

Spark Learning with Differentiation for Middle School Advanced Mathematics

Grade 7 Advanced Math
Handout packet

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Applying Rational Numbers

Independent Practice

Use the following table for questions 1 – 4.

Item	Quantity Purchased	Cost
Colored Pencils	3	\$5.67
Activity Book	1	\$2.48
Markers	4	\$14.40
Stickers	6	\$11.70

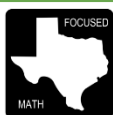
Write an expression to determine each of the following.

1 Cost per box of colored pencils:

2 Cost per package of stickers:

3 Cost for 5 activity books:

4 Cost for 5 boxes of markers:



Use the following information for questions 5 – 7.

A plastic container of mixed nuts contains 3 ounces of pecans, $6\frac{3}{8}$ ounces of cashews, and $5\frac{2}{3}$ ounces of almonds.

- 5** What is the total weight of the contents of the plastic container?
- 6** How many more ounces of cashews are in the container than almonds?
- 7** If the company decides to create a different container that has double the ounces of cashews in the mixture, how many ounces will be in the new container?

Name _____ Date _____

Use the following information for questions 8 – 12.

Below is the current balance in a checking account for each individual.

Name	Current Balance
Sydney	-\$18.92
Jacob	\$24.73
Olivia	\$72.23
Roman	-\$32.06

- 8** How much more money does Jacob have in his account than Roman?
- 9** If Sydney makes a deposit of \$50.00, how much will she have in her account?
- 10** If Jacob and Olivia combine their balances, how much money will they have together?
- 11** If Jacob spends \$8.95 on a purchase, how much money will he have in his account?
- 12** If Roman spends \$11.15 on a purchase, how much money will he have in his account?



Answer questions 13 – 15.

13 Dyshawn wants to run 16 miles this week. On Monday he ran $5\frac{3}{4}$ miles, while on Wednesday he ran $6\frac{1}{2}$ miles. How far does he need to run on Friday to meet his goal for the week?

14 Ian bought a package of gummy bears that contains 4 cups. If he eats $\frac{2}{3}$ cup every day, how many days can he eat gummy bears from the package?

15 A recipe calls for $\frac{1}{4}$ cup of oil, 2 cups of flour, $\frac{3}{4}$ cup of sugar and $\frac{1}{2}$ teaspoon of salt. Corina would like to double this recipe. How many cups of ingredients will she need?

SOLVING PROBLEMS WITH RATIONAL NUMBERS



The student is expected to apply and extend previous understandings of operations to solve problems using addition, subtraction, multiplication, and division of rational numbers.

i TELL ME MORE...

You can represent real-world problems using mathematical expressions or equations. In order to solve these real-world problems, you have to translate the problem in an expression or an equation. One way to represent a real-world situation with an expression or an equation is to look for key actions in the problem and then determine which operation best represents that action. The chart below shows some, but not all, actions that are primarily associated with four arithmetic operations.

Operation	Action	Example(s)
Addition	Combining – bringing two or more quantities together	<ul style="list-style-type: none"> combined length of objects total cost of purchasing multiple items
	Increasing by a quantity rather than a factor or rate	<ul style="list-style-type: none"> adding more to an existing collection extending the length of an object
Subtraction	Separating – removing one quantity from another	<ul style="list-style-type: none"> reduction in length
	Decreasing by a quantity rather than a factor or rate	<ul style="list-style-type: none"> giving away a certain number of objects
	Comparison – the difference between two quantities	<ul style="list-style-type: none"> determining how many more determining how many fewer
Multiplication	Scaling – increasing or decreasing a quantity by a factor	<ul style="list-style-type: none"> tax rates or percent discounts
	Arrays – arranging objects into rows and columns	<ul style="list-style-type: none"> theater or stadium seats geometric arrangements where you want to know the total number of objects
	Area of a rectangle	<ul style="list-style-type: none"> composite area problems (with addition)
	Repeated addition	<ul style="list-style-type: none"> purchasing multiple items at one price
Division	Grouping – redistributing a quantity into equal-sized groups	<ul style="list-style-type: none"> sharing money equally among a group of people
	Factoring – determining which quantities were multiplied to give an end result	<ul style="list-style-type: none"> geometric arrangements where you want to know one dimension
	Repeated subtraction	<ul style="list-style-type: none"> cutting string or lumber into equal-sized pieces



EXAMPLES

EXAMPLE 1: Edward bought a pair of running shoes for \$76.90 and three packages of socks for \$2.29 each. He paid \$6.70 in sales tax. If Edward paid with a \$100 bill, how much change did he receive?

STEP 1 Understand the problem and plan a solution process.

**There are 3 pairs of socks so multiply $3 \times \$2.29$.
Add the cost of the shoes, all the socks, and the tax.
Subtract from \$100 for the change.**

STEP 2 Find the total cost of the socks.

■ $3 \times 2.29 = 6.87$

The socks cost \$6.87 altogether.

STEP 3 Determine the total cost of the shoes, socks, and tax.

