BASIC MATHEMATICS I ( ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION )
Unless otherwise stated, whenever the masculine gender is used, both men and women are included.
INTRODUCTION

This subcourse is designed to train soldiers on how to do basic mathematics (addition, subtraction, multiplication, and division). It will cover each part of the task and your responsibilities.

Supplementary Training Material Provided: None.

Materials to be Provided by the Student: No. 2 pencil and paper.

Material to be Provided by the Unit or Supervisor: None.

This subcourse cannot be completed without the above material.

Three credit hours will be awarded for successful completion of this subcourse.

NOTE: This subcourse and QM0114, QM0115, and QMO116 have all been designed to strengthen the basic mathematical skills of all of the Quartermaster School MOSs.
This paper subcourse does not contain the examination. The examination response sheet is included only as a mailing label. You must go to the following web site to complete the examination and submit it for grading.

http://www.aimsrdl.atsc.army.mil/accp/accp_top.htm

Registered students (those with ACCP userids and passwords) should key in the userid and password to LOGON, then click on the EXAM button to access the examination.

Students who have not yet registered should click on the REGISTER button on the lower right corner of the screen. Follow directions to create a userid and password. Then click on the EXAM button to access the examination.

*** IMPORTANT NOTICE ***

THE PASSING SCORE FOR ALL ACCP MATERIAL IS NOW 70%.

PLEASE DISREGARD ALL REFERENCES TO THE 75% REQUIREMENT.
LESSON

TASK: Basic Mathematics I (Addition, Subtraction, Multiplication, and Division). As a result of successful completion of this subcourse, you will be able to perform the following performance measures:

1. Solve problems of addition and subtraction of whole numbers containing up to five digits.

2. Solve problems of multiplication of whole numbers up to five digits by using the multiplication table up to 9 x 9.

3. Solve problems of short division by two-digit whole numbers and long division by whole numbers up to five digits.

4. Solve problems of addition and subtraction of fractions and mixed numbers.

CONDITIONS: Given this subcourse, you will be able to do basic mathematics I (addition, subtraction, multiplication, and division).

STANDARD: You must answer 70 percent of the written exam questions correctly to receive credit for this subcourse.

CREDIT HOURS: See page ii, Introduction.
LES SON TEXT

HOW TO USE THIS BOOKLET

This is not an ordinary text. It is a programmed text which is designed to help you apply the principles of simple addition, subtraction, multiplication, and division of whole numbers and common fractions. We will ask you to take part in the program by answering questions, filling in blanks, and performing fundamental mathematical computations.

As you will see, the programmed text is designed so that you may study the text and then test yourself immediately. Write your answers in this booklet. Writing each answer will help you remember the specific information you have learned. You can correctly answer all the questions in the programmed text because the programmed text gives you all the correct answers. The answers to the questions will be on the following page.

Fill in all the answers on each page. If you find that you have written a wrong answer, mark through the wrong answer and go back over the teaching point you missed; then write in the correct answer.

If you merely fill in the blanks in the programmed text without studying and working out the problems, you will be unprepared to answer the examination exercises that are located at the back of the text. Remember, you will be graded on the examination exercises.
Whole numbers are the regular numbers you use every day, like 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

You have used whole numbers since you started to learn arithmetic in school.

You have learned to solve problems by using the operations of addition, subtraction, multiplication, and division.

To start,

What do the following signs of operation tell you to do?

(1) \(+\) ____________________________.
(2) \(-\) ____________________________.
(3) \(\times\) ____________________________.
(4) \(\div\) ____________________________.
ANSWERS:

(1) Add (+)
(2) Subtract (-)
(3) Multiply (x)
(4) Divide (÷)

ADDITION OF WHOLE NUMBERS

When you see the sign to add (+), that means you must total the numbers together to come up with a sum.

\[
\begin{array}{c}
247 \\
+ 82 \\
\hline
329
\end{array}
\]

Addends

Sum

To review addition, solve the following problem:

\[30 + 279 = \text{______________________________}.\]
ANSWER: 309

Remember, the problem 30 + 279 = ? can be written like this to make it easier to solve:

\[
\begin{array}{c}
3 0 \\
+ 2 7 9 \\
\hline
3 0 9 
\end{array}
\]

Addends

Sum

Now, try these addition problems to test your addition skills:

(1) 2,175 + 24 = ________________________________

(2) 29,721 + 88 + 224 = __________________________

(3) 856 + 409 + 735 = ____________________________

(4) 74,126 + 1,001 + 60 = __________________________

(5) 34 + 72,100 + 8,169 = __________________________
ANSWERS:

(1)  
2, 1 7 5  
+     2 4  
2, 1 9 9

(2)  
2 9, 7 2 1  
+     8 8  
3 0, 0 3 3

(3)  
8 5 6  
4 0 9  
+ 7 3 5  
2, 0 0 0

(4)  
7 4, 1 2 6  
1, 0 0 1  
+ 6 0  
7 5, 1 8 7

(5)  
3 4  
7 2, 1 0 0  
+ 8, 1 6 9  
8 0, 3 0 3

If you did not make any mistakes in solving the problems on page 5, you probably do not need to spend any time in reviewing how to solve addition problems. If you did make mistakes, you should review your method of solving addition problems.

