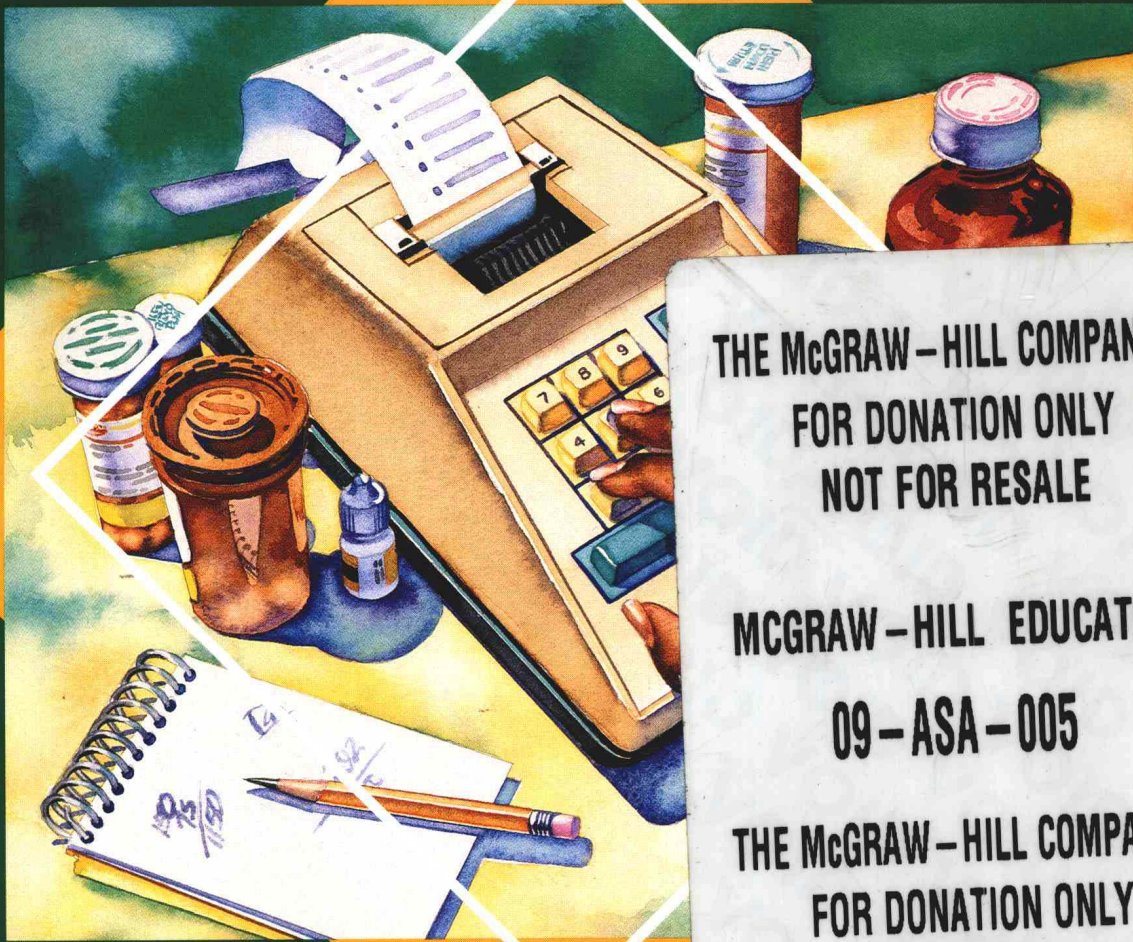


Math and Dosage Calculations for Health Occupations



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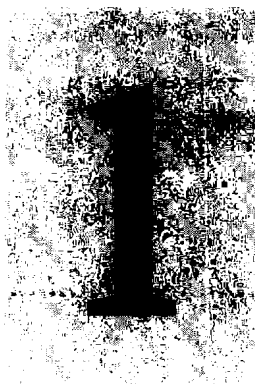
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Common Fractions

PART 1: INTRODUCTION TO COMMON FRACTIONS

OBJECTIVES

1. Identify a common fraction.
2. Express the meaning of a common fraction in three ways.

A number that expresses the relationship of one or more equal parts to the total number of equal parts in one unit (or one group) is called a fraction. Fractions are important; sometimes buying a whole pizza is out of the question, but paying for half of a pizza is possible. Fractions are a way of looking at parts of a whole, whether it is a pizza or part of a vial of medicine. The **common fraction** consists of two numerals, one above the other, separated by a fraction bar.

