Math Skills Practice Guide

Introduction

The exercises in this practice guide are designed to help you review basic mathematical skills.

You are encouraged to use a calculator to complete the practice exercises. It is important that you learn how to apply formulas, rather than perfecting computational skills. Select a calculator with advanced-math functions. There are many different types of calculators that can be used, from handheld or desktop calculators to calculator apps. The first exercise discusses how to use a calculator for math problems.

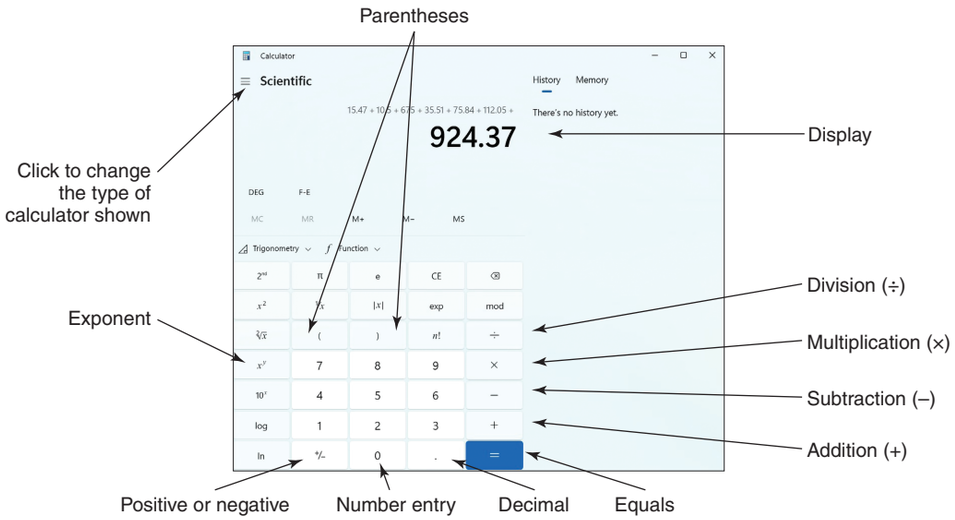
The exercises are set up using the See It, Check It method. The See It section shows how to complete the task being explained. The Check It section provides you the opportunity to complete the task on your own.

PRACTICE 1

Using a Calculator for Math Problems

The purpose of this practice guide is to teach you how to *apply* formulas as you learn financial responsibility. You will not be perfecting computational skills. Therefore, you are encouraged to use a calculator to complete the exercises.

Shown below is an example of an online scientific calculator.



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See It

You have a list of expenses for the month: $15.47, $10.50, $675.00, $35.51, $75.84, $112.05. Calculate your total expenses for the month.

Step 1: Using the calculator keypad, enter 15.47 and press or click the addition (+) key.

Step 2: Enter 10.50 and press or click the addition key. Continuing in this manner, enter 675, 35.51, and 75.84, pressing or clicking the addition key after each number is entered.

Step 3: Enter 112.05 and press or click the equal (=) key or the Enter key. The total is displayed: 924.37.

Step 4: Write down the total and add a dollar sign: $924.37. *Note:* some calculators can be set to automatically display the dollar sign.

Check It

Use a calculator to perform the following operations.

1. 12 + 0.6 =
2. 5 – 0.2 =
3. 16 × 4.2 =
4. 8 ÷ 6.2 =
5. 12 – 0.6 =
6. 5 + 0.2 =
7. 16 ÷ 4.2 =
8. 8 – 6.2 =
9. 12 ÷ 0.6 =
10. 5 × 0.2 =

PRACTICE 2

Solving Word Problems

Word problems are exercises in which the problem is set up in text, rather than presented in mathematical notation. You must identify the elements of the math problem and solve it. There are many strategies for solving word problems. Some of the common strategies include making a list or table; working backward; guessing, checking, and revising; and substituting simpler numbers to solve the problem.

Strategy	How to Apply
List or table	Identify information in the problem and organize it into a table to identify patterns.
Work backward	When an end result is provided, work backward from that to find the requested information.
Guess, check, revise	Start with a reasonable guess at the answer, check to see if it is correct, and revise the guess as needed until the solution is found.
Substitute simpler information	Use different numbers to simplify the problem and solve it, then solve the problem using the provided numbers.

