PAYCHEX, INC.
BASIC BUSINESS MATH
TRAINING MODULE

Basic Business Math

Table of Contents

Overview

This training provides an overview of basic business math skills. By understanding basic math skills, employees not only develop personally, but their performance and quality service also increase.

A basic overview of the following topics is provided in this module:

- Addition
- Subtraction
- Multiplication
- Division
- Rounding
- Fractions
- Ratios
- Percentages
- Order of Operations
- Highest and Lowest Value
- Sequence and Patterns
- Word Problems
- Calculators

Objectives

After completion of this module, employees are able to:

- review and understand the functions of a calculator,
- complete basic addition, subtraction, multiplication and division skills,
- execute rounding problems,
- enhance their knowledge regarding fractions, ratios, and percentages,
- identify order of operations, and highest and lowest value,
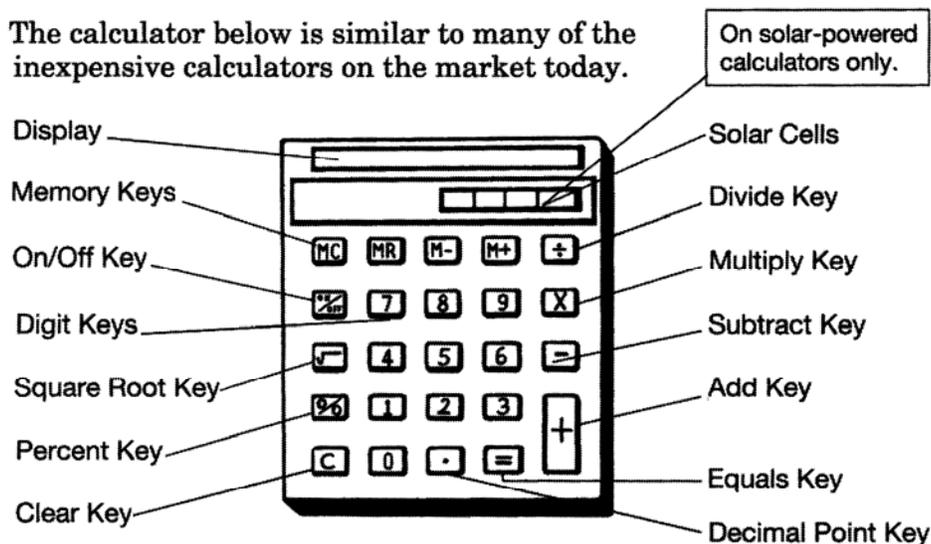- sharpen their skills in finding a pattern in a sequence of numbers, and

- analyze and solve word problems.

Calculator

The calculator is an excellent tool to assist you with basic calculations and math problems. It is important to be familiar with the different features and functions of a calculator so you can utilize them properly. Look at the picture below to learn what each key's function is.

The Calculator Keyboard

The calculator below is similar to many of the inexpensive calculators on the market today.

On solar-powered calculators only.

Display

Memory Keys

On/Off Key

Digit Keys

Square Root Key

Percent Key

Clear Key

Solar Cells

Divide Key

Multiply Key

Subtract Key

Add Key

Equals Key

Decimal Point Key

Locate the following keys (or similar keys) on your calculator.

- The **on/off key:** (ON/OFF). You press (ON/OFF) once to turn a calculator on, and press it again to turn it off. Some calculators have separate (ON) and (OFF) keys.

- The **digit keys:** (0), (1), (2), (3), (4), (5), (6), (7), (8), (9). Entering a number on a calculator is similar to dialing on a touchtone telephone. You simply press one digit at a time.

- The **clear key:** (C). Pressing (C) erases the display. You press (C) each time you begin a new problem or when you've made a keying error.

Different calculators use different clear key symbols. Other commonly used symbols are shown below.

(ON/C) On/Clear   (CE/C) Clear-Entry/Clear

(CE) Clear Entry   (AC) All Clear

Tips to Remember

- A calculator does not have a comma (,) key or a dollar sign ($) key.
- A decimal point is entered to separate dollars from cents.

  (For example, **$1,250.99** would read as **1250.99** on a calculator.)

You Practice!
 Enter the following numbers on your calculator. Then show how the calculator displays each number or amount.

Problem 1

$.47   Displayed Reading on Calculator: _____

Problem 2

$2.35   Displayed Reading on Calculator: _____

Problem 3

187   Displayed Reading on Calculator: _____

Problem 4

2,683   Displayed Reading on Calculator: _____

Basic Calculations

Addition

When you add two numbers together, the result is called the *sum* of those numbers.

You Practice!
Calculate the sums of these 6 addition problems.

1. 456 + 254	**2.** 294 + 711	**3.** 394 + 548
4. 565 + 843	**5.** 431 + 333	**6.** 986 + 122

Subtraction

When you subtract one number from another, the result is called the *difference* between those numbers.

You Practice!
Calculate the differences of these 6 subtraction problems.

1. 546 - 254	**2.** 454 - 131	**3.** 982 -432
4. 774 - 589	**5.** 695 - 555	**6.** 441 - 430

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Multiplication

When you multiply two numbers together, the result is called the **product** of those numbers. Symbols used to represent multiplication include **x**, **·**, and **( )**. When multiplying multi-digit numbers, use these helpful hints:

- Set up the problem in **vertical format**, placing the number with the most digits on top.

  For Example: 3 x 213 would be
  ```
       213
     x   3   ↓
  ```

- Start with the far right digit of the bottom number and multiply it by each of the top digits, right to left.

  For Example: 213   (3x3 is 9, 3x1 is 3, and 3x2 is 6)
  ```
     x   3
       639
  ```

- When multiplying by a number with more than one digit, be sure to line up the resulting numbers for easy addition. Use zeros as place holders if needed.

  *For Example: 125   The **red 0** is a place holder.*
  ```
          x 12
           250
        +1250
          1500
  ```

You Practice!
Calculate the products of these 6 multiplication problems.