The Meaning of a Common Fraction

A COMMON FRACTION is:

PART OF A WHOLE NUMBER

The fraction $\frac{2}{3}$ (two-thirds) means that 2 out of 3 equal parts in one whole are being considered.

ONE NUMBER DIVIDED BY ANOTHER

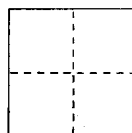
The fraction $\frac{2}{3}$ (two-thirds), read from top to bottom, means 2 divided by 3, $2 \div 3$, or $3 \overline{)2}$.

A PRODUCT OF MULTIPLICATION

The fraction $\frac{2}{3}$ (two-thirds) means that there are 2 of the thirds, or $(2 \times \frac{1}{3})$.

When a *single thing* (unit) is divided into equal parts, a fraction shows the relationship between part of the whole and the whole.

$\frac{3}{4}$ of the square is shaded.
 $\frac{1}{4}$ of the square is not shaded.
 $\frac{4}{4}$ is one whole square.



When a *group of things* is divided into equal parts, a fraction shows the relationship between some of the equal parts and all of the equal parts in one whole group.

$\frac{3}{5}$ of the group is shaded.

$\frac{2}{5}$ of the group is not shaded.

$\frac{5}{5}$ is one whole group.



TRY IT!



PRACTICE

Express each of the following fractions in three different ways.

1. $\frac{3}{4}$

2. $\frac{1}{2}$

3. $\frac{3}{8}$

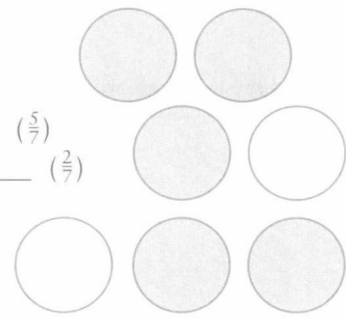
4. Write a fraction that tells:

what part of the circle is shaded. _____ ($\frac{2}{3}$)

what part of the circle is unshaded. _____ ($\frac{1}{3}$)

$\frac{3}{3}$ is a whole circle.

5. Write a fraction that tells:
 what part of the group is shaded. _____ ($\frac{5}{7}$)
 what part of the group is unshaded. _____ ($\frac{2}{7}$)
 $\frac{7}{7}$ is one whole group.



ANSWERS

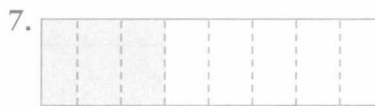
1. $\frac{3}{4}$ can be expressed as
 3 out of 4 equal parts in one whole
 3 divided by 4 ($3 \div 4$ or $4 \overline{)3}$)
 3 of the fourths ($3 \times \frac{1}{4}$)
2. $\frac{1}{2}$ can be expressed as
 1 out of 2 equal parts in one whole
 1 divided by 2 ($1 \div 2$ or $2 \overline{)1}$)
 1 of the halves ($1 \times \frac{1}{2}$)
3. $\frac{3}{8}$ can be expressed as
 3 out of 8 equal parts in one whole
 3 divided by 8 ($3 \div 8$ or $8 \overline{)3}$)
 3 of the eighths ($3 \times \frac{1}{8}$)

ADDITIONAL PRACTICE

Write fractions to express the shaded portion and unshaded portion of each unit or group.



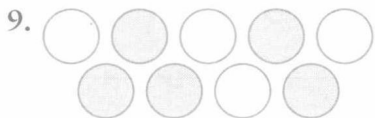
Shaded portion of the group _____
 Unshaded portion of the group _____
 $\frac{4}{4}$ is 1 whole group.



