

Discovering Math: Arithmetic

Teacher's Guide



Grade Level: 3–5

Curriculum Focus: Mathematics

Lesson Duration: Three class periods

Program Description

Discovering Math: Arithmetic — From multiplying and dividing whole numbers to working with decimals and fractions, introduce elementary students to more advanced procedures for computation.

Lesson Plan

Student Objectives

- Demonstrate the ability to add, subtract, multiply, and divide whole numbers to solve real-world problems.
- Demonstrate the ability to add and subtract fractions with like and unlike denominators.
- Demonstrate the ability to add, subtract, multiply, divide, and estimate decimals.
- Use a variety of strategies to estimate computations and check for the reasonableness of computational results.
- Use the appropriate language of basic operations.

Materials

- *Discovering Math: Arithmetic* video
- Cake recipes (see below)
- Cake Recipes Chart (see below)
- Local food store weekly sales circular
- Shopping List Chart (see below)
- Problem-Solving Scenario (see below)
- Problem-Solving Questions (see below)
- Calendar, showing one full year
- Highlighter

Procedures

1. Tell students they will be using arithmetic to determine the total amount of ingredients needed to bake six cakes. Distribute the two cake recipes. Have students read the recipes and identify

the amount of each ingredient needed as whole numbers, fractions, or mixed numbers. Discuss the numbers identified.

- Ask students how they would add two fractions with like denominators. Have them add $\frac{1}{4} + \frac{1}{4}$ and discuss the process used to find the correct sum.
- Ask the students how they would add two fractions with unlike denominators. Have them add $\frac{3}{4} + \frac{1}{2}$ and discuss the process used to find the correct sum.
- Distribute the Cake Recipes Chart. Tell students to do the following and write their answers on the chart.
 1. Triple each recipe and determine the amount of each ingredient needed for three cakes.
 2. Use addition to determine the total amount of each ingredient needed to make all six cakes.

Remind students they will need to add fractions, whole number, and mixed numbers to complete the chart. Depending on ability levels students can work independently or in pairs.

- Have students compare their charts and discuss their calculations. Students should explain how they found the total sums of each ingredient needed to make the cakes.
2. Divide students into pairs. Tell them that they will be planning a party, making a menu, and determining how much money to spend on food using arithmetic. Review arithmetic operations and uses and have students give examples of when they would use addition, subtraction, multiplication, or division.
- Distribute copies of weekly sales circulars and the Shopping List Chart.
 - Discuss the directions.
 - Plan a party for 20 people.
 - Create a menu for the party.
 - Use the sales circular to determine the price of items needed.
 - List each item and its cost.
 - Determine the amount of each item needed.
 - Estimate the total cost for each item.
 - Find the actual total cost for each item.
 - Find the difference between the estimated and the actual total cost of each item.
 - Estimate the total cost for the party menu.
 - Calculate the actual total cost for the party menu.
 - Find the difference between the estimated and the actual total cost of the party menu.

