Problem-Based Learning

Fraction Flag

Fourth Grade

Math

MA12407

Wake Forest®
School of Medicine

Fraction Flag

Fourth Grade

Math

Overview

Your principal wants to have a special flag to hang in front of the school for Fraction Week. Students will explore concepts related to numbers & operations - fractions.

Table of Contents

PBL Problem Guide

FOR FACILITATOR USE ONLY

Timeframe

This lesson plan will take approximately 2 hours. It can be split into two class periods.

Step-by-step guide

- Put students into teams of three to five members.
- Ask for a volunteer to read the STUDENT PROBLEM PART ONE aloud [page 6].
- As a whole group, ask students to list What We Know [FACTS, page 8].
- Have each team create a list of What We Need to Know [NEED TO KNOWS & LEARNING ISSUES, pages 9 & 10].
- Have each team begin a list of POSSIBLE HYPOTHESES [page 15].
- Provide ADDITIONAL INFORMATION for NEED TO KNOWS [pages 11 & 12], allow teams to research LEARNING ISSUES [page 10].
- Teams re-evaluate POSSIBLE HYPOTHESES [page 15] and determine one DEFENDABLE SOLUTION for the Final Product [page 17].
- Ask for a volunteer to read the STUDENT PROBLEM PART TWO aloud [page 7].
- Repeat bullets three through seven.

PBL Resources

FOR FACILITATOR USE ONLY

Resources provided

Included with this case are:

- Principal flag design
- Flag template

Resources to assemble

You may wish to assemble the following resources ahead of time:

- Piece=Part=Portion: Fractions=Decimals=Percents by Scott Gifford
- If You Were a Fraction by Trisha Speed Shaskan
- Fraction strips and circles
- Geoboards
- Paper
- Markers

Student Problem Part One

FOR STUDENT USE

Your principal wants to have a special flag to hang in front of the school for Fraction Week. She created one, but she doesn't like her design. The principal has decided to let students have a competition to create a new flag.

Consider:

- How will you create a flag that showcases fractions?

Student Problem Part Two

FOR STUDENT USE

Now that you have created your own flag, the principal wants you to write a description of her flag in order to test your fractional knowledge. She is looking for comparisons of colors, shapes or anything involving fractions. Only students who submit these written descriptions can have their flags considered in the contest.

Consider:

- How will you compare your flag to the principal's?

Key Facts

FOR FACILITATOR USE ONLY

PART ONE

- Your principal wants to have a special flag to hang in front of the school for Fraction Week.
- She created a flag, but doesn't like her design.
- The principal has decided to let the students have a competition to create a new flag.

PART TWO

- Now that you have created your flag, the principal wants you to write a description of her flag, in order to test your fractional knowledge.
- She is looking for comparisons of colors, shapes, or anything involving fractions.
- Your flag won't be considered in the contest unless you submit a written description.

Need-to-knows / Learning Issues

FOR FACILITATOR USE ONLY

NEED TO KNOWS

- When is Fraction Week?
- Why is there a fraction week at school?
- What was the principal's flag design?
- What do we include in our flag designs?

NEED TO KNOW ANSWERS

- This week!
- To celebrate fractions.
- Prompt students to ask for this; it's provided in Additional Information for Students [page 10].
- The flag template [page 11] contains information about what to include.

LEARNING ISSUES continued on the next page.

Need-to-knows / Learning Issues

FOR FACILITATOR USE ONLY

LEARNING ISSUES

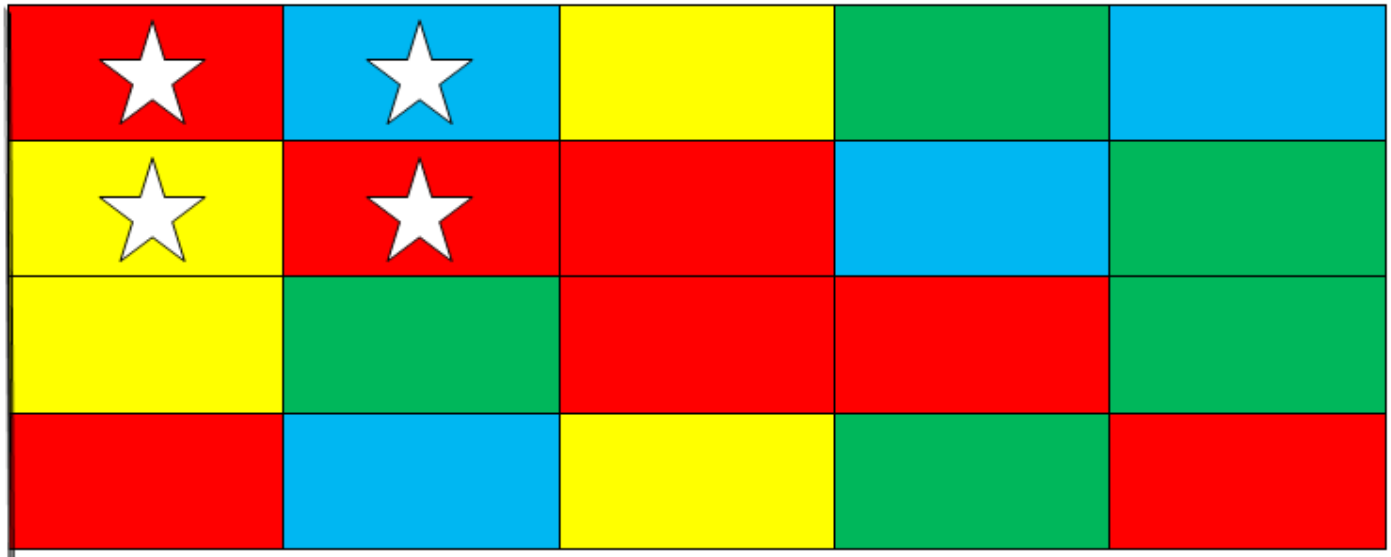
- Designing a flag involving fractions.
- Comparing fractional amounts.