1. $12 \cdot 1 =$ **2.**   24 x 31 =   **3.**   5 (292) =

4.   736   **5.**   546   **6.**   232
          x 259   x 254   x 398

Division

When you divide one number by another, the result is called the **quotient**. Symbols used to represent division include ÷ and /. A division problem should always be put in the following format.

Quotient

Divisor | Dividend
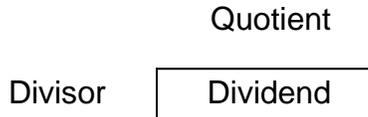
Example

$$360 \div 10 \longrightarrow 36$$

$$
\begin{array}{r}
36 \\
10 \overline{)\ 360} \\
-30 \\
\hline
60 \\
-60 \\
\hline
0
\end{array}
$$

You Practice!

Calculate the quotients of these 6 division problems.

1.   88
        ÷ 11

2.   64
          8

3.   36
        ÷ 12

4.   25
        ÷ 5

5.   824
        ÷ 4

6.   472
          8

Order of Operation

In arithmetic and algebra, there is an order of operations or process used to evaluate equations involving more than one type of calculation.
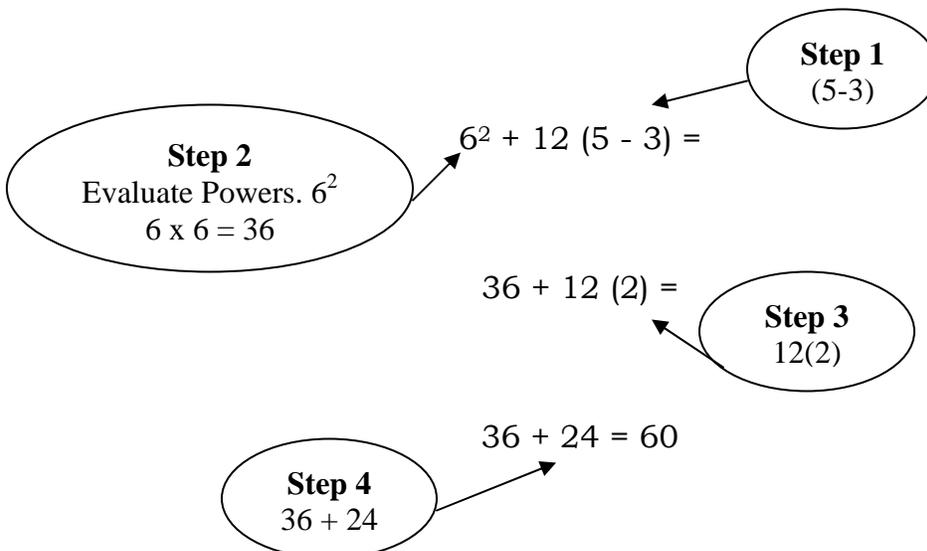
$$6 + 12 (5 - 3) = 30$$

Step 1	First do operations that occur within grouping symbols. Ex. ( )
Step 2	Then evaluate powers or exponents. An exponent means that number is multiplied by itself. Ex. 6^2
Step 3	Then do multiplication and division from left to right.
Step 4	Finally, do additions and subtractions from left to right.

Tips to Remember

Another method to remember the order of operation is "Please Excuse My Dear Aunt Sally."

P = Parentheses
E = Exponents
M = Multiplication
D = Division
A = Addition
S = Subtraction

Step 1
(5-3)

$6^2 + 12 (5 - 3) =$

Step 2
Evaluate Powers. 6^2
6 x 6 = 36

36 + 12 (2) =

Step 3
12(2)

36 + 24 = 60

Step 4
36 + 24

Guided Practice!
Using the steps and tips from above, follow along as we solve the equations utilizing order of operations.

1. 14 – 7 + 5 (4 x 9) = ⟶ **Step 1: (4 x 9)**

    14 – 7 + 5 (36) = ⟶ **Step 2: 5 (36)**

    14 – 7 + 180 = ⟶ **Step 3: 14 - 7**

    7 + 180 = ⟶ **Step 4: 7 + 180**

    7 + 180 = 187 ⟶ **Answer: 187**

2. 6^2 + 33 ÷ (15 – 4) ⟶ **Step 1: (15 – 4)**

    6^2 + 33 ÷ (11) ⟶ **Step 2: 6^2 = 36**

    36 + 33 ÷ (11) ⟶ **Step 3: 33 ÷ (11) = 3**

    36 + 3 = ⟶ **Step 4: 36 + 3**

    36 + 3 = 39 ⟶ **Answer: 39**

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You Practice!

Calculate the answers to the following problems using the order of operations.

1. $57 + 45 - 15 (2) =$

2. $17 - 3^2 + 36 \div (12 - 3) =$

3. $84 + 16 \div 4 =$

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Rounding

Each number represents a value. In the chart below a list of the place values is displayed. A rounded number tells you **about** how much.

589.13

hundreds

tens

ones

hundredths

tenths

(1) When rounding, the problem will ask you to which place value to round.
(2) Once you know that, look to the value directly to the <u>right</u> of the place value to which you are rounding.
(3) If the digit is less than 5, round down.
(4) If the digit is 5 or more, round up.

For example, to round to the tens place, check the digit in the ones place and to round to the tenths place, check the digit in the hundredths place.

It may be helpful to think in terms of a number line and look to see what is closer. For example:

Problem: Round 64 to the nearest ten.

60   61   62   63   64   65   66   67   68   69   70

Ask yourself, "Is 64 closer to 60 or 70?" 64 is closer to 60, so 64 rounds down to 60.

<u>Guided Practice!</u>
You may be asked to round a number to the nearest ten, hundred, thousand, tenth, hundredth, thousandth, or whole number. Let's review each of these.

Round to the nearest <u>ten</u>.