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See It

Joi had minor service done on her car. The bill was $341.48 for parts and labor. She was charged for 2.5 hours of labor, and the labor rate was $121 per hour. How much were the parts? Since the end result is provided, work backward from there to find the requested information.

Step 1: Determine what is added to get the total bill.

$$\text{parts} + \text{labor} = \$341.48$$

Step 2: Insert what is known.

$$\text{parts} + (2.5 \text{ hours} \times \$121 \text{ per hour}) = \$341.48$$
$$\text{parts} + \$302.50 = \$341.48$$

Step 3: Subtract the labor charge from the total bill to find the cost of the parts.

$$\text{parts} = \$341.48 - \$302.50 = \$38.98$$

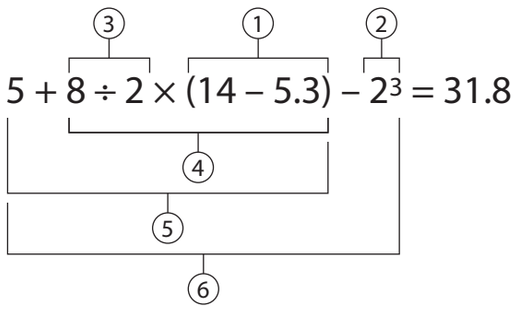
Check It

1. Jamal bought a dozen fruit cups for $8.46. Half of the fruit cups were premium and cost twice as much as the others. How much does one premium fruit cup cost?
2. Lauren received $0.83 in change from a purchase. If she received three quarters and the rest in pennies, how many pennies did she receive?

PRACTICE 3

Order of Operations

The order of operations is a set of rules stating which operations in an equation are performed first. The order of operations is often stated using the acronym *PEMDAS*. PEMDAS stands for parentheses, exponents, multiplication and division, and addition and subtraction. This means anything inside parentheses is computed first. Exponents are computed next. Then, any multiplication and division operations are computed. Finally, any addition and subtraction operations are computed to find the answer to the problem. The equation is solved from left to right by applying PEMDAS.



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See It

Working from left to right, use PEMDAS to solve the equation:

$$8.2 \times (10 - 7)^2 + 9 \div 3 =$$

Step 1: Solve the part of the equation inside parentheses ($10 - 7 = 3$).
Step 2: Solve the exponent ($3^2 = 9$).
Step 3: Solve the multiplication and division ($8.2 \times 9 = 73.8$; $9 \div 3 = 3$).
Step 4: Solve the addition and subtraction outside of parentheses ($73.8 + 3 = 76.8$).

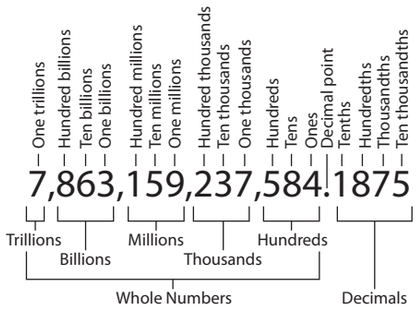
Check It

1. $(3.2 + 1.8)^3 - 25 \div 5 =$
2. $8 - (4 \times 3) + 2^3 \div 2 =$
3. $3 + 4.5 - 27 \div 9 =$
4. $11^2 + (45 \times 2) =$
5. $(2 \times 4)^2 - (21 - 18)^2 =$
6. $9 + 2 - 3 \times 6 =$
7. $48 \div 6 + 9^2 - (3^2)^2 =$
8. $2.5 + (9 \div 3)^3 - 14 =$
9. $88 \times 2 - (9 + 1.85)^2 =$
10. $10.5 + 3.2 \div (18.97 - 19.65 + 2.68) =$

PRACTICE 4

Understanding Place Value

Place value is a basic element of a number system. A digit's position, or place, in a number determines the value of the digit. Each place represents ten times the place to its right. This is a *base ten* system. The number shown below is seven trillion, eight hundred sixty-three billion, one hundred fifty-nine million, two hundred thirty-seven thousand, five hundred eighty-four and one thousand eight hundred seventy-five ten thousandths.



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See It

Write this number using digits: ten billion, five hundred eighty-three million, two hundred nineteen thousand, four hundred and sixty-three.