- Allow students time to share their menus. Then ask them to explain the algorithms, operations, and strategies they used to find the costs of individual items, multiple items, and the total cost of the party.
 - Discuss the benefits of using estimation and the importance of comparing estimates with actual figures.
3. Tell students they will use addition, subtraction, multiplication, and division to solve a real-world problem.
- Divide students into pairs. Review the four basic operations and their purposes and have students share examples of when they would use addition, subtraction, multiplication, or division.
 - Distribute the Problem-Solving Scenario and discuss the given information.
 - Distribute the Problem-Solving Questions and calendar. Discuss the problem and some possible strategies for working through it.
 - Have each pair use the given information and the four basic arithmetic operations to answer the questions.
 - When each pair is finished, have them share their strategies with the class. They should identify and explain when, how, and why they used specific operations. If possible have students describe their problem-solving and arithmetic process in writing using appropriate mathematical terms.
 - As an extension have students create their own scenarios, including numbers and questions, to trade with one another. Ask them to answer the questions using arithmetic and appropriate mathematical terms.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students were highly engaged in class discussions; produced complete assignments, including all the requested information; clearly demonstrated the ability to add, subtract, multiply, and divide whole numbers; clearly demonstrated the ability to add and subtract fractions with like and unlike denominators; clearly demonstrated the ability to add, subtract, multiply, and estimate decimals; clearly demonstrated the ability to use a variety of strategies to estimate computations and check for the reasonableness of computational results; and clearly demonstrated the ability to use the appropriate language of basic operations.
- **2 points:** Students participated in class discussions; produced adequate assignments, including most of the requested information; satisfactorily demonstrated the ability to add, subtract, multiply, and divide whole numbers; satisfactorily demonstrated the ability to add and subtract fractions with like and unlike denominators; satisfactorily demonstrated the ability to add, subtract, multiply, and estimate decimals; satisfactorily demonstrated the ability to use a variety of strategies to estimate computations and check for the reasonableness of

computational results; and satisfactorily demonstrated the ability to use the appropriate language of basic operations.

- **1 point:** Students participated minimally in class discussions; produced incomplete assignments, including little or none of the requested information; did not demonstrate the ability to add, subtract, multiply, and divide whole numbers; did not demonstrate the ability to add and subtract fractions with like and unlike denominators; did not demonstrate the ability to add, subtract, multiply, and estimate decimals; did not demonstrate the ability to use a variety of strategies to estimate computations and check for the reasonableness of computational results; and did not demonstrate the ability to use the appropriate language of basic operations.

Vocabulary

addition

Definition: the process of finding the sum of two or more numbers; the opposite operation of subtraction

Context: There were 20 books on one shelf and 30 books on the other shelf. Using addition the student found that there were 50 books in all.

decimal

Definition: a number with one or more digits to the right of the decimal point

Context: The cost of one bag of apples is \$3.54 and it is a decimal because it has two digits to the right of the decimal point.

difference

Definition: the answer to a subtraction problem

Context: The teacher asked the students to find the difference between 7 and 4.
 $7 - 4 = 3$, so the difference is 3.

dividend

Definition: the number to be divided in a division problem

Context: The dividend in the problem $48 \div 6 = 8$ is 48 because it is the number being divided.

division

Definition: the process of dividing a number into a given number of equal parts; the opposite operation of multiplication

Context: The students bought a pizza that had 10 slices. They used division to figure out how to divide the pizza so that each person received the same number of pieces.

divisor

Definition: the number that divides the dividend in a division problem

Context: The divisor in the problem $24 \div 6 = 4$ is 6 because it is the number that the dividend is being divided by.

estimate

Definition: to find a number close to an exact amount

Context: The teacher asked the students to estimate how much it would cost to buy three tickets to the fair. The actual cost of each ticket is \$1.98, so the students estimated that one ticket is about \$2.00 and three tickets would be about \$6.00.

factor

Definition: a number that is multiplied by another number to get a product

Context: A factor of 21 is 7 because $7 \times 3 = 21$.

fraction

Definition: a number that names a part of a whole or part of a group

Context: There are 10 students in the class, but only 9 completed the project. The fraction of students that completed the project is $\frac{9}{10}$.

multiplication

Definition: a process to find the total number of items in equal-sized groups; the opposite operation of division

Context: Sue used multiplication to find the total price of 6 bags of apples that cost \$1.99 each. The total price was \$11.94.

product

Definition: the answer to a multiplication problem

Context: The product in the multiplication problem $5 \times 6 = 30$ is 30.

quotient

Definition: the answer to a division problem

Context: The quotient in the division problem $32 \div 8 = 4$ is 4.

subtraction

Definition: the process of finding the difference between two numbers or groups of objects; the opposite operation of addition

Context: The students use subtraction to find the difference between two numbers.

sum

Definition: the answer in an addition problem

Context: The sum in the addition problem $5 + 4 = 9$ is 9.