Which of these statements describes you best?

I made at least one mistake. -- Turn to page 7.

I made no mistakes. -- Turn to page 13.
To be able to add, you must know the addition table on page 64. Make certain you know all of this table before going ahead.

Which of the following statements describes you best?

I have the addition table memorized. -- Turn to page 8.

I'm not sure of the addition table and would like to see it again. -- Turn to page 64.
Let's look at the number 42,135. Each column in the number has a name.

42,135
The 5 is in the units column. 5
The 3 is in the tens column. 30
The I is in the hundreds column. 100
The 2 is in the thousands column. 2,000
The 4 is in the ten thousands column. 40,000
When we total the columns, we have 42,135

In addition, when you write

\[
\begin{array}{c}
4 & 7 \\
+ & 3 & 2 \\
\hline
7 & 9 \\
\end{array}
\quad \text{4 Tens + 7 Units}
\begin{array}{c}
+ \\
\hline
\end{array}
\begin{array}{c}
3 & 2 \\
\hline
\end{array}
\quad \text{3 Tens + 2 Units}
\begin{array}{c}
you are saying \\
\hline
\end{array}
\begin{array}{c}
7 & 9 \\
\hline
\end{array}
\quad \text{7 Tens + 9 Units}
\]

You are adding units to units and tens to tens.

One big trouble spot in addition is \textit{carrying}.

If you do not understand \textit{carrying}, the following sample should help you.
CARRYING IN ADDITION

Most of you are familiar with the idea of carrying in addition. In actual practice, you mentally carry a number into the next column. This example will show you why you carry.

Add the numbers:

```
  2 3 9
+ 5 4 2
+ 8 1 9
-----
  3 5 6
```

The sum of the units column is 26. So you write the 6 in the units column, but you have 2 tens also. So you must carry the 2 tens to the second, or tone, column.

The sum of the tens column is 1 hundred and 3 tens. So you write the 3 tens in the column and carry the 1 hundred to the column.

The sum of the hundreds column is 1 thousand. So you write the in the hundreds column and carry the thousands to the column.

When you find the sum of the units column to be 26, you write the 6 in the units column, but you have 2 tens also. So you must carry the 2 tens to the second, or tone, column.

The sum of the tens column is 1 hundred and 3 tens. So you write the 3 tens in the column and carry the 1 hundred to the column.

The sum of the hundreds column is 1 thousand and hundreds. So you write the in the hundreds column and carry the thousands to the column.
ANSWERS:

Tens

Hundreds

8

8

1

Thousands

Good. Now let's see if you have the idea.

Add: 

(1)  2 8 9
    +  7 4 8

(2)  7 5 2 3 4
    +  1 9 9 3

+  2 0 2

+  2 1
ANSWERS:  
(1)  
\[ \begin{array}{c}
289 \\
+ 748 \\
\hline
1037
\end{array} \]  
(2)  
\[ \begin{array}{c}
75234 \\
+ 1993 \\
\hline
21
\end{array} \] 
\[ \begin{array}{c}
102 \\
+ 193 \\
\hline
21
\end{array} \] 
\[ \begin{array}{c}
77450
\end{array} \]

In each case you had to carry the 1 to the next column.

A few persons continue to write the carried number above the next column, as we have shown here. You should practice your addition until you are able to add without using this crutch.

---

**ADDITION REVIEW**

Let's review what you have covered about addition.

1. When you add numbers together, your answer is called the ______.

2. The number 732 means:
   
   7 ______ + 3 Tens + 2 ________________.

3. In order to add quickly and correctly, you must know the ________________ table.

4. Be sure to carry the proper amount into the next column. In this problem, what is the amount to be carried to the tens column? ________________

\[ \begin{array}{c}
38 \\
19 \\
27 \\
\hline
17
\end{array} \]

The sum is ________________________.
ANSWERS:

1. Sum

2. 7 hundreds + 3 tens + 2 units.

3. Addition table - on page 64.

4. Amount carried -- 3.


Now, if you feel you need some extra practice in addition, turn to page 13 for additional problems.