1. 25 ➤ Look at the ones place. It's a 5, so you *round up* to **30**.
2. 31 ➤ Look at the ones place. It's a 1, so you *round down* to **30**.
3. 367 ➤ Look at the ones place. It's a 7, so you *round up* to **370**.

Round to the nearest <u>hundred</u>.

1. 468 ➤ Look at the tens place. It's a 6, so you *round up* to **500**.
2. 921 ➤ Look at the tens place. It's a 2, so you *round down* to **900**.
3. 344 ➤ Look at the tens place. It's a 4, so you *round down* to **300**.

Round to the nearest <u>whole number</u>.

1. 6.53 ➤ Look at the tenths place. It's a 5, so round up to **7**.
2. 78.68 ➤ Look at the tenths place. It's a 6, so *round up* to **79**.
3. 854.31 ➤ Look at the tenths place. It's a 3, so *round down* to **854**.

Round to the nearest <u>tenth</u>.

1. 4.26 ➤ Look at the hundredths place. It's a 6, so *round up* to **4.3**.
2. 17.49 ➤ Look at the hundredths place. It's a 9, so *round up* to **17.5**.
3. 3.456 ➤ Look at the hundredths place. It's a 5, so *round up* to **3.5**.

Round to the nearest <u>hundredth</u>.

1. 8.369 ➤ Look at the thousandths place. It's a 9, so *round up* to **8.37**.
2. 369.637 ➤ Look at the thousandths place. It's a 7, so *round up* to **369.64**.
3. 16.983 ➤ Look at the thousandths place. It's a 3, so *round down* to **16.98**.

Round to the nearest <u>thousandth</u>.

1. 46.5698 ➤ Look at the ten thousandths place. It's an 8, so *round up* to **46.570**.
2. 64.3592 ➤ Look at the ten thousandths place. It's a 2, so *round down* to **64.359**.
3. 76.3645 ➤ Look at the ten thousandths place. It's a 5, so *round up* to **76.365**.

You Practice!

In the following exercise, practice rounding to different place values.

Round to the nearest ten.

  1.   43
  2.   56
  3.   867

Round to the nearest hundred.

  1.   834
  2.   421
  3.   294

Round to the nearest whole number.

  1.   6.34
  2.   84.54
  3.   732.79

Round to the nearest tenth.

  1.   7.64
  2.   35.86
  3.   3.123

Round to the nearest hundredth.

  1.   2.367
  2.   438.838
  3.   13.252

Round to the nearest thousandth.

  1.   69.3514
  2.   72.8649
  3.   95.4637

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Patterns and Sequences

Patterns and sequences are found in the world around us. In fact, math is built on the use of patterns and sequences.

Tips to Remember

Break down the pattern and compare numbers individually. Compare the relationship between the two numbers.

The best way to see patterns is to practice identifying the patterns and sequences found in a series of numbers.

Guided Practice!

    1. One number in the following series is omitted. What should that number be?

        1   3   5   7   **?**   11   13

The difference between the two numbers is 2.

The difference between the two numbers is 2.

The difference between the two numbers is 2.

The difference between the two numbers is 2.

After comparing each number, you will notice that the pattern is each number is added by 2 to get the following number. Therefore, the number missing should be **9**.
(7 + 2 = 9)

    2. One number in the following series is omitted. What should that number be?

    63   60   57   **?**   51   48

The difference between the two numbers is 3.

The difference between the two numbers is 3.

The difference between the two numbers is 3.

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After comparing each number, you will notice that the pattern is each number is subtracted by 3 to get the following number. Therefore, the missing number is **54**. (57 – 3 = 54).

3. Look at the row of numbers below. What number should come next?

81	27	9	3	?

The relationship between the two numbers is that 81 ÷ 3 is 27.

The relationship between the two numbers is that 27 ÷ 3 is 9.

The relationship between the two numbers is that 9 ÷ 3 is 3.
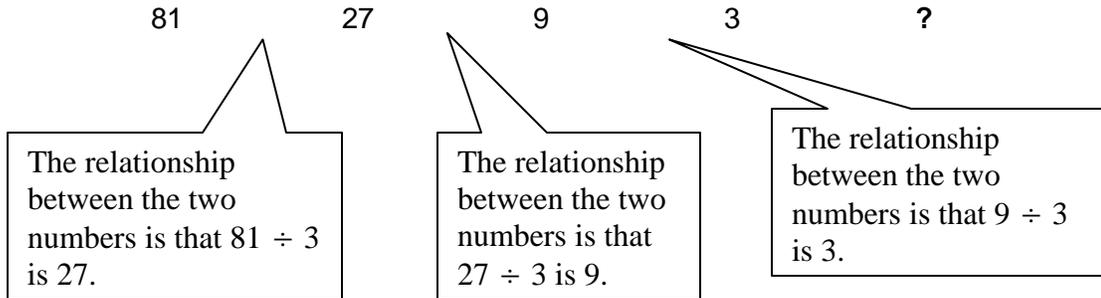
After comparing each number, you will notice that the pattern is each number is being divided by 3 to obtain the following number. Therefore, the number missing should be 1. (3 ÷ 3 = 1).

4. One number in the following series is omitted. What should that number be?

5	6	8	11	15	20	?

The difference Between the two numbers is 1.

The difference between the two numbers is 2.

The difference between the two numbers is 3.

The difference between the two numbers is 4.