LEARNING ISSUE RESOURCES

- Students will investigate using the Learning Issue Resource Guide, page 16.

Additional Information

FOR STUDENT USE



This is the flag the principal created.

Additional Information

FOR STUDENT USE

Additional Information

FOR FACILITATOR USE ONLY

Teams must complete Student Problem Part One [page 6] before beginning Part Two [page 7].

For Part One, teams will design decorate the flag template [page 12]. They should use the template provided, because of the total number of spaces that will be used in Correlating Activity One [page 14]. If the facilitator chooses not to do the correlating activity, then teams can design a fraction flag using any template they choose.

For Part Two, teams will create a written description for part of the Final Product. They will need to describe the principal's flag in fractional amounts. Teams can write this in a letter form to the principal.

Teams may need guidance to begin this part. For example: since there are 20 total spaces on the principal's flag, 20 will be the denominator. Four twentieths of the flag has stars. The facilitator can have teams simplify all fractions.

The facilitator may choose to have students create the written description of the principal's flag independently. Students will also have to write a written description of the whole lesson as part of their assessment.

Additional Information

FOR FACILITATOR USE ONLY

CORRELATING ACTIVITIES

1) To further expand on comparing fractions, the facilitator may have students compare their flag to the principal's flag. If the students used the flag template provided, then the sections totaled 16, compared to the 20 total sections on the principal's flag (4.NF.2). If students created their own templates, then the sections will need to be drawn in. For example: 7/20 of the principal's flag is red, while 3/16 of a team's flag may be red.

2) The facilitator can have students simplify all fractions they used in their written descriptions.

Hypotheses

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- Hypotheses for Student Problem Part One will vary by how teams design their flags.
- Hypotheses for Part Two will vary by which traits teams choose to compare in their letter to the principal. The denominator for the fractions should total 20, (unless teams simplify certain fractions) as there are 20 spaces on the principal's flag.

Sample Hypothesis for PART 2

Dear Principal,

I'm sorry you didn't like the flag you created for fraction week. I personally thought it was very colorful and creative. I'd like to explain to you how fractions were involved in your flag.

4/20 of your flag had shapes, while 16/20 did not have shapes. 7/20 of your flag was red. 8/20 of your flag was blue and yellow. 5/20 of your flag was green.

You could have used some more shapes, or created a design within the flag to change things up. I hope you like my flag design!

Sincerely,

_____

Learning Issue Resource Guide

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TEXT RESOURCES

Piece=Part=Portion:

Fractions=Decimals=Percents by Scott Gifford

This text compares fractions, decimals, and percents. Percent is not a fourth grade standard, but the concept of the book is still a good resource for students to access.

If You Were a Fraction by Trisha Speed Shaskan

This is a good additional text on fractions, focusing on fractions as parts of a whole.

MANIPULATIVES

Fraction strips
Fraction circles
Geoboards

These manipulatives will be helpful to teams when they are breaking down the flags into fractional parts. Some students will need the hands-on manipulatives to better understand the comparisons they will be making.

Final Product and Writing Guide

FOR FACILITATOR USE ONLY

Team

- Each team will submit a flag design with accompanying letter to the principal that describes the principal's flag in fractional amounts.

Individual

- The facilitator may choose to have students write the letter to the principal individually.
- Students will also write about the Final Product. They will include the problem summary, learning issues they encountered, how they came to their hypotheses, solution, and final product.

Fraction Flag

Rubric

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AREA	ABOVE AVERAGE Three points each	AVERAGE Two points each	BELOW AVERAGE One point each	NO EVIDENCE Zero points each	POINTS
Final Product	• All Learning Issues addressed • Three or more hypotheses present • High quality final product	• Most Learning Issues addressed • Two hypotheses present • Roles somewhat defined • Fair quality final product	• Few learning issues addressed • One hypothesis present • Low quality final product	• No learning issues addressed • No hypotheses present • No final product	
Writing Assessment	• Problem Summary, Learning Issues/New Information Integrated well presented • Hypotheses well presented • Solution and Defense well presented	• Problem Summary, Learning Issues/New Information Integrated presented • Hypotheses presented • Solution and Defense presented	• Problem Summary, Learning Issues/New Information Integrated poorly presented • Hypotheses poorly presented • Solution and Defense poorly presented	• Problem Summary, Learning Issues/New Information Integrated not presented • Hypotheses not presented • Solution and Defense not presented	
Collaboration	• Individual works well with group members • Individual communicates well with group members • Individual carries out their individual responsibilities	• Individual works acceptably with group members • Individual communicates acceptably with group • Individual mostly carries out their individual responsibilities	• Individual does not work well with group members • Individual does not communicate well with group members • Individual attempts but fails to carry out their individual responsibilities	• Individual interferes with group members • Individual does not communicate at all • Individual does not attempt to carry out their individual responsibilities	

24 – 27 Points = Above Average 15 – 23 = Average 6 – 14 = Below Average 0 – 6 = Failing

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Problem-Based Learning

Wake Forest School of Medicine Problem-Based Learning provides essential case studies to K–12 teachers across the United States. Access useful and easy-to implement case studies on Math, English Language and other STEM topics online at www.wakeproblembasedlearning.com.

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