Step 1: The largest value in this number is billions (10).
Step 2: The next largest value is millions (583).
Step 3: The next largest value is thousands (219).
Step 4: The smallest value is hundreds (463).
Step 5: Compose the number separating the values with commas (10,583,219,463).

Check It

Write the following numbers in words.

1. 489,815
2. 1,347
3. 25,185,492,235.05
4. 13,034,765,192,486
5. 2.9375

Write the following numbers in digits.

6. ten thousand, four hundred and fifty-eight
7. thirty-seven and one hundred eighty-five thousandths
8. fourteen billion, one hundred fifty-six million, two hundred five thousand, eight hundred and eleven
9. four hundred nineteen thousandths
10. nine million, six hundred eighteen thousand, seven hundred twenty-one and ninety-eight hundredths

PRACTICE 5

Understanding Integers

Integers are positive and negative whole numbers and zero. In other words, they are not decimals or fractions. A given integer is greater than another integer if it has a higher value. An integer has a higher value than all integers to its left on the number line. The integer 5 is greater than the integer 4 (5 > 4). An integer has a lower value than all integers to its right on the number line. The integer 4 is less than the integer 5 (4 < 5).

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See It

Identify the integers in this series of numbers: 5, –2.6, 0, $3\frac{3}{4}$, $-9\frac{1}{8}$, 10, $14\frac{2}{6}$.

Step 1: Eliminate from the list all fractions, both positive and negative ($3\frac{3}{4}$, $-9\frac{1}{8}$, $14\frac{2}{6}$).

Step 2: Eliminate from the list all decimals, both positive and negative (–2.6).

Step 3: The remaining list includes only integers (5, 0, 10).

Check It

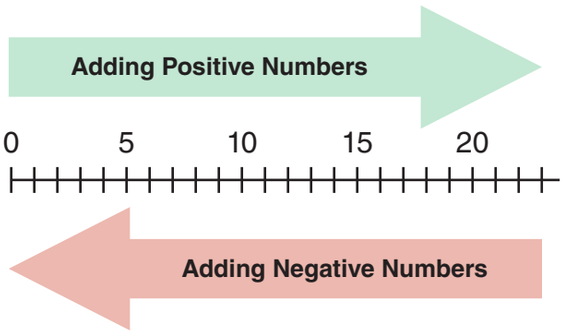
Identify the integers in each series of numbers.

1. 128, 99.05, $105\frac{1}{3}$, –115, 98, 103
2. $\frac{1}{3}$, –5, 0.4, $\frac{1}{4}$, 3, 0, 6
3. 1, –35, 56.7, 0.001, $\frac{15}{16}$, 10, 756
4. $45\frac{1}{4}$, 978, –359, 0, 15.6, 37, $4\frac{5}{7}$
5. 8, $-4\frac{2}{3}$, –7, 9.01, 4, 2, $\frac{7}{8}$, –6.3
6. 529, 749, –876, 697.4, 589.9, 567, 502
7. 62.8, 76, $54\frac{1}{8}$, 73.9, 58, $63\frac{6}{7}$
8. $4\frac{7}{8}$, –3, $5\frac{1}{8}$, $-2\frac{4}{5}$, 0, 5
9. 242.2, 189, 252, $197\frac{1}{4}$, 237
10. 365, 180, 90, 30, 7

PRACTICE 6

Adding and Subtracting Whole Numbers and Decimals

Whole numbers are numbers that can be used to count, including 0. Decimals are numbers in the base ten system that may have whole number portions to the left of a decimal point and fractional portions to the right of a decimal point. The decimal point is used to indicate the boundary between whole number portions to its left and fractional portions to its right. To add a positive number, move to the right on the number line. To subtract a positive number, move to the left on the number line.



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When adding or subtracting whole numbers and decimals, place each number in a vertical list, aligning the place values and using the decimal point as a visual anchor. Then, complete the operation, starting with the place farthest to the right and working to the left. In an addition operation, regroup as necessary to the next place value to the left. The result of addition is called the *sum*. In a subtraction operation, regroup as necessary from the place value to the left. The result of subtraction is called the *difference*.