Shaded portion of the rectangle _____
 Unshaded portion of the rectangle _____
 $\frac{8}{8}$ is 1 whole rectangle.



Shaded portion of the circle _____
 Unshaded portion of the circle _____
 $\frac{8}{8}$ is 1 whole circle.



Shaded portion of the group _____
 Unshaded portion of the group _____
 $\frac{9}{9}$ is 1 whole group.



Shaded portion of the square _____
 Unshaded portion of the square _____
 $\frac{4}{4}$ is 1 whole square.

PART 2: DENOMINATOR, NUMERATOR, AND FRACTION BAR

OBJECTIVES

1. Identify the two terms of a fraction.
2. State two pieces of information obtained from the denominator.
3. State one piece of information obtained from the numerator.

A common fraction has a **denominator**, a **numerator** and a **fraction bar**. The **denominator** and the **numerator** are called the **terms of the fraction**. The **fraction bar** represents the operation of division.

Denominator

A denominator (down below the fraction bar) gives two very important pieces of information.

The **DENOMINATOR** tells:

the **TOTAL** number of **EQUAL** parts in **ONE** whole the **SIZE** of each equal part in one whole

In the fraction $\frac{2}{3}$, the denominator of 3 means 3 equal parts in one whole the size of each part is one third ($\frac{1}{3}$)

In the fraction $\frac{1}{2}$, the denominator of 2 means 2 equal parts in one whole the size of each part is one half ($\frac{1}{2}$)

- 3 If the denominator is 3, it means that one whole has 3 equal parts and each part has the size of one-third ($\frac{1}{3}$). Then $\frac{2}{3}$ is read "two-thirds."
- 2 If the denominator is 2, it means that one whole has 2 equal parts and each part has the size of one-half ($\frac{1}{2}$). Then $\frac{2}{2}$ is read "two-halves."
- 1 If the denominator is 1, it means that one whole has 1 equal part and that part has the size of one whole. Then $\frac{2}{1}$ is read "two wholes."
- 0 The denominator of a fraction can never be zero. It is impossible for zero parts to make one whole and it is impossible to divide by zero.



The denominator of a fraction can never be zero.

- A larger denominator means that one whole has been divided into more parts, so the pieces are a smaller size.
- A smaller denominator means that one whole has been divided into fewer parts, so the pieces are a larger size.
- **The denominator can have any value except for zero.** Zero parts could never make up one whole. It is impossible to divide by zero.

Numerator

A numerator (up above the fraction bar) gives one important piece of information.

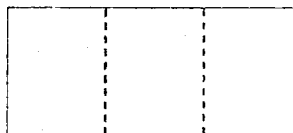
The **NUMERATOR** tells the **NUMBER** of **EQUAL** parts being used, talked about, or considered

In the fraction $\frac{2}{3}$, the numerator of 2 means that 2 equal parts are being talked about or used (out of a total of 3 equal parts in one whole).

$\frac{2}{3}$ of the rectangle is shaded.

$\frac{1}{3}$ of the rectangle is not shaded.

$\frac{3}{3}$ is one whole rectangle.



Fraction Bar

In mathematics, the symbol (\div) means “divided by.” Think of the fraction bar as the same symbol, except with the dots replaced by numerals. The fraction is thus an expression of division.

Read a fraction from top to bottom when reading it as an expression of division.

$$\frac{7}{8} = 7 \text{ divided by } 8 = 7 \div 8 = 8 \overline{)7}$$

$$\frac{4}{4} = 4 \text{ divided by } 4 = 4 \div 4 = 4 \overline{)4}$$

$$\frac{10}{5} = 10 \text{ divided by } 5 = 10 \div 5 = 5 \overline{)10}$$

The meaning of a fraction can be expressed in many different ways.



three-fifths

3 equal parts out of a total of 5 equal parts in one whole

3 divided by 5

$3 \div 5$

$5 \overline{)3}$

3 of the fifths ($3 \times \frac{1}{5}$)

**TRY IT!****PRACTICE**

Examine the following fractions. Write the answers on the lines provided.