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following benchmarks:

- Adds, subtracts, multiplies, and divides decimals.
- Adds and subtracts simple fractions.
- Uses specific strategies to estimate computations and to check the reasonableness of computational results.
- Performs basic mental computations.
- Determines the effects of addition, subtraction, multiplication, and division on size and order of numbers.
- Understands the properties of and the relationships among addition, subtraction, multiplication, and division.
- Solves real-world problems involving number operations.
- Knows the language of basic operations.

National Council of Teachers of Mathematics (NCTM)

The National Council of Teachers of Mathematics (NCTM) has developed national standards to provide guidelines for teaching mathematics. To view the standards online, go to

<http://standards.nctm.org>.

This lesson plan addresses the following standards:

- Understand various meanings of multiplication and division.
- Understand the effects of multiplying and dividing whole numbers.
- Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems.
- Understand and use properties of operations, such as the distributive of multiplication over addition.
- Develop fluency in adding, subtracting, multiplying, and dividing whole numbers.
- Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results.
- Develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience.
- Recognize and use connections among mathematical ideas.

Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>

DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How to Use the DVD

The DVD starting screen has the following options:

Play Video— This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index— Here the video is divided into chapters indicated by title. Each chapter is then divided into four sections indicated by video thumbnail icons; brief descriptions are noted for each section. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Quiz— Each chapter has four interactive quiz questions correlated to each of the chapter's four sections.

Standards Link— Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources— This screen gives the technical support number and Web site address.

Video Index

I. Whole Number Multiplication and Division (8 min.)

Whole Number Multiplication and Division: Introduction

Multiplication is repeated addition and division is repeated subtraction.

Example 1: Multiply Miles by Repeated Addition

The total number of miles a cyclist rides is used to model the relationship between repeated addition and multiplication.

Example 2: Multiplication of Miles or Weights— Exercise

Multiplication is modeled and used to determine the total number of miles a man walks and the amount of weight a weightlifter puts on the bar. Multiplication is more efficient than repeated addition.

Example 3: Dividing Seats into Equal Sections – Stadium

Division is used to determine how many seats are in each section of a baseball stadium. Division is modeled and used to find out how many equal groups make up a number.

II. Decimal Arithmetic (7 min.)

Decimal Arithmetic: Introduction

Prices in a grocery store are used to model and explain decimal points. Repeated addition and multiplication are modeled and used to find the total cost of food.

Example 1: Adding and Subtracting Decimals

Adding and subtracting with decimals is used to find the distance kayakers need to travel. Emphasis is placed on lining up the decimals when adding and subtracting.

Example 2: Multiplying by Two Decimals

Multiplying by two decimals is used to figure out the cost of building materials. The process for multiplying two decimals is modeled and explained.

Example 3: Dividing a Decimal by a Whole Number

Division is used to determine how to split a restaurant bill. Dividing a decimal by a whole number is modeled and explained.

III. Fraction Addition and Subtraction (7 min.)

Fraction Addition and Subtraction: Introduction

Cooking requires addition and subtraction of fractions every day. Addition of fractions with like denominators is modeled.

Example 1: Adding Fractions With a Common Denominator

Addition of fractions is used to bake cakes. Addition of fractions with common denominators is modeled and explained. A fraction with the same numerator and denominator equals one whole.

Example 2: Subtracting Fractions With Different Denominators

Subtracting fractions is used to determine how much cake has been eaten. Subtracting fractions with different denominators is modeled and explained.

Example 3: Adding Fractions With Different Denominators

Addition with fractions is used to determine how much salsa can be served in a restaurant. Addition of fractions with different denominators is modeled and explained.

IV. Estimating Computation (9 min.)

Estimating Computation: Introduction

NASA uses estimation in space travel. Estimation is an important skill that helps avoid errors in computation.

