

Adding and Subtracting Rational Numbers Instructional Task

Overview

This instructional task requires students to use addition and subtraction of rational numbers to create a budget for a school club.

Standards

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

- Describe situations in which opposite quantities combine to make 0. *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.*
- Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Prior to the Task

Standards Preparation: The material in the chart below illustrates the standards and sample tasks that are pre-requisites for student success with this task's standards.

| Grade Level Standards | The following standards will prepare them: | Items to Check for Task Readiness: | Sample Remediation Items : |
|-----------------------|--|--|--|
| 7.NS.A.1 | <ul style="list-style-type: none"> 5.NF.A.1 6.NS.C.5 6.NS.C.6a 6.NS.C.7c | <ol style="list-style-type: none"> $\\$123.64 + \\243.75 <ol style="list-style-type: none"> $\\$367.39$ $\\$432.76 - \\175.62 <ol style="list-style-type: none"> $\\$257.14$ http://www.illustrativemathematics.org/7.NS.A.1 | <ol style="list-style-type: none"> http://www.illustrativemathematics.org/5.NF.A.1 http://www.illustrativemathematics.org/6.NS.C.5 http://learnzillion.com/lessonsets/411-add-and-subtract-rational-numbers-represent-addition-and-subtraction-on-a-horizontal-or-vertical-number-line-diagram http://learnzillion.com/lessonsets/596-adding-and-subtracting-rational-numbers-using-distance-absolute-value-and-opposites |
| 7.NS.A.3 | <ul style="list-style-type: none"> 4.OA.A.3 6.NS.B.3 | <ol style="list-style-type: none"> Your class is considering going on a field trip to a skating ring. The admission fee is \$12 per person. You have 25 students in your class. How much will it cost for your class to enter the skating ring? <ol style="list-style-type: none"> \$300 http://www.illustrativemathematics.org/7.NS.A.3 | <ol style="list-style-type: none"> http://www.illustrativemathematics.org/4.OA.A.3 http://www.illustrativemathematics.org/6.NS.B.3 http://learnzillion.com/lessons/1150-use-addition-and-subtraction-to-solve-realworld-problems-involving-decimals |

Real world preparation: The following questions will prepare students for some of the real world components of this task:

1. What is a budget?
 - a. This question is designed to make sure that students understand the purpose of this task. They need to figure out a plan to track how much money is deposited and how much money is spent to ensure that the account always has money.
2. What is an account?
 - a. Some students may be unfamiliar with accounts and using banks. You may need to explain that a bank is where you can bring money. The bank holds the money in an account until you are ready to spend it.
3. What is a balance?
 - a. Students may be unfamiliar with banking terminology. A balance is the amount of money in your account.
4. What is the difference between a withdrawal and a deposit?
 - a. Students may confuse these terms. A deposit is putting money into an account, and a withdrawal is taking money out of an account

During the Task:

Students may struggle with creating a monthly statement. You can scaffold this task for them using the three months in part one. Have students create monthly statements for September, October, and November. This will help students practice the process of creating a monthly statement before they have to start making decisions about how to make and spend money.

During the task, as you circulate around the room look for groups who may only be adding in unrealistic numbers for their fundraisers.

For example, students may only add in \$25 for a car wash fundraiser. Ask students guiding questions like the following:

1. If you made \$25 at your car wash, how many cars did you wash?
 - a. 5 cars at \$5 each
2. Would you have a car wash if you only were only going to was 5 cars all day?
 - a. Students at this point should discuss a car wash and about how many cars they might expect to wash.

After the Task:

This task shows students how math is useful in their own lives. Encourage students to think of ways creating a budget might be useful in their own lives. Students may mention creating budgets for clubs or their own personal money.

Student Instructional Task

Your group has been selected as the officers for your school’s Junior Beta Club. One of your tasks as the executive committee is to track all money deposited into the account as well as all money spent during the year and create a budget for the remainder of the year. At the beginning of September, the balance in the account was \$253.24.

1. Below are listed the activities the club spent money on or collected money for:

| Sept 1 – Sept 30 | Oct 1 – Oct 31 | Nov 1 – Nov 30 |
|----------------------------------|-----------------------------------|--|
| Dues: 25 members at \$5 each | Gardening materials: \$–124.98 | Supplies for Thanksgiving baskets: \$–40.43 |
| Induction ceremony: \$–100.32 | Bake sale: \$205.50 | |

- Using the table above, create a number line to represent the amount of money added to the account during this three-month period.
- Using the table above, create a number line to represent the amount of money spent during this three-month period.
- How much money is in the account at the end of November? Show two different ways to find the balance of the account.

2. This year the club also voted to include some fun activities throughout the year and an end-of-year trip to celebrate the club’s success. Below is a list of the suggested activities and fundraisers.

| Fun Activities | Fundraisers |
|--|----------------------------------|
| Bowling: \$60 per lane (up to 6 people per lane) | Candy sale: \$60 per member |
| Skating: \$12 per person | Wrapping paper: \$50 per member |
| Laser Tag: \$15 per person | Holiday wreaths: \$65 per member |
| Water park: \$50 per person | Car wash: \$5 per car |
| Zoo visit: \$12 per student; \$17.50 per adult | Dress down day: \$1 per student |

- Create a monthly budget for the remainder of the year. In your budget, you will propose which fun activity or activities your club should pursue. You will also propose which fundraisers your club should use to raise the money to finish the year. Keep the following points in mind.
 - Begin with Dec 1 – Dec 31 and end with May 1 – May 31.
 - Show the balance at the beginning of each month (use the ending balance from November as the beginning balance for December).
 - Show any proposed expenses for the month as well as any proposed fundraisers.
 - Budget \$75 per month for supplies for service projects.
 - The club must also attend the Louisiana Jr. Beta Club Convention in Lafayette, LA in May. The cost of the trip for the convention is \$1,500. This includes transportation and hotel rooms.
 - Include at least one Fun Activity from the list above.
 - The balance at the end of May should at least \$250 to begin the next school year.