■ Use addition.

■ When adding decimals, line up the numbers using place value for proper regrouping.

The shoes, socks, and tax total \$90.47.

$$\begin{array}{r} 22 \\ 76.90 \\ 6.87 \\ + 6.70 \\ \hline 90.47 \end{array}$$

STEP 4 Subtract the cost of the items and the tax from 100.

■ Use the standard algorithm for subtracting decimals: $100.00 - 90.47 = 9.53$.

■ Alternatively, begin with 90.47 and count on until you reach 100.00.

- $90.47 + 0.53 = 91.00$
- $91.00 + 9.00 = 100.00$
- $0.53 + 9.00 = 9.53$, so $90.47 + 9.53 = 100.00$
- Inversely, $100.00 - 90.47 = 9.53$

Edward will receive \$9.53 in change back for his purchases.

EXAMPLE 2: Sonya found a length of ribbon that measures $23\frac{11}{20}$ feet long in her craft closet. She needs a $\frac{4}{5}$ -foot long piece for an art project. She plans to use the rest to make some bows. Each bow uses $2\frac{1}{3}$ feet of ribbon to complete. How many bows can Sonya make with the ribbon.

STEP 1 Understand the problem and plan the solution.

Sonya will remove a piece of ribbon that is $\frac{4}{5}$ foot long, so subtract $\frac{4}{5}$ from the total $23\frac{11}{20}$.

Sonya will group the remaining ribbon into groups of $2\frac{1}{3}$ feet, so divide the difference by $2\frac{1}{3}$.

STEP 2 Determine the amount of ribbon remaining after the art project. Subtract $\frac{4}{5}$ from $23\frac{11}{20}$.

- When subtracting with fractions, you need a common denominator.

- Both denominators have a least common multiple of 20.

- $\frac{4 \times 4}{5 \times 4} = \frac{16}{20}$ and $23\frac{11}{20}$ already has a denominator of 20.

- Subtract $\frac{16}{20}$ from $23\frac{11}{20}$.

- Regroup $23\frac{11}{20}$ into $22 + 1\frac{11}{20} = 22 + \frac{31}{20} = 22\frac{31}{20}$. Subtract (see right).

- Simplify $22\frac{15}{20} = 22\frac{15 \div 5}{20 \div 5} = 22\frac{3}{4}$

$$\begin{array}{r} 23\frac{11}{20} \\ - \frac{16}{20} \\ \hline 22\frac{31}{20} \\ - \frac{16}{20} \\ \hline 22\frac{15}{20} \end{array}$$

There will be $22\frac{3}{4}$ feet of ribbon left for bows.

STEP 3 Divide $22\frac{3}{4}$ by $2\frac{1}{3}$ for the number of bows.

Convert mixed numbers to fractions. Then multiply by the reciprocal of the divisor.

$$22\frac{3}{4} \div 2\frac{1}{3} = \frac{91}{4} \div \frac{2}{3} = \frac{91}{4} \times \frac{3}{2} = \frac{273}{8} = 9\frac{21}{8} = 9\frac{3}{4}$$

Sonya has enough ribbon for $9\frac{3}{4}$ bows, so she can make 9 complete bows.

EXAMPLE 3: Tom planted flowers in a rectangular garden. The garden bed was 24 feet long and 15.5 feet wide. Tom used $\frac{1}{3}$ of the area for pansies and another 0.2 of the garden space for periwinkles. How many square feet of space remained for other types of flowers.

STEP 1 Understand the problem and plan the solution.

First, determine the area of the garden.

Then, determine $\frac{1}{3}$ of the area for pansies.

Then, determine 0.2 of the original area for periwinkles.

Finally, use subtraction to determine the amount of area left over.

STEP 2 Rewrite all the rational numbers in the problem into one form.

- Since the fraction $\frac{1}{3}$ is a repeating decimal, use fractions for the problem.

- 0.5 is a benchmark decimal equivalent to $\frac{1}{2}$, so $15.5 = 15\frac{1}{2}$.

- $0.2 = \frac{2}{10} = \frac{2 \div 2}{10 \div 2} = \frac{1}{5}$.

$$24 = \frac{24}{1}; 15.5 = \frac{31}{2}; \frac{1}{3} = \frac{1}{3}; 0.2 = \frac{1}{5}$$

STEP 3 Determine the total area of the garden using the area formula for a rectangle.

- $A = lw$
- $A = 24(15\frac{1}{2}) = \frac{24}{1} \times \frac{31}{2} = \frac{744}{2} = 372$

The area of the garden is 372 ft².

STEP 4 Determine the area used for the pansies.

- Pansies use $\frac{1}{3}$ of the area of the garden.
- Multiply $\frac{1}{3}$ by 372.
- $\frac{1}{3} \times \frac{372}{1} = \frac{372}{3} = 124$

Pansies use 124 ft² of area.

STEP 5 Determine the area for the periwinkles.