Example 1: Estimating to Check Addition Using Rounding

Rounding to estimate a sum helps find the total distance traveled. Comparing the estimated sum with the actual sum can identify and prevent errors in computation.

Example 2: Checking Addition Using Front-end Estimation

Front-end estimation is used to find and compare scores in video games. Only the front-end digits are used in front-end estimation.

Example 3: Estimation to Check Subtraction Using Rounding

Estimating differences by rounding is used to determine how far scientists are from the *Titanic* wreckage. Comparing the estimated difference to the actual difference can identify and prevent errors in calculations.

V. Mental Math (7 min.)

Mental Math: Introduction

Mental math—computation without a calculator or paper and pencil—is used to find the difference between two dates.

Example 1: Mental Math Using Multiples of Ten

Using mental math and multiples of 10 is modeled and explained. Mental math is easier with multiples of 10.

Example 2: Subtracting Using Mental Math

Mental math and a number line are used to find the difference between two numbers. Finding multiples of 10 makes mental math easier.

Example 3: Adding Decimal Numbers Using Mental Math

Mental math is used to find the total cost of two items at a toy store. One strategy to add decimal numbers is introduced, modeled, and explained.

VI. Effects of Arithmetic Operations (7 min.)

Effects of Arithmetic Operations: Introduction

The effects of addition, subtraction, multiplication, and division are explained. Addition and multiplication result in an increase. Subtraction and division result in a decrease.

Example 1: Addition and Subtraction of Monkeys

Addition and subtraction are used to record population changes among monkeys. When monkeys are born, the new number is added to the population. When monkeys go to zoos, the number is subtracted from the population.

Example 2: Multiplication of Rabbits

Multiplication is used to determine the number of rabbits born. Repeated addition can be used, but multiplication is quicker. Adding a number to another whole number results in a larger number.

Example 3: Division of Groups of Sheep

Division is used to divide sheep into equal groups. Repeated subtraction can be used, but division is quicker. Division of a whole number by another whole number greater than one results in a smaller number.

VII. Properties and Relationships of Arithmetic Operations (11 min.)

Properties and Relationships of Arithmetic Operations: Introduction

The commutative properties of addition and multiplication are explained and modeled. In addition and multiplication, order doesn't matter, but in subtraction and division, it does.

Example 1: Addition and Subtraction

The commutative property of addition is modeled and explained, and order doesn't matter. Subtraction is not commutative, and order does matter. Addition and subtraction are opposites.

Example 2: Multiplication

Multiplication is used to determine total amounts of vegetables at a produce stand. Multiplication is commutative and the result of multiplication is the same as repeated addition.

Example 3: Division and Multiplication

The beads on a necklace are used to model and explain division. Division results in the same answer as repeated subtraction, but division is faster. Division is not commutative and it reverses multiplication.

VIII. Solving Problems Using Operations (8 min.)

Solving Problems Using Operations: Introduction

Math is used when determining how much money has been earned, saved, or spent. The process of making coins and paper bills is explained.

Example 1: Adding and Subtracting for Earning Toward a Goal

A family uses adding and subtracting to record how much money they save in one week and how much more money they need to reach their savings goal.

Example 2: Multiplying for Monthly Savings

Multiplication is used to calculate the amount of money a family saves each week and each month.

Example 3: Dividing for Hours to Earn Toward a Goal

A family uses division to determine how long they need to work to earn their savings goal.

IX. The Language of Operations (7 min.)

The Language of Operations: Introduction

Many words have more than one meaning. Math deals with numbers and words. It is important to understand the correct definitions for math terms such as sum, difference, and equality.

Example 1: Sum, Difference, and Equality

In math, equality refers to numbers that have the same value; difference refers to how much two numbers are unlike; and sum refers to the result when numbers are added.

Example 2: Factor and Product

In math, factors refer to whole numbers that are multiplied together, resulting in a product; a product refers to the number that results when two or more whole numbers are multiplied together.