1 1 1	2	7
685	29	98 10
71.5	56	23.3
+ 18.65	+ 17	− 54
775.15	102	20.7

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See It

Find the sum of these numbers: 65.9, 88.7, and 12.

Step 1: Place the three numbers in a vertical list, aligning the decimal points.
Step 2: Add the tenths column (16) and carry the remainder (1).
Step 3: Add the ones column (16) and carry the remainder (1).
Step 4: Add the tens column (16). The sum is 166.6.

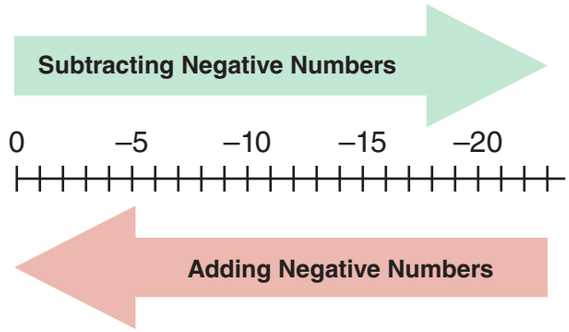
Check It

1. 5.87 + 4.956 + 2.011 + 4 =
2. 112,058 – 98,968 =
3. 112.058 + 2.1 + 93.237 =
4. 67,058.45 – 102,450.04 =

PRACTICE 7

Adding and Subtracting Negative Numbers

To add a negative number, move to the *left* on the number line. To subtract a negative number, move to the *right* on the number line.



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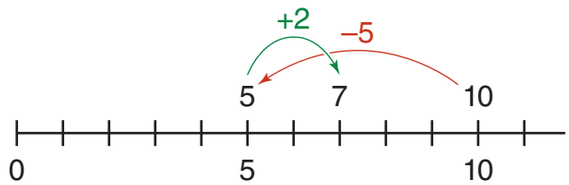
When subtracting negative numbers, the negative sign is cancelled by the operation. Subtracting a negative number is the same as adding a positive number of the same value: 2 – (–5) = 2 + 5 = 7. Identify the sign of each number, compare the sign to the operation, and determine which direction to move on the number line.



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See It

Solve the equation: 10 – 5 – (–2) =

Step 1: The integers 10 and 5 are positive, but the integer 2 is negative.

Step 2: Positive 5 is subtracted from 10. Negative 2 is subtracted from the previous result, so change the operation to addition and remove the negative sign.

Step 3: Starting at 10 on the number line, move 5 places to the left to end at 5.

Step 4: Starting at 5 on the number line, move 2 places to the right to end at the answer of 7.

Check It

1. 5 – 7 =
2. 3 + 4 – 1 =
3. –8 + –3 =
4. 4 – (–7) + 3 =
5. 347 + 15 – 187 =
6. –38 + 19 – (–205) =
7. 1,108 – 386 + (–117) =
8. 94 – 18 + (–52) + 42 =
9. –61 + 39 + 9 – (–3) =
10. 2,039 – 761 – 78 + 15 =

PRACTICE 8

Multiplying and Dividing Whole Numbers and Decimals

The result of two or more numbers multiplied together is called the *product*. The answer when one value is divided by another is called the *quotient*.

To multiply whole numbers and decimals using the standard algorithm (set of instructions), place the numbers, called the *factors*, in pairs in a vertical list. Starting with the right-hand number on the bottom, find the partial products and add them. To find the number of decimal places needed in the final product, add the number of places in each number (two decimal places plus three decimal places means the product must have five decimal places).

$437.05 \times 2.5 =$

437.05 Two decimal places

$\times$ 2.5 One decimal place

218525 Product of 43705 times 5

874100 Product of 43705 times 20

1092625 Sum of the partial products

1,092.625 Count off three decimal places to find the final product

$128.48 \div 5.5 =$

23.36 Move the decimal point one place to the right in both the divisor and the dividend to make the divisor a whole number

55) 1284.80

110 Product of 2 times 55

184 Bring 4 down

165 Product of 3 times 55

198 Bring 8 down

165 Product of 3 times 55

330 Add a 0 to the dividend and bring it down

330 Product of 6 times 55

0 No remainder

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To divide whole numbers and decimals using the standard algorithm, place the dividend under the division symbol and the divisor to the left of the division symbol. The answer, called the *quotient,* is placed above the division symbol. To solve the equation, work from the left of the dividend and estimate how many times the divisor goes into the first number or group of numbers. Carry the remainder down along with the next number and repeat the process. Do this until the final quotient is found. When dividing decimals, multiply the divisor by a power of 10 until the decimal point is at the end of the divisor, making it a whole number. Then, multiply the dividend by the same power of 10. The decimal point in the quotient should be aligned with the decimal point in the dividend.