1. In the fraction $\frac{5}{6}$, the denominator is _____. This denominator means that there are _____ equal parts in one whole. The size of each part is a _____.
2. In the fraction $\frac{5}{6}$, the numerator is _____. This number means that _____ equal parts are being talked about or considered.
3. The fraction $\frac{2}{2}$ is read “_____ - _____.” It means _____ ÷ _____.
4. The fraction $\frac{6}{1}$ is read “_____ - _____” and means _____ ÷ _____.

ANSWERS

1. The denominator—down below the fraction bar—is 6. This means there are 6 equal parts in one whole. The size of each part is a sixth or $\frac{1}{6}$.
2. The numerator is 5. 5 equal parts are being talked about or considered.
3. $\frac{2}{2}$ = two halves = $2 \div 2 = 1$
4. $\frac{6}{1}$ = six wholes = $6 \div 1 = 6$

ADDITIONAL PRACTICE

Fill in the blanks about each fraction.

Look at the fraction $\frac{3}{4}$.

5. What is the total number of equal parts in 1 whole? _____
6. What is the size of each part? _____
7. How many parts are being talked about or used? _____
8. The numerator is _____.
9. The denominator is _____.

Look at the fraction $\frac{4}{4}$.

10. What is the total number of equal parts in 1 whole? _____
11. What is the size of each part? _____
12. How many parts are being talked about or used? _____
13. The numerator is _____.
14. The denominator is _____.

Look at the fraction $\frac{7}{4}$.

15. What is the total number of equal parts in 1 whole? _____
16. What is the size of each part? _____
17. How many parts are being talked about or used? _____
18. The numerator is _____.
19. The denominator is _____.

OBJECTIVES

1. Identify proper and improper fractions.
2. State the value of any common fraction as equal to one, less than one, or greater than one.

There are two kinds of common fractions: **proper fractions** and **improper fractions**. Proper fractions have a value that is less than one, while improper fractions have a value that is equal to one or greater than one.

Proper Fractions

A proper fraction has a numerator that is smaller than the denominator. The value of a proper fraction is less than one.

The fraction $\frac{3}{4}$ means that 3 equal parts out of four equal parts in one whole are being used. $\frac{3}{4}$ is less than one whole circle.



The fraction $\frac{4}{5}$ means that 4 equal parts out of 5 equal parts in one whole group are being used. $\frac{4}{5}$ is less than one whole group.



So $\frac{3}{4}$ and $\frac{4}{5}$ are examples of proper fractions. The numerator is smaller than the denominator in each case, and each fraction is less than one.

Improper Fractions

An improper fraction has a numerator that is equal to or greater than the denominator. The value of an improper fraction is equal to one or greater than one. $\frac{4}{4}$, $\frac{5}{1}$, and $\frac{7}{4}$ are examples of improper fractions.

- A. When the numerator and denominator are equal, the fraction is equal to one.

$$\frac{4}{4} = 4 \text{ fourths}$$



Means one whole consists of 4 equal parts. Each part is a fourth.

We are considering 4 of those fourths.

$$\frac{4}{4} = 4 \div 4 = 1 \text{ whole square.}$$



$4/4$ means that this one whole stack of persons consists of 4 equal parts. Each would-be acrobat is a fourth of the stack. $4/4$ is 4 divided by 4 and equals 1 (stack). Harry on the bottom is holding 3 out of the 4 persons in the stack or $3/4$ of the stack. Harry's not too bright.

Here are more examples of fractions that are equal to one.

$$\frac{5}{5} = 5 \text{ divided by } 5 = 5 \div 5 = 1 \qquad \frac{5}{5} = 1$$

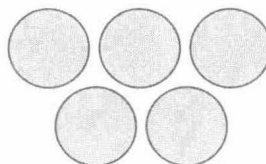
$$\frac{9}{9} = 9 \text{ divided by } 9 = 9 \div 9 = 1 \qquad \frac{9}{9} = 1$$

$$\frac{20}{20} = 20 \text{ divided by } 20 = 20 \div 20 = 1 \qquad \frac{20}{20} = 1$$

B. When the denominator is 1, the fraction is equal to the whole number in the numerator.

$$\frac{5}{1} = 5 \text{ wholes}$$

Means one whole consists of 1 equal part. Each part is a whole.



