Lesson 16: Posing Percentage Problems

Goals

- Generate questions (orally and in writing) about a real-world situation involving percent increase or decrease.

- Interpret news headlines or advertisements that include statements about percent increase and decrease.

- Solve a problem about a real-world situation involving percent increase or decrease and present the solution method (in writing and through other representations).

Learning Targets

- I can write and solve problems about real-world situations that involve percent increase and decrease.

Lesson Narrative

In this culminating lesson on percentages, students work in groups to collect news clippings that mention percentages and sort them according to whether they are about percent increase or percent decrease, formulate questions about them, and then share their questions with other groups in a gallery walk. The purpose for students to apply percentages in a real-world context (MP4).

Alignments

Addressing

- 7.RP.A.3: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Instructional Routines

- Group Presentations

- MLR5: Co-Craft Questions

- MLR8: Discussion Supports

- Take Turns

Required Materials

Grocery store circulars

Grocery store advertisements from the newspaper or that are picked up at the store. If students have Internet access, you could substitute an online version of this.

Tools for creating a visual display

Any way for students to create work that can be easily displayed to the class. Examples: chart paper and markers, whiteboard space and markers, shared online drawing tool, access to a document camera.

Sticky notes

Required Preparation

If possible, have students cut several clippings from newspapers or print advertisements that include percentages or bring in similar items from internet searches. If not possible, bring several examples yourself. Examples include coupons, news stories, and advertisements claiming an increase in product size ("Now with 33% more soap!"). Every group of 3–4 students should have a set including a variety of contexts as well as some that show a percentage increase of an amount and some that include a percentage decrease in an amount.

In the final activity, each group of 3–4 students create a visual display to be used in a gallery walk based on one of the situations. Provide materials to create these displays. During the gallery walk, students will leave feedback for each group on a sticky note they can attach to the displays. Provide several sticky notes for each group.

> **Student Learning Goals**
>
> Let's explore how percentages are used in the news.

16.1 Sorting the News

Warm Up: 10 minutes
Addressing

- 7.RP.A.3

Instructional Routines

- Take Turns

Launch

Arrange students in groups of 3--4. Provide each group with a set of newspaper clippings involving percentage increase and decrease.

Tell students to take turns sorting the clippings into the piles representing percentage increase and percentage decrease and explaining the decision. If there is a disagreement, partners should discuss their ideas to try to agree about the correct sorting of the item. If an agreement cannot be made, the clipping can be put to the side to be discussed after the activity.

> **Student Task Statement**
>
> Your teacher will give you a variety of news clippings that include percentages.
>
> 1. Sort the clippings into two piles: those that are about increases and those that are about decreases.
>
> 2. Were there any clippings that you had trouble deciding which pile they should go in?

Student Response

Answers vary.

Activity Synthesis

The purpose of the discussion is to discuss any issues students may have had determining the sorting as well as to discuss any interesting contexts from the clippings.

Ask students, "Were there any clippings that were not easy to sort? What made it difficult?" Work with the class to try to determine the correct sorting, if possible. Ask each group to read the important parts of their most interesting newspaper clipping and explain their reasoning behind sorting it where they did.

16.2 Investigating

10 minutes
In this activity, students use the examples of percentage increase and decrease that they sorted in the previous activity to pose questions that arise from the different situations. They ask and answer questions based on the information given and present this information graphically. In the next activity they will make a poster using one of their news items. Then students will go on a gallery walk and use sticky notes to ask questions about the information presented on each poster.

Addressing

- 7.RP.A.3

Instructional Routines

- MLR5: Co-Craft Questions

Launch

Keep students in groups of 3–4. Display the following statement for all to see:

"Global human population growth amounts to around 75 million annually, or 1.1% per year."

Ask students what questions they could answer with this information. Sample responses:

- What were possible populations in the two years used to compute the annual increase?

- By how many people will the population grow next year?

Tell students they will use the clippings from the warm-up to write similar questions for different situations.

Student Task Statement

In the previous activity, you sorted news clippings into two piles.

1. For each pile, choose one example. Draw a diagram that shows how percentages are being used to describe the situation.

    a. Increase Example:

    b. Decrease Example:

2. For each example, write *two* questions that you can answer with the given information. Next, find the answers. Explain or show your reasoning.

Student Response

Answers vary.

16.3 Displaying the News

20 minutes
In this activity, students work in groups and make a poster in their groups using one of their news items. Next, students go on a gallery walk and use sticky notes to ask questions about the information presented on each poster. They practice critiquing the reasoning of others as they

study information they have not themselves worked on. They then go back and study the feedback they received from their classmates and revise their own work.

Addressing

- 7.RP.A.3

Instructional Routines

- Group Presentations

- MLR8: Discussion Supports

Launch

Keep students in the same groups of 3–4. Give students supplies to make posters. Tell them that they will choose one of their news clippings and make a visual display for the information they worked on in the previous activity. The posters should include all necessary information so that somebody who has not extensively worked with the same information should be able to understand the work.

Allow students 10 minutes to work on creating their display. Review group work as they finish.

After all groups have finished, display each group's work around the room for students to do a gallery walk. Tell students that they should leave feedback for each display on a sticky note attached to each group's work. Feedback can include questions about the display or information as well as compliments or critiques. Comments and questions should be constructive with the goal to help the groups who made the poster improve their work.

Tell each group which poster to start with and in which direction they should move.

As groups finish viewing the displays, allow them time to view the feedback left on their own display and, if necessary, time to improve their display based on the feedback.

Access for Students with Disabilities

Engagement: Develop Effort and Persistence. Provide prompts, reminders, guides, rubrics, or checklists that focus on increasing the length of on-task orientation in the face of distractions. For example, provide a task checklist which makes all the required components of the poster explicit.
Supports accessibility for: Attention; Social-emotional skills

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Student Task Statement

1. Choose the example that you find the most interesting. Create a visual display that includes:

   ○ a title that describes the situation

   ○ the news clipping

   ○ your diagram of the situation

   ○ the two questions you asked about the situation

   ○ the answers to each of your questions

   ○ an explanation of how you calculated each answer

   Pause here so your teacher can review your work.

2. Examine each display. Write one comment and one question for the group.

3. Next, read the comments and questions your classmates wrote for your group. Revise your display using the feedback from your classmates.

Student Response

Answers vary.

Student Lesson Summary

Statements about percentage increase or decrease need to specify what the whole is to be mathematically meaningful. Sometimes advertisements, media, etc. leave the whole ambiguous in order to make somewhat misleading claims. We should be careful to think critically about what mathematical claim is being made.

For example, if a disinfectant claims to "kill 99% of all bacteria," does it mean that

- It kills 99% of the number of bacteria on a surface?

- Or is it 99% of the types of bacteria commonly found inside the house?

- Or 99% of the total mass or volume of bacteria?

- Does it even matter if the remaining 1% are the most harmful bacteria?

Resolving questions of this type is an important step in making informed decisions.