See It

Find the product of 81.6 times 3.5.

Step 1 Place 81.6 over 3.5 in a vertical list and count the total number of decimal places (2).

Step 2: Multiply 816 by 5 ($816 \times 5 = 4{,}080$).

Step 3: Multiply 816 by 30 ($816 \times 30 = 24{,}480$).

Step 4: Add the partial products and count off two decimal places (285.60).

Check It

1. $1{,}024 \times 4.5 =$
2. $86.7 \div 3 =$
3. $4{,}327 \times 209 =$
4. $945.35 \div 36.5 =$

PRACTICE 9

Rounding Numbers

Many times, you will not need as precise of a number as the calculation provides. For example, if you are calculating millions of dollars, it may not be important to know the result down to the dollar. Instead, you may round the number to the nearest ten thousand or even hundred thousand. Also, when working with decimals, especially multiplication and division operations, the final answer may have several more decimal places than you need.

To round a number, locate the value place to which you want to round. Then, look at the digit to the right of this place. If the digit to the right is 5 or greater, add 1 to the value place to which you are rounding. If the digit to the right is less than 5, do nothing to the value place to which you are rounding.

See It

Round the number 23.987293 to four decimal places.

Step 1: Locate the fourth decimal place (23.987293).

Step 2: Identify the value of the digit to the right of 2. This digit is 9, which is greater than 5 (23.987293).

Step 3: Add 1 to 2 and eliminate all digits to the right of the result (23.9873).

Check It

Round the following numbers to two decimal places.

1. 12.86905746
2. 152.19574
3. 76.559539
4. 4.129834
5. 98.9936756
6. Round to the nearest one dollar: $1,386,345.56.
7. Round to the nearest one hundred dollars: $1,386,345.56.
8. Round to the nearest one thousand dollars: $1,386,345.56.
9. Round to the nearest one hundred thousand dollars: $1,386,345.56.
10. Round to the nearest one million dollars: $1,386,345.56.

PRACTICE 10

Multiplying and Dividing Fractions

To multiply fractions, multiply all the numerators (top numbers). Also, multiply all the denominators (bottom numbers). Finally, simplify the fraction.

To divide fractions, invert the fraction that is the divisor. Then, multiply the two fractions. Finally, simplify the fraction.

See It

Find the product of these fractions: $\frac{2}{3}$, $\frac{3}{8}$, and $\frac{9}{10}$.

Step 1: Multiply the numerators ($2 \times 3 \times 9 = 54$)

Step 2: Multiply the denominators ($5 \times 8 \times 10 = 400$)

Step 3: Simplify the fraction ($\frac{54}{400} = \frac{27}{200}$).

Check It

1. $\frac{2}{3} \times \frac{4}{5} \times \frac{6}{7} =$
2. $\frac{41}{54} \times \frac{67}{100} =$
3. $\frac{21}{36} \times \frac{78}{90} \times \frac{1}{5} =$
4. $\frac{2}{7} \times \frac{4}{9} \times \frac{5}{8} =$
5. $\frac{14}{19} \div \frac{3}{8} =$
6. $\frac{2}{7} \div \frac{8}{21} =$
7. $\frac{41}{54} \div \frac{99}{100} =$
8. $\frac{31}{32} \div \frac{67}{72} =$

PRACTICE 11

Adding Fractions

To add fractions, each fraction must have the same denominator. In some cases, this means calculating the *least common denominator.*

To find the least common denominator, list multiples of each denominator and then identify the smallest common value. Once you have the least common denominator, determine for each fraction what number is multiplied by the denominator to achieve the least common denominator and multiply the numerator by the same number.

Once all fractions have the same denominator, add the numerators. Finally, simplify the fraction.

See It

Find the sum of these fractions: $\frac{3}{8}$, $\frac{5}{16}$, and $\frac{11}{32}$. Calculate the least common denominator if needed, then add the numerators.

