Video Games (IT)

Overview

This instructional task requires students to use multiplication and division of rational numbers to purchase a video game system.

Standards

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

7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

    a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

    c. Apply properties of operations as strategies to multiply and divide 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.2	• 5.NF.B.3
	• 5.NF.B.4
	• 6.NS.A.1
		1. -46.28×4
		   a. -185.12
		2. $-234.8 \div -23.2$
		   Round your answer to two decimal places.
		   a. 10.12
		3. http://www.illustrativemathematics.org/illustrations/604
		4. http://www.illustrativemathematics.org/illustrations/593
			• http://www.illustrativemathematics.org/illustrations/858
			• http://www.illustrativemathematics.org/illustrations/321
			• http://www.illustrativemathematics.org/illustrations/965
			• http://www.illustrativemathematics.org/illustrations/50
			• http://www.illustrativemathematics.org/illustrations/407
			• http://www.illustrativemathematics.org/illustrations/464
			• http://learnzillion.com/lessonsets/281-extending-multiplication-of-fractions-to-rational-numbers
			• http://learnzillion.com/lessonsets/18-multiply-and-divide-improper-fractions
			• http://learnzillion.com/lessonsets/600-convert-a-rational-number-to-a-decimal-using-long-division

7.NS.A.3	• 4.OA.A.3 • 6.NS.B.3	1. You have to pay $75 to your mom in equal payments over 6 months. If you are paying her	• http://www.illustrativemathematics.org/illustrations/1289 • http://www.illustrativemathematics.org/illustrations/

| | | from your savings account, how much will your account change each month?
    a.   -$12.50
2. http://www.illustrativemathematics.org/illustrations/298 | 272
• http://www.illustrativemathematics.org/illustrations/275
• http://www.illustrativemathematics.org/illustrations/374
• http://www.illustrativemathematics.org/illustrations/274
• http://www.illustrativemathematics.org/illustrations/1299
• http://www.illustrativemathematics.org/illustrations/1300
• http://learnzillion.com/lessonsets/193-solve-realworld-problems-involving-the-four-operations-with-rational-numbers-1
• http://learnzillion.com/lessonsets/20-simplify-expressions-with-order-of-operations |

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

What is a savings account? This question is designed to make sure that students understand the purpose of this task. A saving account is an account at a bank. You deposit money into an account, usually for a long period of time. A savings account is a good way of collecting money for a future purchase.

What is a Statement of Account? A Statement of Account is a listing of the activity occurring in an account over a period of time. Statements of account show money withdrawn and money deposited.

What is a balance? Students may be unfamiliar with banking terminology. A balance is the amount of money in your account.

What is the difference between a withdrawal and a deposit? 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 the idea of change and negative numbers. Remind students that they are starting with money in the account and taking money out each month. If they are starting with money and then taking out money, they can represent this situation with a negative number.

Students may struggle with creating a monthly statement. You can scaffold this task for them using the situation in problem 3. Have students create monthly statements for sixth months using a starting account balance of $500. This will help students practice the process of creating a monthly statement before they have to start making decisions about how to spend money.

During the task, circulate around the room and look for groups who may be spending more money than they have in the account. The students may also have trouble calculating their totals with the tax included.

After the Task:

This task shows students how math is useful in their own lives. Savings accounts can be useful when they want to make a big purchase. Saving a little each month can allow them to purchase something expensive without having to pay interest.

Student Instructional Task

1. David is purchasing an Xbox One. David's mom will buy the game system, but he will have to pay her back. He will pay her the same amount each month from his savings account. He will take 6 months to pay her back. If he does not deposit or withdraw any money from the account, the account balance would change by $-499.00.

   a. How much would David's account change each month? Explain.

   b. Describe the change in the account after three months.

2. David wants to purchase three Xbox One games. The total for the three games is $179.88

   a. What is the price of each game if they are the same price? Show your calculations.

   b. If the games are paid for in equal amounts over six months, how much would he pay each month? Explain.

3. David decides to buy the three games with the Xbox One. His mom will pay for the games and the game console, and he will pay her back in equal payments over six months.

   a. How much would David's account change each month? Show your calculations.

   b. Describe the change in the account after three months.

4. You decide to purchase your own game system. You have $950 saved. Research game systems and game prices. Decide which game system and which games you would like to purchase.

   a. Create a total bill for your purchases. In addition to the game system and games, you must pay sales tax. Use the sales tax rate in the town where you will purchase your game system and games.

b. You are going to pay for your purchases in equal monthly installments over six months. Create an Account Statement for your savings account each month. Each Statement of Account should show how you calculated the balance at the end of each month.

c. Write a short narrative explaining how you choose your game systems and games. Assume your beginning balance is $950. Be sure to include your ending balance and a brief explanation of how you calculated your monthly balances. Be prepared to share your project with the class.