Your budget should include a month by month statement as well as a short narrative explaining why you chose certain activities and fundraisers. Each monthly statement should show how you calculated the balance at the end each month.

In your narrative, be sure to explain how you determined which fundraisers to choose, which activity to choose, and when to conduct certain fundraisers. Also, be sure state how much money will be remaining at the end of May. Be prepared to share your budget with the class.

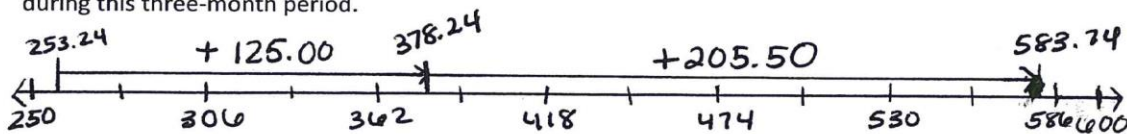
Instructional Task Exemplar Response

Your group has been selected as the officers for your school's Junior Beta Club. One of your tasks as the executive committee is to track all money deposited into the account as well as all money spent during the year and create a budget for the remainder of the year. At the beginning of September, the balance in the account was \$253.24.

1. Below are listed the activities the club spent money on or collected money for:

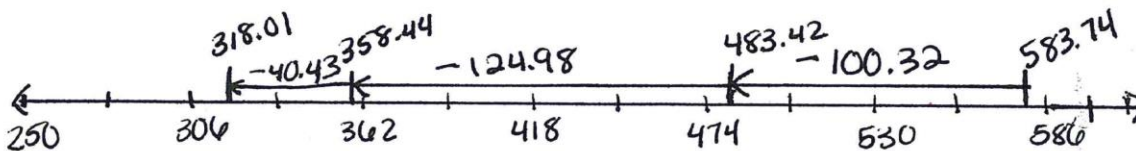
| Sept 1 – Sept 30 | Oct 1 – Oct 31 | Nov 1 – Nov 30 |
|----------------------------------|-----------------------------------|--|
| Dues: 25 members at \$5 each | Gardening materials: \$-124.98 | Supplies for Thanksgiving baskets: \$-40.43 |
| Induction ceremony: \$-100.32 | Bake sale: \$205.50 | |

a. Using the table above, create a number line to represent the amount of money added to the account during this three-month period.



Dues: $25 \times 5 = \$125$

b. Using the table above, create a number line to represent the amount of money spent during this three-month period.



c. How much money is in the account at the end of November? Show two different ways to find the balance of the account.

At the end of November, there is \$318.01 in the account.

① $253.24 + 330.50 = 583.74$
 $583.74 - 265.73 = 318.01$

② $330.50 - 265.73 = 64.77$

$253.24 + 64.77 = 318.01$

Students may have different number lines for parts a and b as they may not use the beginning balance. The problem asks to show the amount added or spent; students may choose to start at zero. There may also be different methods shown in part c.

2. This year the club also voted to include some fun activities throughout the year and an end-of-year trip to celebrate the club’s success. Below is a list of the suggested activities and fundraisers.

| Fun Activities | Fundraisers |
|--|----------------------------------|
| Bowling: \$60 per lane (up to 6 people per lane) | Candy sale: \$60 per member |
| Skating: \$12 per person | Wrapping paper: \$50 per member |
| Laser Tag: \$15 per person | Holiday wreaths: \$65 per member |
| Water park: \$50 per person | Car wash: \$5 per car |
| Zoo visit: \$12 per student; \$17.50 per adult | Dress down day: \$1 per student |

a. Create a monthly budget for the remainder of the year. In your budget, you will propose which fun activity or activities your club should pursue. You will also propose which fundraisers your club should use to raise the money to finish the year. Keep the following points in mind.

- Begin with Dec 1 – Dec 31 and end with May 1 – May 31.
- Show the balance at the beginning of each month (use the ending balance from November as the beginning balance for December)
- Show any proposed expenses for the month as well as any proposed fundraisers.
- Budget \$75 per month for supplies for service projects.
- The club must also attend the Louisiana Jr. Beta Club Convention in Lafayette, LA in May. The cost of the trip for the convention is \$1,500. This includes transportation and hotel rooms.
- Include at least one Fun Activity from the list above.
- The balance at the end of May should at least \$250 to begin the next school year.

Your budget should include a month by month statement as well as a short narrative explaining why you chose certain activities and fundraisers. Each monthly statement should show how you calculated the balance at the end each month. In your narrative, be sure to explain how you determined which fundraisers to choose, which activity to choose, and when to conduct certain fundraisers. Also, be sure state how much money will be remaining at the end of May. Be prepared to share your budget with the class.

This portion of the task will take on many different looks. Students have multiple options to fulfill the requirements listed above. They will need to make some assumptions about the number of chaperones needed for the activities they may wish to propose. They may also need to make some assumptions about the fundraisers, specifically the number of cars they would need to wash and how many students might buy a dress down day pass. Students could research the rules in their school/district and past dress down events to attempt to determine values that make sense with this problem. At minimum, students must include fundraisers to cover \$1950 for the service project supplies and convention. Additional fundraisers would be needed to cover the cost of the activity they chose to propose.