Step 1: Determine the least common denominator. In this case, 32 is the least common denominator because it is divisible by both 8 and 16.

Step 2: Multiply $\frac{3}{8}$ by $\frac{4}{4}$ ($\frac{3}{8} \times \frac{4}{4} = \frac{12}{32}$).

Step 3: Multiply $\frac{5}{16}$ by $\frac{2}{2}$ ($\frac{5}{16} \times \frac{2}{2} = \frac{10}{32}$).

Step 4: Add the fractions $\frac{12}{32}$, $\frac{10}{32}$, and $\frac{11}{32}$ ($\frac{12}{32} + \frac{10}{32} + \frac{11}{32} = \frac{33}{32}$) and simplify the result ($\frac{33}{32} = 1\frac{1}{32}$).

Check It

1. $\frac{4}{5} + \frac{3}{20} + \frac{1}{5} =$
2. $\frac{3}{16} + \frac{1}{2} + \frac{5}{8} =$
3. $\frac{1}{18} + \frac{2}{9} + \frac{1}{2} =$
4. $\frac{2}{3} + \frac{20}{21} + \frac{1}{7} =$

PRACTICE 12

Subtracting Fractions

To subtract fractions, each fraction must have the same denominator. In some cases, this means calculating the *least common denominator*.

To find the least common denominator, list multiples of each denominator and then identify the smallest common value. Once you have the least common denominator, determine for each fraction what number is multiplied by the denominator to achieve the least common denominator and multiply the numerator by the same number.

Once all fractions have the same denominator, subtract the numerators. Finally, simplify the fraction.

See It

Find the difference between these fractions $\frac{5}{18}$, $\frac{2}{9}$, and $\frac{1}{3}$. Calculate a least common denominator if needed, then subtract the numerators.

Step 1: Determine the least common denominator. In this case, 18 is the least common denominator because it is divisible by both 9 and 3.

Step 2: Multiply $\frac{2}{9}$ by $\frac{2}{2}$ ($\frac{2}{9} \times \frac{2}{2} = \frac{4}{18}$).

Step 3: Multiply $\frac{1}{3}$ by $\frac{6}{6}$ ($\frac{1}{3} \times \frac{6}{6} = \frac{6}{18}$).

Step 4: Subtract the numerators ($5 - 4 - 6 = -5$).

Step 5: Simplify the fraction $\frac{-5}{18}$. In this case, the fraction cannot be simplified.

Check It

1. $\frac{2}{5} - \frac{1}{20} - \frac{1}{5} =$
2. $\frac{5}{8} - \frac{3}{16} - \frac{1}{2} =$
3. $\frac{7}{9} - \frac{1}{18} - \frac{1}{3} =$
4. $\frac{20}{21} - \frac{1}{7} - \frac{2}{3} =$

PRACTICE 13

Calculating a Percentage

You can find the percentage of a number or what percentage one number is of another number. To find the percentage of a number, change the percentage to a decimal by dividing the percentage by 100, which results in the decimal point moving two places to the left. Then, multiply the decimal by the number.

To find what percentage one number is of another, divide the first number by the second number. Then, convert the quotient to a percentage by multiplying the quotient by 100, which results in the decimal point moving two places to the right. The number being divided is called the dividend. The divisor is the number by which the dividend is divided.

See It

Calculate 14% of 1,248.

Step 1: Change 14% to a decimal by dividing 14 by 100 (14% → 0.14).
Step 2: Multiply 1,248 by 0.14 to find the answer (1,248 × 0.14 = 174.72).

Check It

1. What is 2.5% of $578?
2. What is 0.05% of 10.65?
3. What is 1.87% of 54.3?
4. What is 102.3% of 5.75?

See It

Calculate what percentage 27 is of 429.

Step 1: The divisor is 429. The dividend is 27.
Step 2: Divide 27 by 429 (27 ÷ 429 ≈ 0.63).
Step 3: Convert 0.63 to a percentage by multiplying 0.63 by 100% (0.63 → 63%).

Check It

1. What percentage of 35 is 42?
2. What percentage of 117.5 is 9.8?
3. What percentage of 1,034 is 58.2?
4. What percentage of $184,352.90 is $105.98?
5. What percentage of $58.92 is $11.78?