Instructional Task Exemplar Response

1. Your friend David is purchasing an Xbox One. David's mom will buy the game system, but he will have to pay her back. He will pay her the same amount each month from his savings account. He will take 6 months to pay her back. If he does not deposit or withdraw any money from the account, the account balance would change by $-499.00.
   a. How much would your friend's account change each month? Explain.

$$\$ - 499 \div 6$$

$$\$ - 83.17$$

   David's account would change by -$83.17 each month. The change is -$83.17 each month because money is being withdrawn from the account.

   b. Describe the change in the account after three months.

$$-\$83.17 \times 3$$

$$-\$249.51$$

   The account would change by -$249.51 after three payments over three months.

2. David wants to purchase three Xbox One games. The total for the three games is $179.88
   a. What is the price of each game if they are the same price? Show your calculations.

$$\$179.88 \div 3$$

$$\$59.96$$

   Each game would cost $59.96.

   b. If the games are paid for in equal amounts over six months, how much would he pay each month?

$$\$179.88 \div 6$$

$$\$29.98$$

   The total cost of the games is $179.88, so that number must be divided by 6, the number of payments. He would pay $29.98 each month.

3. David decides to buy the three games with the Xbox One. His mom will pay for the games and the game console, and he will pay her back in equal payments over six months.
   a. How much would your friend's account change each month? Show your calculations.

$$\frac{499 + 179.88}{6}$$

$$\frac{678.88}{6}$$

$$\$113.15$$

His account would change by -$113.15 per month.

    b. Describe the change in the account after three months.

$$-\$113.15 \times 3$$

$$-\$339.45$$

The account would change by -$339.45 after three payments over three months.

4. You decide to purchase your own game system. You have $950 saved. Research game systems and game prices. Decide which game system and which games you would like to purchase.
    a. Create a total bill for your purchases. In addition to the game system and games, you must pay sales tax. Use the sales tax rate in the town where you will purchase your game system and games.

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 decide on the number of games they want to purchase. They also need to choose a game system.

This is a sample bill. The listed prices are from Walmart.com.

Playstation 4:	*$458.00*
Lego Marvel Super Heroes:	*$44.98*
Skylanders Swap Force Start Pack:	*$51.65*
Subtotal:	*$554.63*
Tax (9%):	*$49.92*
Total:	*$604.55*

    b. You are going to pay for your purchases in equal monthly installments over six months. Create an Account Statement for your savings account each month. Each Statement of account should show how you calculated the balance at the end of each month.
    c.

This is a sample of the information needed in the monthly Statement of Account.

$$\$604.55 \div 6 = \$100.76$$

Month 1:

Beginning Balance: $950

Withdrawal: $100.76

$950-$100.76=$849.24

Ending Balance: $849.24

d. Write a short narrative explaining how you choose your game systems and games. Assume your beginning balance is $950. Be sure to include your ending balance and a brief explanation of how you calculated your monthly balances. Be prepared to share your project with the class.

This is a sample narrative.

> *I chose to buy a Playstation 4 for $458.00. I chose this game system because I have an old Playstation 2, so I thought that it would be nice to have the new Playstation console. I don't have a lot of time to play games and didn't want to spend all of my money, so I chose two games. Lego Marvel Super Heroes was $44.98, and Skylanders Swap Force Start Pack was $51.65. My subtotal was $554.63. The sales tax in Crowley, Louisiana where I would make my purchases is 9%, so my sales tax is $49.92. My total amount spent was $604.55. My monthly payment for each of the six months is $100.76. My savings account would have $345.45 left after I finished paying for my Playstation 4 and games.*

Sleep Survey (ECR)

Overview

Students will work with rational numbers including decimals, fractions, and percentages to answer questions about a survey conducted by students.

Standards

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation*.

Prior to the Task

Students must be able to convert fractions to decimals, decimals to fractions, percentages to decimals, decimals to percentages, fractions to percentages and percentages to fractions. Students need to be able to round to the nearest whole number.

Grade Level Standard	The following standards will prepare them:	Items to Check for Task Readiness:	Sample Remediation Items :

7.EE.B.3	• 7.NS.A.3	1. What is the decimal equivalent of 45%?
		   a. 0.45
		2. Write 25% as a fraction in simplest form.
		   a. ¼
		3. Write a percentage for 35/100.
		   a. 35%
		4. Write 4% as a decimal.
		   a. 0.04
		5. What is 12% of 73?
		   a. 8.76
		6. http://www.illustrativemathematics.org/illustrations/108
		7. http://www.illustrativemathematics.org/illustrations/478
		8. http://www.illustrativemathematics.org/illustrations/1588
			• http://www.illustrativemathematics.org/illustrations/298
			• http://learnzillion.com/lessonsets/680-solve-complex-problems-with-positive-and-negative-rational-numbers-in-all-forms-converting-between-forms-and-assessing-the-reasonableness-of-answers
			• http://learnzillion.com/lessonsets/135-solve-multistep-reallife-and-mathematical-problems-with-positive-and-negative-rational-numbers-in-any-form

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

What is a survey? It is a question, or set of questions, that is asked of a large group to find out what how the group feels about a topic.