The difference between the two numbers is 5.
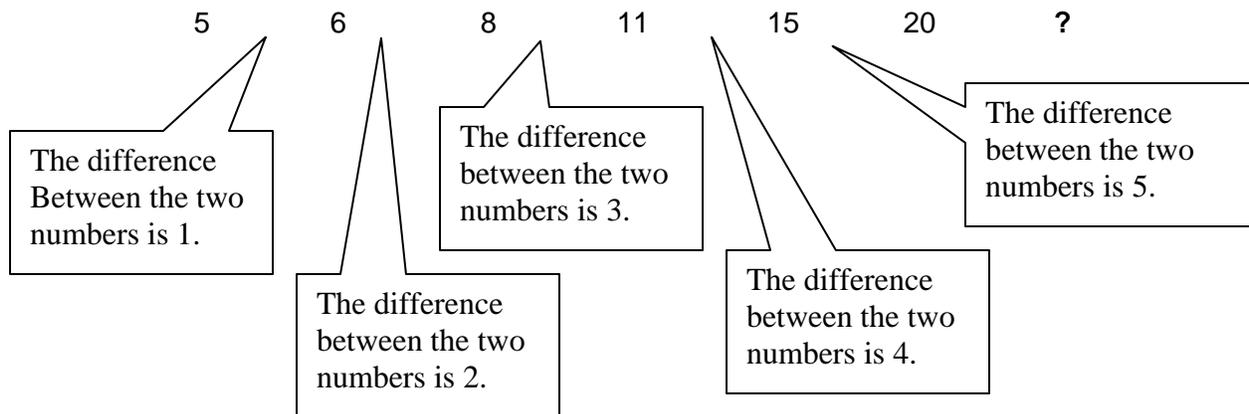
After comparing each number, you will notice the pattern is that with each number, the difference goes up by one. Therefore, the missing number is 26. (20 + 6 = 26).

You Practice!

1. One number in the following series is omitted. What should that number be?

    0   4   8   12   **?**   20   24

2. One number in the following series is omitted. What should that number be?

    51   49   47   **?**   43   41

3. Look at the row of numbers below. What number should come next?

    48   12   3   **?**

4. One number in the following series is omitted. What should that number be?

    15   16   18   21   25   30   **?**

Fractions

Fractions are numbers less than one.

Numerator

$$\frac{4}{5}$$
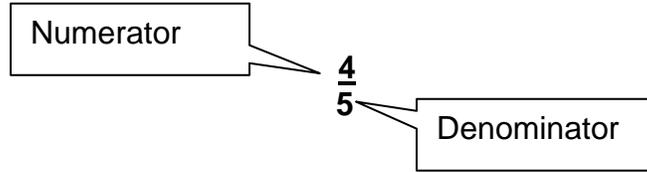
Denominator

The bottom number is called the *denominator* and tells into how many pieces the whole is divided.

The top number is called the *numerator* and tells how many of those pieces you are considering.

For the example above, think of a pizza divided into five equal parts. You have eaten 4/5 of the pieces. What fraction of the pizza is left?
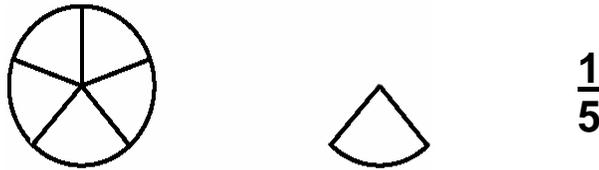
$$\frac{1}{5}$$

Guided Practice!

Determine what the fraction is for each of the examples below. Remember, the "How Many Parts?" number is the denominator or bottom number, and the "Shaded Amount?" number is the numerator or top number.
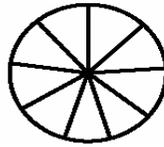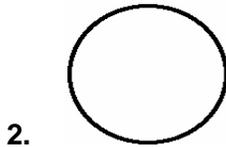
One Whole Object	How Many Parts?	Shaded Amount?	Fraction

1.

1	5	2	$\dfrac{2}{5}$
	(Denominator)	(Numerator)	
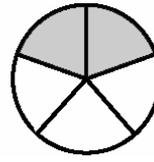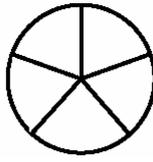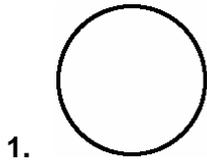
Note: 2 out of 5 pieces are shaded, so the fraction is 2/5.

2.

1	9	3	$\dfrac{3}{9}$
	(Denominator)	(Numerator)	
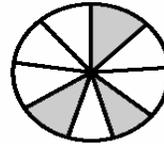
Note: 3 out of 9 pieces are shaded, so the fraction is 3/9.
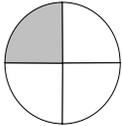
You Practice!

Determine what the fraction is for each of the examples below. Remember, the "How Many Parts?" number is the denominator or bottom number, and the "Shaded Amount?" number is the numerator or top number. The two of these make up the fraction.
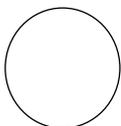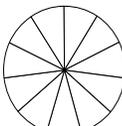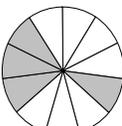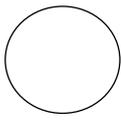
One Whole Object	How Many Parts?	Shaded Amount ?	Fraction

1. _____ _____ _____ _____
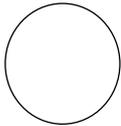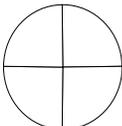
2. _____ _____ _____ _____

3. _____ _____ _____ _____
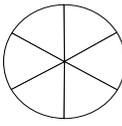
4. _____ _____ _____ _____
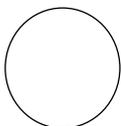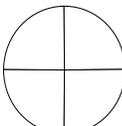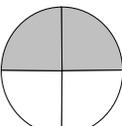
5. _____ _____ _____ _____
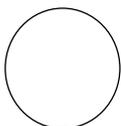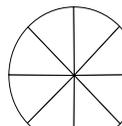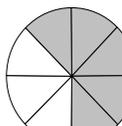
6. _____ _____ _____ _____
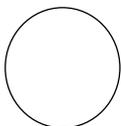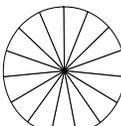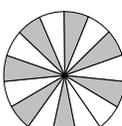
Fractions, continued. . .

