tell the class that in their packets that they will find five different kinds of polynomials. Have the students to take all of the polynomials out of the packets and place them so that each member of the group is able to see all five polynomials.

Step 3: Tell the class that as you give the description of a polynomial, they are to decide among themselves, which polynomial fits the description. Place tape on the back of the sheet with their answer. One member from each group is to take that polynomial and go stand by the word that you have placed around the room that they feel fits the description. After you have given five descriptions, there should be five students standing near each of the terms.

Step 4: Finally, you put up the correct responses either on the board or overhead-list the terms and all of the possible correct answers from the group packets. Then ask the students who are standing by the terms to stick their sheets under, around (whatever is best) the word/term on the wall. Discuss each group's response.

CULMINATING ACTIVITY

Have students move to the 4 groups they were in for the opening/engagement activity. Tell them that to closeout this lesson on polynomials, you want each group to make up their own polynomial to fit the descriptions provided by you. Put the descriptions of the polynomials on the overhead projector. See sample descriptions. Transparency should be prepared before class. Ask each group to write two polynomials to fit each description. Tell them that a group grade will be assigned based on appropriate answers. Tell them that each group will be asked to share their answers with the class.

CROSS-CURRICULAR EXTENSIONS

1. **Geometry** Connection-Ask the class to find the measure of the volume of a cube. Provide the class with a picture of a cube with the dimensions you wish them to use.

Review the definition of volume and allow the students to give the formula for finding the volume of a cube.

2. Biology- Animal Population Group

COMMUNITY CONNECTIONS

1. Plan a class field trip to visit the local zoo. See and discussion with staff how animal population is controlled.
2. If a zoo is not assessable, then invite a person who works with animals to speak to the class relative to animal population control.

STUDENT MATERIALS

- Culminating Group Activity-Prepare as a Transparency and individual handout
- Vocabulary List
- Polynomial Family Packets

HANDOUT 1

VOCABULARY LIST

Upon completing this lesson, you should be familiar with the following terms:

1. monomial
2. binomial
3. trinomial
4. polynomial
5. degree (of a monomial; of a polynomial)
6. constants
7. term

HANDOUT 2

Culminating Cooperative Group Activity-Prepare as a Transparency and Individual Handouts for Each Group Member (Timed Activity)

Description of Polynomials

Write two polynomials to fit each description. Discuss your answers, and turn in only one paper to represent your group.

1. **Monomial with degree of seven**
2. **Polynomial with five terms and whose degree is six.**
3. **Trinomial whose terms are in ascending order. Let the leading term have the variable x.**
4. **Binomial with a degree of three without a constant term**
5. **Binomial with a degree of four and a constant term**