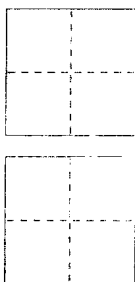
We are considering 5 of those wholes. (One whole is not enough.)

$$\frac{5}{1} = 5 \div 1 = 5 \text{ whole circles.}$$

C. When the numerator is greater than the denominator, the fraction equals more than one.

$$\frac{7}{4} = 7 \text{ fourths}$$

Means one whole consists of 4 equal parts. Each part is a fourth.



We are considering 7 of those fourths. (There aren't enough fourths in one whole. More fourths are needed from another square.)
7 fourths is one whole and $\frac{3}{4}$ of another whole.

$$\frac{7}{4} = 7 \div 4 = 1 \frac{3}{4}$$

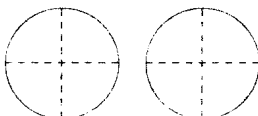
$1 \frac{3}{4}$ is called a mixed number because it is a "mixture" of a whole number and a fraction.

Here are more examples of fractions that are equal to more than one.

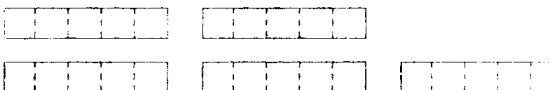
$$\frac{5}{3} = 5 \text{ thirds} = 5 \text{ divided by } 3 = 5 \div 3 = 1 \frac{2}{3}$$



$$\frac{8}{4} = 8 \text{ fourths} = 8 \text{ divided by } 4 = 8 \div 4 = 2$$



$$\frac{21}{5} = 21 \text{ fifths} = 21 \text{ divided by } 5 = 21 \div 5 = 4 \frac{1}{5}$$





PRACTICE

Fill in the chart for each fraction.

FRACTION	WORDS	TYPE (proper or improper)	EXPRESSION OF DIVISION
EXAMPLE			
$\frac{10}{10}$	ten-tenths	improper	$10 \div 10$
1. $\frac{8}{7}$	_____	_____	_____
2. $\frac{3}{7}$	_____	_____	_____
3. $\frac{7}{7}$	_____	_____	_____

ANSWERS

1. Eight-sevenths is an improper fraction, $8 \div 7$
2. Three-sevenths is a proper fraction, $3 \div 7$
3. Seven-sevenths is an improper fraction, $7 \div 7$

ADDITIONAL PRACTICE

Fill in the chart for each fraction.

FRACTION	WORDS	TYPE (proper or improper)	EXPRESSION OF DIVISION
EXAMPLE			
$\frac{4}{1}$	4 wholes	improper	$4 \div 1$
4. $\frac{2}{2}$	_____	_____	_____
5. $\frac{7}{2}$	_____	_____	_____
6. $\frac{1}{2}$	_____	_____	_____
7. $\frac{10}{1}$	_____	_____	_____
8. $\frac{1}{1}$	_____	_____	_____
9. $\frac{9}{4}$	_____	_____	_____
10. $\frac{3}{4}$	_____	_____	_____
11. $\frac{5}{5}$	_____	_____	_____
12. $\frac{9}{7}$	_____	_____	_____
13. $\frac{7}{8}$	_____	_____	_____

FRACTION	WORDS	TYPE (proper or improper)	EXPRESSION OF DIVISION
14. $\frac{5}{3}$			_____
15. $\frac{1}{10}$			_____
16. $\frac{4}{2}$			_____
17. $\frac{3}{3}$			_____
18. $\frac{9}{10}$			_____


FUN FACTS


Of the 206 bones in the human body, one fourth or twenty-five percent of them are in the feet.