There are three types of fractions: proper fraction, improper fraction, and mixed number.

➢ A **proper fraction** is a fraction with a numerator smaller than its denominator.   This is a number that is smaller than one.

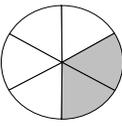Examples are: $\dfrac{2}{5},\ \dfrac{4}{8},\ \dfrac{1}{3},\ \dfrac{10}{40}$

➢ An **improper fraction** is a fraction with a numerator larger than its denominator. This is a number that is actually greater than one.

Examples are: $\dfrac{8}{5},\ \dfrac{10}{9},\ \dfrac{14}{7},\ \dfrac{3}{2}$

➢ A **mixed number** consists of a whole number followed by a proper fraction.

Examples are: $2\dfrac{3}{4},\ 5\dfrac{1}{8},\ 3\dfrac{6}{7},\ 11\dfrac{7}{12}$

An improper fraction can be changed to a mixed number by dividing the numerator by the denominator. The quotient becomes the whole number and the remainder becomes the new numerator.

For example, $\dfrac{8}{5}$ is an improper fraction since the numerator (8) is larger than the denominator (5). By dividing 8 by 5, the quotient is 1 and the remainder is 3.

Therefore: $\dfrac{8}{5}$ = $1\dfrac{3}{5}$
                       improper   proper

Guided Practice!
Change the following improper fractions into mixed numbers.

1. $\dfrac{9}{4}$

Step 1: Divide 9 by 4. (9 ÷ 4)
Step 2: The quotient is 2. (9 ÷ 4 = 2 with 1 left over.)
Step 3: The remainder is 1.
Step 4: The mixed number is **2$\dfrac{1}{4}$**

2. $$\dfrac{16}{3}$$

Step 1: Divide 16 by 3. (16 ÷ 3)
Step 2: The quotient is 5. (16 ÷ 3 = 5 with 1 left over.)
Step 3: The remainder is 1
Step 4: The mixed number is **5** $\dfrac{1}{3}$

3. $$\dfrac{29}{5}$$

Step 1: Divide 29 by 5. (29 ÷ 5)
Step 2: The quotient is 5. (29 ÷ 5 = 5 with 4 left over.)
Step 3: The remainder is 4.
Step 4: The mixed number is **5** $\dfrac{4}{5}$

4. $$\dfrac{53}{9}$$

Step 1: Divide 53 by 9. (53 ÷ 9)
Step 2: The quotient is 5. (53 ÷ 9 = 5 with 8 left over.)
Step 3: The remainder is 8.
Step 4: The mixed number is **5** $\dfrac{8}{9}$

5. $$\dfrac{77}{12}$$

Step 1: Divide 77 by 12. (77 ÷ 12)
Step 2: The quotient is 6. (77 ÷ 12 = 6 with 5 left over.)
Step 3: The remainder is 5
Step 4: The mixed number is **6** $\dfrac{5}{12}$

Reducing Fractions

To reduce a fraction to its lowest terms, divide by the factor(s) that the numerator and denominator have in common.

<u>Guided Practice!</u>

Step 1   Step 2   Step 1

(1) $\dfrac{9}{36}$ ➲ $\begin{array}{l} 9 \div 3 = \underline{3} \\ 36 \div 3 = 12 \end{array}$ ➲ $\begin{array}{l} 3 \div 3 = \underline{1} \\ 12 \div 3 = 4 \end{array}$ OR $\begin{array}{l} 9 \div 9 = \underline{1} \\ 36 \div 9 = 4 \end{array}$

A common factor for 9 and 36 is 3, so both are divided by 3 (step 1). However, the resulting fraction of 3/12 can be reduced further. 3/12 has the common factor of 3 again, so they are both divided by 3 a second time (step 2). The resulting fraction of ¼ is in lowest terms because it cannot be further reduced.

OR

A common factor for 9 and 36 is 9, so both are divided by 9. The resulting fraction is ¼ which is in lowest terms and cannot be further reduced.

(2) $\dfrac{10}{35}$ ➲ $\begin{array}{l} 10 \div 5 = \underline{2} \\ 35 \div 5 = 7 \end{array}$

A common factor for 10 and 35 is 5, so both are divided by 5. The resulting fraction of 2/7 is in lowest terms because it cannot be further reduced.

(3) $\dfrac{21}{56}$ ➲ $\begin{array}{l} 21 \div 7 = \underline{3} \\ 56 \div 7 = 8 \end{array}$

A common factor for 21 and 56 is 7, so both are divided by 7. The resulting fraction of 3/8 is in lowest terms because it cannot be further reduced.

You Practice!
Reduce the following fractions into lowest terms. Remember to find the common factor of both the numerator and denominator.

(1.) $\dfrac{8}{12}$

(2.) $\dfrac{3}{6}$

(3.) $\dfrac{8}{24}$

(4.) $\dfrac{16}{72}$

(5.) $\dfrac{18}{48}$

(6.) $\dfrac{25}{45}$

Decimals

Decimals are another form of fractions. Fractions are turned into decimals by dividing the numerator by the denominator. 5/8 is 5 ÷ 8. The decimal equivalent for 5/8 is equal to .625.

Each number in a decimal represents a value.
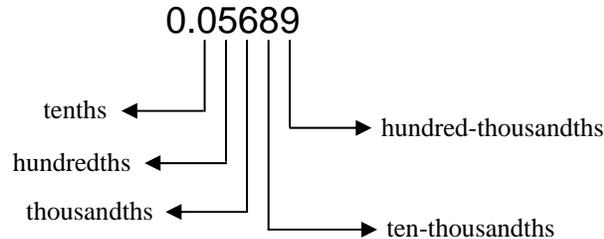
Tips to Remember

Multiplication (x)	Count the total number of spaces to the right of the decimal and ensure the same number of decimal spaces appears in the solution. 32.12 x 4.86 = 156.1032
Division (÷)	When dividing by a decimal, move the decimal point of the divisor to the right until the number becomes a whole number. Then move the decimal of the dividend by the same number of places. Lastly, make sure the decimal point for the quotient aligns with the dividend.
Addition (+)	Make sure you line up the decimal point before adding. 4.3649 + 17.7521 22.1170
Subtraction (-)	Make sure you line up the decimal point before subtracting. 34.3649 - 7.7521 26.6128

Guided Practice!