Example 3: Dividend, Divisor, and Quotient

In math, dividend refers to the whole number divided by another number; divisor refers to the number that is being divided into the dividend; and quotient refers to the result in a division problem.

Quiz

I. Whole Number Multiplication and Division

1. Cedric rides his bike five miles on Monday, five miles on Tuesday, and five miles on Wednesday. How many miles does Cedric ride in all?
A. 5
B. 8
C. 15
D. 20

Answer: C

2. The cyclists ride their bikes 10 miles, three times a day, for three days. How many miles do they ride in all?
 - A. 30
 - B. 60
 - C. 90
 - D. 100

Answer: C

3. Shane jogs 14 miles on the treadmill. He jogs on the treadmill 15 times a month. How many miles does Shane jog every month?
 - A. 29
 - B. 84
 - C. 110
 - D. 210

Answer: D

4. Pat has 1,250 baseball cards. He wants to store his baseball cards in plastic bags. Each bag can hold 50 cards. How many bags will Pat need to store all of his baseball cards?
 - A. 20
 - B. 25
 - C. 50
 - D. 100

Answer: B

II. Decimal Arithmetic

1. Bananas cost \$0.79 per pound. Mike wants to buy seven pounds of bananas. How much money does Mike need?
 - A. \$0.86
 - B. \$4.93
 - C. \$5.53
 - D. \$7.90

Answer: C

2. Bob and Jim kayaked for three days. They traveled 43.5 miles the first day, 52.8 miles the second day, and 27.4 miles the third day. What is the total distance Bob and Jim traveled?
 - A. 53.9 miles
 - B. 123.7 miles
 - C. 138.7 miles
 - D. 238.7 miles

Answer: B

3. $5.34 \times 6.7 =$ _____
A. 35.778
B. 35.798
C. 357.78
D. 359.78

Answer: A

4. $\$386.96 \div 7 =$ _____
A. \$55.00
B. \$55.28
C. \$56.27
D. \$69.58

Answer: B

III. Fraction Addition and Subtraction

1. $\frac{1}{9} + \frac{1}{9} =$ _____
A. $\frac{2}{18}$
B. $\frac{2}{9}$
C. $\frac{1}{9}$
D. $\frac{1}{18}$

Answer: B

2. Juan is baking three cakes. He needs $\frac{1}{4}$ teaspoon of cinnamon for each cake. How much cinnamon does Juan need in all?
A. $\frac{3}{12}$ teaspoon
B. $\frac{2}{4}$ teaspoon
C. $\frac{3}{4}$ teaspoon
D. $\frac{4}{4}$ teaspoon

Answer: C

3. $\frac{3}{4} - \frac{1}{2} = \underline{\hspace{2cm}}$

A. $\frac{1}{4}$

B. $\frac{2}{4}$

C. $\frac{3}{2}$

D. $\frac{4}{4}$

Answer: A

4. $\frac{1}{4} + \frac{1}{5} = \underline{\hspace{2cm}}$

A. $\frac{2}{10}$

B. $\frac{2}{9}$

C. $\frac{2}{20}$

D. $\frac{9}{20}$

Answer: D

IV. Estimating Computation

1. Bryan and Kelly went on a trip. They recorded the distance they biked, hiked, and kayaked in the chart. Use rounding to estimate the total number of miles Bryan and Kelly traveled.

- A. 340 miles
B. 350 miles
C. 360 miles
D. 370 miles

Answer: B

Activity	Distance Traveled
Bike	159 miles
Hike	72 miles
Kayak	123 miles

2. Michelle played a video game four times. She recorded her scores in the chart. Use front-end estimation to estimate the total of Michelle's scores.