- Periwinkles use $\frac{2}{10}$ of the area of the garden.
- Multiply $\frac{2}{10}$ by 372.
- $\frac{2}{10} \times \frac{372}{1} = \frac{744}{10} = \frac{744 \div 2}{10 \div 2} = \frac{372}{5} = 74\frac{2}{5}$

Periwinkles use 74 $\frac{2}{5}$ square feet of area.

STEP 6 Determine the amount of area not planted with pansies or periwinkles.

- Subtract the sum of the area planted with pansies or periwinkles from the total area of the garden.
- $124 + 74\frac{2}{5} = 198\frac{2}{5}$
- $372 - 198\frac{2}{5} = 371\frac{5}{5} - 198\frac{2}{5} = 173\frac{3}{5}$

There are 173 $\frac{3}{5}$ square feet of space to plant other flowers.

YOU TRY IT!

Mrs. Moses combined $5\frac{1}{6}$ lb of one type of fish food with $3\frac{7}{12}$ lbs of another type of fish food to create a special food for her saltwater fish. If she separated this mixture into 10 equal portions, how much was in each portion?

Determine the total amount of fish food:

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Divide into 10 equal portions:

$$\underline{\hspace{2cm}} + \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



PRACTICE

1. Marshall bought 2.8 pounds of flank steak to make dinner for his family. The steak was on sale for \$5.40 per pound. How much did the steak cost for dinner?
2. Callie's grandmother's cookie recipe makes $14\frac{2}{3}$ dozen cookies. Callie only wants to make $\frac{1}{4}$ of the recipe to take to work for her coworkers. How many dozen cookies will the reduced recipe yield?

3. Megan has a canister of mixed nuts that contains 4 ounces of pecans, $5\frac{3}{8}$ ounces of cashews, and $7\frac{2}{3}$ ounces of almonds. What is the total weight of the contents of the canister?
4. Mrs. Sparks purchased supplies to make a curtains for her living room. She purchased $25\frac{1}{3}$ yards of fabric, 20.5 yards of lining, $63\frac{1}{4}$ yards of trim, and $10\frac{1}{6}$ yards of cording. How many total yards of supplies did she purchase?
5. At the local market James sells vegetables grown on his farm. A sack of carrots weighs 15.7 kg. A sack of potatoes weighs 3.4 times as much as the carrots. A sack of onions weighs the difference between the carrots and the potatoes. How much do the onions weigh?
- A 53.38 kg
B 19.1 kg
C 3.4 kg
D 37.68 kg
6. Four families went to the movies together. Each family has 2 adults and 2 children. Adult tickets cost \$9.75 and child tickets cost \$6.25. How much will the movie cost for everyone in the group to see it?
7. Jackson has 85.4 pounds of mulch that need to be separated into bags that each hold $5\frac{3}{4}$ pound portions. How many full bags can Jackson make of the mulch?
- A 15
B 14
C 17
D 79
8. Janis is 65.25 inches tall. Her best friend Sumi is 63.375 inches tall. If Janis grew another $\frac{5}{6}$ inches during the semester and Sumi did not, how many inches taller will Janis be compared to Sumi?
- F $2\frac{17}{24}$ inches
G $1\frac{7}{8}$ inches
H $1\frac{1}{24}$ inches
J $3\frac{1}{2}$ inches

Performance Task: 7AM.3B
Rational Number Operations: Buying Appliances

Rolando and Michelle are buying appliances for their new home. After comparing prices they have settled on their choices. The following is information about the cost of the appliances.

- The washer and dryer are each the same price and together are \$1,398 before any discounts. There is a discount of 10% available when buying the pair.
 - The refrigerator is regularly priced at \$1,999 and on sale for 25% off.
 - The dishwasher is $\frac{1}{3}$ the discounted price of the refrigerator, but is not on sale.
 - The microwave is \$399 regularly and has a discount available for 15%.
 - The range (stove/oven combo) is marked \$649, but has a scratch so the salesperson is willing to mark $\frac{1}{10}$ off the price.
-
- How much will Rolando and Michelle spend on appliances, including 8.25% sales tax?
 - How much did they save in discounts and taxes compared to paying the regular prices?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



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 - The microwave is \$399 regularly and has a discount available for 15%.
 - The range (stove/oven combo) is marked \$649, but has a scratch so the salesperson is willing to mark $\frac{1}{10}$ off the price.
- How much will Rolando and Michelle spend on appliances, not including sales tax?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



Performance Task: 7AM.3B
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- The refrigerator is regularly priced at \$1,999 and on sale for 25% off.
- The dishwasher is $\frac{1}{3}$ the discounted price of the refrigerator, but is not on sale.
- The microwave is \$339.15 on sale including a discount of 15%.
- The range (stove/oven combo) is marked \$649, but has a scratch so the salesperson is willing to mark $\frac{1}{10}$ off the price.

Rolando and Michelle have a subtotal of \$4180.45 before including 8.25% sales tax.

- How much did they save in discounts and taxes compared to paying the regular prices?

Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