(1.) Multiplication   **6.35 X 5**

    (a) Rewrite the equation   6.35
                                      x   5

    (b) Solve the equation   3175

    (c) Ensure that the answer has **2** decimal spaces as that's how many there are in the original problem.

    (d) The answer or product is 31.75

(2.) Addition   **78.09 + 19.367**

    (a) Rewrite the equation vertically & remember to line up the decimal points.

                              78.09
                            + 19.367

    (b) Solve the equation.   97.457

    (c) The answer or sum is   97.457

(3.) Subtraction   **149.632 – 72.541**

    (a) Rewrite the equation vertically & remember to line up the decimal points.

                           149.632
                         - 72.541

    (b) Solve the equation.   77.091

    (c) The answer or difference is 77.091.

(4.) Division   **12.7775 ÷ 2.5**

    (a) Rewrite the equation to this format: 2.5 | 12.775

(b) Move the decimal point of the divisor, 2.5, over one space to the right so it becomes a whole number, 25. Also, move the decimal point over one space to the right on the dividend, 12.775. It then becomes 127.75.

(c) Don't forget to line up the decimal point for the answer or quotient with that of the dividend.

$$
25 \overline{)\; 127.75}
$$

(d) Solve the equation.   5.11

(d) The answer or quotient is 5.11.

You Practice!

Solve the following problems involving decimals. Don't forget the tips to help you!

(1.) 172 x 0.56

(2.) 4.45 ÷ .125

(3.) 5.9 – 4.166

(4.) 6.35 + 27.039

(5.) Which digit of the following number is in the ten-thousandths place?   .053489

Highest and Lowest Value

Discovering the value of a number takes into consideration if the number is positive or negative, a fraction, or a decimal.

Positive numbers always hold a higher value than negative numbers.
Whole numbers are greater than fractions or decimals. Decimals need to be reviewed carefully and place value needs to be taken into account when determining highest or lowest value.

$$0.05689$$

tenths ←

hundredths ←

thousandths ←

→ hundred-thousandths

→ ten-thousandths
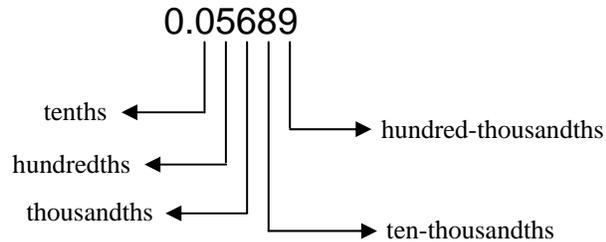
Tip to Remember

Compare each place value between the numbers when deciding which number is of higher or lower value.

Guided Practice!

Determine the number that is of highest value.

(1.)   .46985   .9216

tenths ←   → tenths

Comparing the tenths place, 9 is larger than 4. So, **.9216** is of higher value than .46985.

(2.)   7.832   7.83
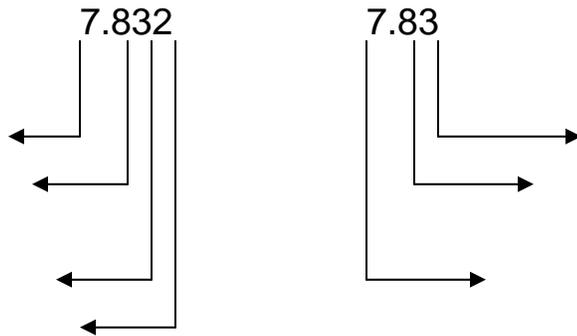
First compare the ones place. Both are a 7.
Next compare the tenths place. Both are an 8.
Then compare the hundredths place. Both are a 3.
Lastly, compare the thousandths place. One is a 2 and the other has nothing (0).
2 is a higher number than 0.
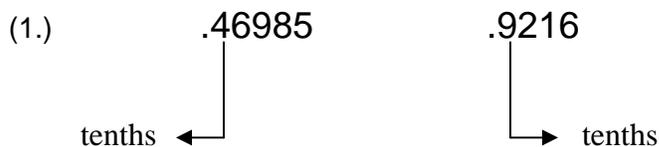
So, **7.832** is of higher value than 7.83.

(3.)   .5427   .5247

First compare the tenths place. Both are a 5.
Next compare the hundredths place. One is a 4 and the other is a 2.
The 4 is greater than the 2.

So, **.5427** has a higher value than .5247.

(4.)   - 5   .258

Although .258 is a decimal (smaller than 1), it is a positive number. - 5 is a negative
        number, so **.258** has a higher value than -5.

(5.)   .01697   .01687

First compare the tenths place. Both are a 0.
Next compare the hundredths place. Both are a 1.
Next compare the thousandths place. Both are a 6.
Then compare the ten-thousandths place. One is a 9 and one is an 8.
The 9 is greater than the 8.
So, **.01697** has a higher value than .01687.

You Practice!

Determine which number has the highest value.

(1.)   .843   .84321

(2.)   4568.10   4568.01

(3.)   .032567   .45632

(4.)   .01234   .00123

(5.)   - 3   .09785

(6.)   .57844   .78545

(7.)   .64278   .61247

(8.)   .75124   .75024

(9.)   1.9456   1.0001

(10.)   54.785   54.211

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Ratios

Ratios are similar to fractions. Ratios compare the relative size of two quantities. Ratios are written using either a semicolon or a fraction. For example the ratio of A to B is written either A:B or $\frac{A}{B}$

To know which number goes on top and which number goes on the bottom, you must look for clues in the sentence.

$$\text{Ratio} = \frac{\text{of}}{\text{to}}$$

The ratio of Laura's age to Jim's age is $\frac{\text{Laura's age}}{\text{Jim's age}}$

Ratios typically describe parts of a whole. The whole is the entire set, such as the students in a classroom. The part is a certain section of the whole, such as the female students in a classroom. The ratio of male students to female students can be called a part-to-part ratio. It compares one part of the whole to another part of the whole.