PRACTICE 14

Representing Percentages as Fractions and Decimals

It is easy to convert between percentages, fractions, and decimals. A percentage is simply the numerator of a fraction with a denominator of 100. The word *percent* means *for every one hundred*, or per one cent. For example, 15% is equal to the fraction $\frac{15}{100}$, which can be simplified to $\frac{3}{20}$.

To change a percentage to a decimal, divide the percentage by 100, which results in the decimal point moving two places to the left. For example, 25.7% is equal to the decimal 0.257. To change a decimal to a percentage, multiply the decimal by 100%, which results in the decimal point moving two places to the right. For example, the decimal 0.072 is equal to 7.2%.

To change a fraction to a percentage, first convert it to a decimal by dividing the numerator by the denominator. Then, convert the decimal to a percentage by moving the decimal point two places to the right.

See It

Convert $\frac{42}{37}$ to a percentage.

Step 1: Convert the fraction to a decimal by dividing the numerator by the denominator ($42 \div 37 \approx 1.135$).

Step 2: Convert the decimal to a percentage by multiplying the decimal by 100% ($1.135 \rightarrow 113.5\%$).

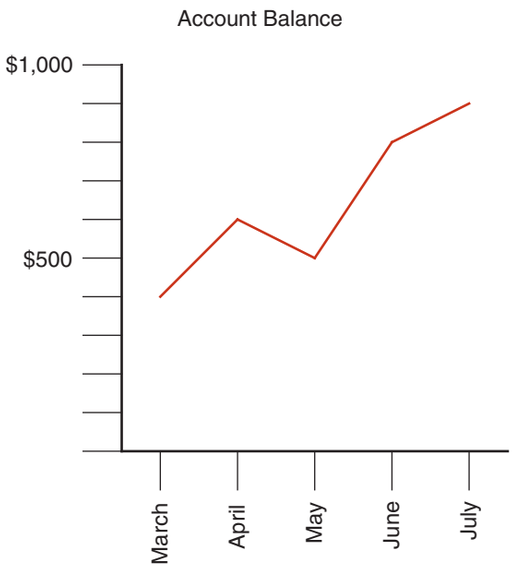
Check It

1. Convert $\frac{5}{7}$ to a percentage.
2. Convert 2.6% to a decimal.
3. Convert 0.0385 to a percentage.
4. Convert 3% to a fraction.
5. Convert $\frac{9}{32}$ to a percentage.
6. Convert 98.72% to a decimal.
7. Convert 1.456 to a percentage.
8. Convert 45% to a fraction.
9. Convert $\frac{10}{15}$ to a percentage.
10. Convert 1.009 to a percentage.

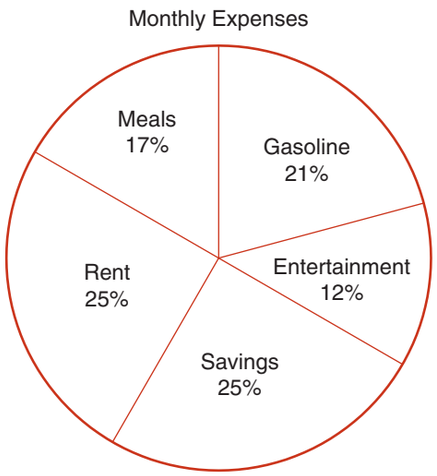
PRACTICE 15

Interpreting Graphs

Graphs are used to illustrate data in a picture-like format. Often, it is easier to understand data if it is shown in a graphical form instead of a numerical form. For example, a graph can be used to show the trend of financial markets over time. Two common types of graphs are line graphs and circle graphs.



Line graph



Circle graph

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See It

Using the line graph above, what was the highest account balance over the five months shown? Identify the highest point on the line graph and determine the dollar amount to which the point corresponds.

Step 1: Locate the highest point on the line graph, which occurred in July.

Step 2: From the highest point, draw a line to the vertical axis to determine the corresponding dollar amount ($900).

Check It

Use the line graph to answer these questions.

1. In which month did the account have the lowest balance?
2. In which month was the account balance lower than the previous month?
3. What was the account balance in April?
4. In which month was the account balance $800?