What does the term interview mean in terms of a survey? The term interview in relation to a survey is when a person asks someone a survey question to record the person's response.

After the Task:

Students may have difficulty with question 3. When multiplying, they will get fractions of students. They will have to realize that this number must be rounded to the nearest whole number to represent an accurate number of students.

Student Extended Constructed Response Task

Mr. Browning asked his science class to survey their schoolmates to find out how many hours of sleep students at their school get each night. To keep his class from asking the same students, each group was given a certain grade to interview. The following chart displays the results of their survey.

Grade	Less than 8 hours	8 hours	More than 8 hours
6th	23%	26%	51%
7th	3/10	¼	9/20
8th	0.28	0.2	0.52

1. Which group has the largest amount of students getting more than 8 hours of sleep? What is the difference between the two largest groups? Show all of your work.

2. Which group has the largest amount of students getting less than 8 hours of sleep? What is the difference between the two largest groups? Show all of your work.

3. If there are 70 sixth graders, 68 seventh graders, and 76 eighth graders, complete the table below to show approximately how many students are in each category by grade.

Grade	Less than 8 hours	8 hours	More than 8 hours
6th			
7th			
8th			

4. Find the percentage of **the total number** of students surveyed across all three grades for each category: Less than 8 hours, 8 hours, and More than 8 hours. Show all work or explaining your reasoning.

Extended Constructed Response Exemplar Response

Mr. Browning asked his science class to survey their schoolmates to find out how many hours of sleep students at their school get each night. To keep his class from asking the same students, each group was given a certain grade to interview. The following chart displays the results of their survey.

Grade	Less than 8 hours	8 hours	More than 8 hours
6th	23%	26%	51%
7th	3/10	¼	9/20
8th	0.28	0.2	0.52

1. Which group has the largest amount of students getting more than 8 hours of sleep? What is the difference between the two largest groups? Show all of your work.
   More 8th graders get more than 8 hours of sleep. There is 1%, 0.01, or 1/100 more eighth graders than 6th graders that get more than 8 hours of sleep.
   Work should include changing numbers to percentages, decimals or fractions in order to compare. There are three sample answers below. Any one is acceptable—not all three are needed.

   Sample answer 1: 6th graders: 51%; 7th graders: 45% because 9/20 is equal to 45/100 which is 45%; 8th graders: 52% because 0.52 is 52/100 which is 52%

   Sample answer 2: 8th graders: 0.52; 7th graders: 9/20 is equal to 45/100 which is 0.45; 6th graders: 51% is equal to 51/100 which is 0.51

   Sample answer 3: 7th graders: 9/20 which equals 45/100; 8th graders: 0.52 which is 52/100; 6th graders 51% which is 51/100

2. Which group has the largest amount of students getting less than 8 hours of sleep? What is the difference between the two largest groups? Show all of your work.
   More 7th graders get less than 8 hours of sleep. There is 2%, 2/100 or 0.02 more seventh graders than 8th graders that get less than 8 hours of sleep.
   Work should include changing numbers to percentages, decimals or fractions in order to compare. There are three sample answers below. Any one is acceptable—not all three are needed.

   Sample answer 1: 7th graders: 3/10 which equals 30/100; 6th graders: 0.23 which is 23/100; 8th graders: 51% which is 51/500

Sample answer 2: 6th graders: 0.23; 7th graders: 3/10 equals 30/100 which is 0.30; 8th graders: 51% which is 0.51

Sample answer 3: 8th graders 51%; 7th graders 3/10 equals 30/100 which is 30%; 6th graders: 0.23 which is 23%

3. If there are 70 sixth graders, 68 seventh graders, and 76 eighth graders, complete the table below to show approximately how many students are in each category by grade.

Grade	Less than 8 hours	8 hours	More than 8 hours
6th	16	18	36
7th	20	17	31
8th	21	15	40

4. Find the percentage of **the total number** of students surveyed across all three grades for each category: Less than 8 hours, 8 hours, and More than 8 hours. Show all work or explaining your reasoning.

> *There are 214 students surveyed from all three grades. The group of less than 8 hours has 57 students, 8 hours has 50 students, and more than 8 hours has 107 students.*
>
> *57 ÷ 214 = 0.266 so about 27% of students surveyed get less than 8 hours of sleep.*
>
> *51 ÷ 214 = 0.234 so about 23% of students surveyed get 8 hours of sleep.*
>
> *107 ÷ 214 = 0.50 so about 50% of students surveyed get more than 8 hours of sleep.*

Other explanations/work may be given and should be given credit if the reasoning is correct and complete.