Example: There are 30 students in the classroom. There are 17 females and 13 males. The ratio of females to the whole room is 17:30. The ratio of males to the whole room is 13:30. The part-to-part ratio of females to males is 17:13.

It's important to know what ratios describe. A ratio is a description of a relative size, not an actual size.

A rate is special type of ratio. A rate is a quantity measured with respect to another measured quantity.   Example: a rate of speed of 60 miles an hour.   It measures miles (60) traveled per hour (1).

Guided Practice!

Determine the ratio for the following problems.

Problem 1

The tennis team won 10 of its 16 matches. Find the ratio of wins to losses.

Step 1

Step 2

Step 3

Ratio = matches won = 10 matches = 5
          matches lost   6 matches   3

Step 1: The ratio is matches won to matches lost.
Step 2: Fill in the numbers. Won = 10. Lost = 6.
Step 3: 10/6 can be reduced to 5/3.
Solution: The win ratio is **5**, which is read as "five to three" and is written 5:3.

Problem 2

You run a 10 kilometer race in 50 minutes. What is your average speed in kilometers per minute?

Step 1

Rate = 10 km = 1 km = 0.2 km/min
        50 min   5 min

Step 3

Step 2

Step 1: The ratio is kilometers run per minute.
Step 2: Fill in the numbers for this problem. 10 km. / 50 min.
Step 3: 10/50 can be reduced to 1/5. Change 1/5 into a decimal ($1 \div 5 = .2$)
Solution: Your average speed is 0.2 kilometers per minute.

You Practice!

For the problems below, determine the ratio.

Problem 1

Your school soccer team won 8 out of 15 games, with no ties. What was the team's ratio of wins to losses?

Problem 2

A plane flies 1,200 miles in 4 hours. How many miles does the plane fly in one hour?

Problem 3

You earn $45 for mowing 3 lawns. If you charge an equal amount for each lawn what is the amount you earn for 2 lawns?

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Percentages

Percentages are another way to write a part of the whole. The % sign always represents a number out of 100. 85% means 85/100.

Percentages may also be converted to fractions or decimals.

- When converting to fractions, the percentage is always a number out of 100. 35% mean 35/100. 77% means 77/100.

- When converting decimals, drop the percentage sign and move the decimal point to the left two spaces. 85% = .85, 25% = .25

Guided Practice!

Determine the percentage for the problems below.

Problem 1

4% of 50 =

Step 1: Change 4% to a decimal by moving the decimal point 2 spaces to the left ➲ .04
Step 2: Multiply .04 by 50. (.04 x 50)
Step 3: The answer is 2.
Step 4: 4% of 50 = 2.

Problem 2

42% of 60 =

Step 1: Change 42% to a decimal by moving the decimal point 2 spaces to the left ➲ .42
Step 2: Multiply .42 by 60. (.42 x 60)
Step 3: The answer is 25.2.
Step 4: 42% of 60 = 25.2.

Problem 3

10% of 90 =

Step 1: Change 10% to a decimal by moving the decimal point 2 spaces to the left ➲ .10
Step 2: Multiply .10 by 90. (.10 x 90)
Step 3: The answer is 9.
Step 4: 10% of 90 = 9.

Problem 4

550% of 12 =

Step 1: Change 550% to a decimal by moving the decimal pt. 2 spaces to the left ➲ 5.50
Step 2: Multiply 5.50 by 12. (5.50 x 12)
Step 3: The answer is 66.
Step 4: 550% of 12 = 66.

Problem 5

14% of 260 =

Step 1: Change 14% to a decimal by moving the decimal pt. 2 spaces to the left ➲ .14
Step 2: Multiply .14 by 260 (.14 x 260)
Step 3: The answer is 36.4.
Step 4: 14% of 260 = 36.4.

Problem 6

250% of 36 =

Step 1: Change 250% to a decimal by moving the decimal pt. 2 spaces to the left ➲ 2.50
Step 2: Multiply 2.50 by 36 (2.50 x 36)
Step 3: The answer is 90.
Step 4: 250% of 36 = 90.

You Practice!

Problem 1

4% of 50 =

Problem 2

80% of 400 =

Problem 3

10% of 50 =

Problem 4

Find 300% of 11 =

Problem 5

Find 14% of 260 =

Problem 6

What percent of 40 is 15?

Problem 7

What percent of 4 is 16?

Problem 8

9 is what percent of 36?

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Word Problems

A word problem is any mathematics exercise expressed in a hypothetical situation explained in words. Letters (or variables) are used in an algebraic expression to represent one or more unknown numbers. Symbols are used to translate word phrases.

Tips to Remember

Read the word problem at least twice. Read the problem quickly the first time, just get the broad view and zoom in carefully on the last part -- the question. Don't start translating until the second read-through.

English words from the problem most often translate into mathematical expressions. The following table is an example of some of the most common "translations."

English	*Math*
Equals, is, was, will be, has, costs, adds up to, is the same as	=
Times, of, multiplied by, product of, twice, double, half, triple	X
Divided by, per, out of, each, ratio of __to__.	÷
Plus, added to, sum, combined, and, more than, total	+
Minus, subtracted from, less than, decreased by, difference	-
What, how much, how many, a certain number	*x, n*, etc.

Guided Practice!