- A. 2,400
- B. 2,500
- C. 2,600
- D. 2,700

Answer: D

Video Game Scores
679
812
390
792

3. Estimate the difference using rounding.

$$24,586 - 12,318 = \underline{\hspace{2cm}}$$

- A. 12,100
- B. 12,200
- C. 12,300
- D. 12,400

Answer: C

V. Mental Math

1. Use mental math to solve.
What is the difference between 1,852 and 1,831?

- A. 12
- B. 20
- C. 21
- D. 31

Answer: C

2. Use mental math and multiples of 10 to solve.

$$1,358 + 37 = \underline{\hspace{2cm}}$$

- A. 1,321
- B. 1,387
- C. 1,393
- D. 1,395

Answer: D

3. Use mental math and multiples of 10 to solve.

$$1,268 - 1,229 = \underline{\quad}$$

- A. 38
- B. 39
- C. 40
- D. 41

Answer: B

4. Nell wants to buy a new video game for \$19.99 and a new card game for \$12.95. Use mental math to find the total cost of the two items.

- A. \$32.94
- B. \$33.00
- C. \$33.06
- D. \$41.54

Answer: A

VI. Effects of Arithmetic Operations

1. What is the result when one whole number is divided by a different whole number greater than one?

- A. The new number is a fraction.
- B. The new number is equal to the original number.
- C. The new number is less than the original number.
- D. The new number is greater than the original number.

Answer: C

2. Lila has 7,867 buttons in her button collection. Sean gives Lila 3,978 more buttons. What operation should Lila use to find the total number of buttons she has in her button collection?

- A. addition
- B. division
- C. subtraction
- D. multiplication

Answer: A

3. Kenny has eight boxes of books. Each box contains five books. How many books does Kenny have in all?
 - A. 13
 - B. 20
 - C. 25
 - D. 40

Answer: D

4. There are 56 sheep in the pasture. The sheep need to be divided into eight equal groups. How many sheep will be in each group?
 - A. 6
 - B. 7
 - C. 8
 - D. 9

Answer: B

VII. Properties and Relationships of Arithmetic Operations

1. Identify a different way to write the number sentence using the commutative property of addition. $34 + 85 = \underline{\quad}$
 - A. $43 + 58 = \underline{\quad}$
 - B. $34 + \underline{\quad} = 85$
 - C. $85 + 34 = \underline{\quad}$
 - D. $85 + \underline{\quad} = 34$

Answer: C

2. Martha has to read 63 pages in her book before she can watch television. She has already read 28 pages. How many more pages does Martha need to read before she can watch television?
 - A. 25
 - B. 35
 - C. 45
 - D. 55

Answer: B

3. There are nine bags of pears on the shelf. Each bag contains 12 pears. How many pears are there in all?
 - A. 21
 - B. 98
 - C. 108
 - D. 118

Answer: C

4. Nina has a necklace with 36 beads. There are an equal number of red, yellow, and green beads on the necklace. How many of each color bead are on the necklace?
- A. 9
 - B. 10
 - C. 12
 - D. 13

Answer: C

VIII. Solving Problems Using Operations

1. Janna is trying to save \$175.00 to buy a new bike. She earned \$30 delivering newspapers, \$25 pet sitting, \$55 babysitting, and \$40 washing cars. How much money has Janna saved so far?
- A. \$80
 - B. \$95
 - C. \$140
 - D. \$150

Answer: D

2. Vincent mows his neighbor's lawn. He earns \$30 every time he mows the lawn. How much money will Vincent earn if he mows the lawn four times?
- A. \$70
 - B. \$100
 - C. \$120
 - D. \$170

Answer: C

3. Jessica earned \$144 babysitting. She makes \$6 an hour. How many hours did Jessica babysit?
- A. 24
 - B. 32
 - C. 38
 - D. 42

Answer: A

IX. The Language of Operations

1. Jasmine earned \$752 over the summer. Karl earned \$492 over the summer. What is the difference between the amount of money Jasmine and Karl earned?
A. \$260
B. \$340
C. \$1144
D. \$1244