(1.) Sam had a bag of 150 cookies. He ate 4% of the cookies while watching cartoons on Saturday morning and 15% of the remaining cookies while watching detective show reruns on Saturday afternoon. <u>About how many cookies did he have left?</u>

Step 1: 150 x 0.04 = 6 cookies (This determines 4% of 150 cookies.)

Step 2: 150 - 6 = 144 (This determines how many cookies are left after Saturday morning)

Step 3: 144 x 0.15 = 21.6 (This determines 15% of 144 cookies.)

Step 4: 6 + 21.6 = 27.6 (This determines how many cookies were eaten all together.)

Step 5: 150 - 27.6 = 122.4 round to 122 (This determines how many cookies were left from the original 150 after those eaten on Saturday were subtracted.)

Step 6: About how many cookies did he have left? The answer is **122**.

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(2.) Matthew cuts a piece of string cheese into three pieces. One piece is 6 inches long, one piece is 4 inches long, and one piece is 3 inches long. <u>The shortest piece of string cheese is approximately what percent of the original length before the string cheese was cut?</u>

Step 1: 6 + 4 + 3 = 13 (This determines the total amount string cheese.)

Step 2: $\dfrac{3}{13}$ (This creates the ratio of the shortest piece of cheese to the total amount of cheese.)

Step 3: 3 ÷ 13 = .231 (This determines the percentage -- 23%)

Step 4: The shortest piece of cheese is **23%** of the original length of cheese.

(3.) If Lisa can run around the block 5 times in 20 minutes, <u>how many times can she run around the block in one hour?</u>

Step 1: 60 minutes to an hour (This determines how many minutes are in 1 hour.)

Step 2: 60 ÷ 20 = 3 (This determines how many 20 minute segments there are in 1 hr.)

Step 3: 3 x 5 = 15 (This determines how many laps Lisa can run in 1 hour.)

Step 4: Lisa can run around the block **15** times in an hour.

(4.) If a bag of 20 apples costs $2.50, <u>about how much does each apple cost?</u>

Step 1: $2.50 ÷ 20 = 0.125 (This determines how much one apple costs.)

Step 2: 0.125 rounds up to 0.13 (This determines the cost of one apple.)

Step 3: About how much does each apple cost? Each apple costs about **13¢**.

You Practice!

Problem 1

Julie counts the cars passing her house and finds that 2 of every 5 cars are foreign.
If she counts for an hour and 60 cars pass, how many of them are likely to be domestic?

Problem 2

Six friends agree to evenly split the cost of gasoline on a trip. Each friend paid $37.27.
What was the total cost of gas?

Problem 3

If production line A can produce 12.5 units in an hour and production line B can produce
15.25 units in an hour, how long will the production line A have to work to produce the
same amount of units as line B?

Problem 4

A jar of coins totaling $4.58 contains 13 quarters and 5 nickels. There are twice as
many pennies as there are dimes. How many dimes are there?

Summary

Basic math skills have practical applications in everyday life such as shopping and balancing a checkbook. By increasing awareness of the different math skills and practicing them, individual skills are enhanced.

This training provided you with an opportunity to practice the following math skills:

- Addition
- Subtraction
- Multiplication
- Division
- Rounding
- Fractions
- Ratios
- Percentages
- Order of Operations
- Highest and Lowest Value
- Sequence and Patterns
- Word Problems
- Calculators

Notes

Basic Business Math Answer Key

Calculator

(1.) **.47**   (2.) **2.35**   (3.) **187**   (4.) **2683**

Basic Calculations

Addition

(1.) **710**   (2.) **1,005**   (3.) **942**   (4.) **1,408**   (5.) **764**   (6.) **1,108**

Subtraction

(1.) **292**   (2.) **323**   (3.) **550**   (4.) **185**   (5.) **140**   (6.) **11**

Multiplication

(1.) **12**   (2.) **744**   (3.) **1,460**   (4.) **190,624** (5.) **138,684** (6.) **92,336**

Division

(1.) **8**   (2.) **8**   (3.) **3**   (4.) **5**   (5.) **206**   (6.) **59**

Order of Operation

(1.) **72**   (2.) **12**   (3.) **88**

Rounding

Round to the nearest ten.
(1.) **40**   (2.) **60**   (3.) **870**

Round to the nearest hundred.
(1.) **800**   (2.) **400**   (3.) **300**

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Round to the nearest whole number.
(1.) **6**   (2.) **85**   (3.) **733**

Round to the nearest tenth.
(1.) **7.6**   (2.) **35.9**   (3.) **3.1**

Round to the nearest hundredth.
(1.) **2.37**   (2.) **438.84**   (3.) **13.25**

Round to the nearest thousandth.
(1.) **69.351**   (2.) **72.865**   (3.) **95.464**

Patterns and Sequences

(1.) **16**   (2.) **45**   (3.) **¾**   (4.) **36**

Fractions

(1.) **¼**   (2.) **4/11**   (3.) **2/6**   (4.) **2/4**   (5.) **5/8**   (6.) **7/15**

Reducing Fractions

(1.) **2/3**   (2.) **½**   (3.) **1/3**   (4.) **2/9**   (5.) **3/8**   (6.) **5/9**

Decimals

(1.) **96.32**   (2.) **35.6**   (3.) **1.734**   (4.) **33.389**   (5.) **4**

Highest and Lowest Value

(1.) **.84321**   (2.) **4568.10** (3.) **.45632**   (4.) **.01234**   (5.) **.09785**

(6.) **.78545**   (7.) **.64278**   (8.) **.75124**   (9.) **1.9456**   (10.) **54.785**

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Ratios

(1.) **8:7 or 8/7**   (2.) **300 mph**   (3.) **$30**

Percentages

(1.) **2**   (2.) **320**   (3.) **5**   (4.) **33**

(5.) **36.40**   (6.) **37.5%**   (7.) **400%**   (8.) **25%**

Word Problems

(1.) **36 domestic cars**   (2.) **$223.62**

(3.) **1.22 hours**   (4.) **9 dimes**