Answer: A

2. Harry multiplied the whole number 4 by the whole number 6. The result was 24. In this situation, what mathematical term refers to the number 24?
A. sum
B. factor
C. product
D. difference

Answer: C

3. Veronica divided 432 by 12. The result was 36. In this situation, what mathematical term refers to the number 12?
A. divisor
B. quotient
C. dividend
D. difference

Answer: A

Cake Recipes

Recipe 1: Chocolate Supreme Cake

2 cups boiling water

$2\frac{1}{4}$ cups unsweetened cocoa powder

$2\frac{1}{4}$ cups all purpose flour

2 teaspoons baking soda

$\frac{1}{2}$ teaspoon baking powder

$\frac{1}{4}$ teaspoon salt

$1\frac{1}{4}$ cups butter, softened

$2\frac{1}{4}$ cups white sugar

4 eggs

$1\frac{1}{2}$ teaspoons vanilla extract

Recipe 2: Chocolate Decadence Cake

$1\frac{1}{3}$ cups unsweetened cocoa powder

$2\frac{1}{2}$ ounces red food coloring

$1\frac{1}{4}$ cups buttermilk

$\frac{1}{4}$ teaspoon salt

$1\frac{1}{3}$ teaspoon vanilla extract

$\frac{1}{2}$ cup butter, softened

$1\frac{1}{2}$ cups white sugar

2 eggs

$2\frac{1}{2}$ cups all purpose flour

$1\frac{1}{2}$ teaspoons baking soda

1 teaspoon white vinegar

Cake Recipes Chart

Ingredient	Cake 1: Chocolate Supreme		Cake 2: Chocolate Decadence		Total
	Amount for 1 cake	Amount for 3 cakes	Amount for 1 cake	Amount for 3 cakes	
Boiling water					
Unsweetened cocoa powder					
All purpose flour					
Baking soda					
Baking powder					
Salt					
Butter, softened					
White sugar					
Eggs					
Vanilla extract					
Red food coloring					
Buttermilk					

Problem-Solving Scenario

Given Information

Pat travels two times each month for business. She is trying to calculate the amount of time spent traveling in a plane, the amount of money spent on each trip, and the amount of time away from home.

- Pat lives in New York City.
- Pat travels to Chicago, Illinois, twice a month.
- The first trip of the month begins on the first Tuesday of the month and ends on Friday of the same week.
- The second trip of the month begins on the third Monday of the month and ends on Wednesday of the same week.
- Pat pays \$229 for one round-trip ticket from New York City to Chicago.
- The flight is approximately 2 hours 20 minutes long.
- Pat receives \$10,000 a year to purchase tickets and to spend on food when traveling.

Problem-Solving Questions

1. Use the calendar and highlight the days that Pat travels. Remember she travels twice a month, every month of the year.

2. Use arithmetic to solve the following problems.
 - a. How many days a month is Pat in Chicago?
 - b. How many days in three months is Pat in Chicago?
 - c. How many days in eight months is Pat in Chicago?
 - d. How many days a year is Pat in Chicago?
 - e. How many days a month is Pat in New York City?
 - f. How many days in a year is Pat in New York City?
 - g. How much money does Pat spend on airplane tickets each month?
 - h. How much money does Pat spend on airplane tickets every five months?
 - i. How much money does Pat spend on airplane tickets every year?
 - j. How much money does Pat have in all to spend on airplane tickets and food?
 - k. How much money does Pat have left to spend on food once she pays for the airplane tickets for the year?
 - l. If Pat wants to spend the same amount of money each month on food, how much will she spend?
 - m. If Pat wants to spend the same amount of money each day in Chicago on food, how much money will she spend?
 - n. About how much time does Pat spend on a plane each month flying from New York City to Chicago?
 - o. About how much time does Pat spend on a plane every four months flying from New York City to Chicago?
 - p. About how much time does Pat spend on a plane every year flying from New York City to Chicago?

3. Identify the operations used to answer each question and explain why you chose to use that operation.