If you think you have the idea and can add without mistakes, turn to page 15.
EXTRA PRACTICE IN ADDITION

Work all of the practice problems before checking your answers.

ADDITION:

(1) 3
    1
    4
    5
    4
    +7

(2) 8
    4

(3) 87
    5

(4) 7,994
    18
    579
    +6,383

(5) 536
    465
    299
    +508

(6) 8,975
    8,637
    7,294
    +4,367

(7) 75,621
    3,285
    64,027
    +80,701

(8) 1,0001
    692
    +208

(9) A man worked five days building his garage. How many hours did he work if he worked the following number of hours each day?

12 hours, 14 hours, 7 hours, 16 hours, 10 hours.
ANSWERS:

(1) 2 4  
(2) 4 2  
(3) 7, 0 6 7  
(4) 9, 5 3 4  

(5) 1, 8 0 8  
(6) 2 9, 2 7 3  
(7) 1 4 3, 1 4 1  
(8) 9 1, 3 9 4  

(9) 59 hours  

TURN TO PAGE 15.
SUBTRACTION OF WHOLE NUMBERS

Subtraction is the opposite of addition. The sign of operation looks like this (-).

The sign (-) tells you to "take away"; so in the problem, 8 blocks – 3 blocks = 5 blocks, you are "taking away" 3 blocks from the 8 blocks; and you have 5 blocks left.

\[
\begin{array}{cccc}
8 & \text{Minuend} & \text{Subtrahend} & 5 \\
- & 3 & & - \\
\end{array}
\]

This problem may also look like this:

1. In this case the 8 is called the__________________________.
2. The 3 is called the__________________________.
3. The 5 is called the__________________________.
ANSWERS:

(1) Minuend 8 blocks
(2) Subtrahend -3 blocks
(3) Difference 5 blocks

The reason we give the numbers a name is to make it easier to understand which number we are talking about.

Let's solve these problems to test your subtraction skills.

(1) \[ \begin{array}{c}
1 & 8 & 2 \\
\hline
& -3 & 4 \\
\end{array} \]

(2) \[ \begin{array}{c}
1 & 3 & 8 & 6 \\
\hline
& 4 & 9 & 2 \\
\end{array} \]

(3) \[ \begin{array}{c}
7 & 2 & 7 & 2 & 1 \\
\hline
& 1 & 0 & 4 & 8 & 7 \\
\end{array} \]

(4) Subtract 73 from 141.

(5) \[75,201 - 2,017 = \boxed{73184}\]
ANSWERS:

(1) \[
\begin{array}{c}
1 \ 8 \ 2 \\
- \ 3 \ 4 \\
\hline
1 \ 4 \ 8
\end{array}
\]

(2) \[
\begin{array}{c}
1 \ 3 \ 8 \ 6 \\
- \ 4 \ 9 \ 2 \\
\hline
8 \ 9 \ 4
\end{array}
\]

(3) \[
\begin{array}{c}
7 \ 2 \ 7 \ 2 \ 1 \\
- \ 1 \ 0 \ 4 \ 8 \ 7 \\
\hline
6 \ 2 \ 2 \ 3 \ 4
\end{array}
\]

(4) \[
141 - 73 = 68 \quad \text{or} \quad 1 \ 4 \ 1 \\
- \ 7 \ 3 \\
\hline
6 \ 8
\]

(5) \[
\begin{array}{c}
7 \ 5 \ 2 \ 0 \ 1 \\
- \ 2 \ 0 \ 1 \ 7 \\
\hline
7 \ 3 \ 1 \ 8 \ 4
\end{array}
\]

Which of the following statements best describes you?

1. I seem to be doing something wrong because my answers are not the same as yours! Turn to page 18.

2. I made only a few mistakes, but I would like some review on subtraction problems. Turn to page 22.

3. I made no mistakes in solving the problems on page 16, and I feel I understand how to solve subtraction problems properly. Turn to page 24.
SUBTRACTION OF WHOLE NUMBERS

Just as you have an addition table, you have a subtraction table. If you do not understand the subtraction table, you must turn to page 64 and review it completely.

Which of these two statements best describes you?

1. I already understand the subtraction table and have it memorized. Turn to page 19.

2. I need to review the subtraction table. Turn to page 64.
BORROWING IN SUBTRACTION

In addition you learn to carry; and, since subtraction is the opposite of addition, you will now use the idea of borrowing in subtraction.

When, for example, you write

\[
\begin{align*}
476 & \quad 4 \text{ hundreds} + 6 \text{ tens} + 16 \text{ units} \\
- \ 259 & \quad -2 \text{ hundreds} + 5 \text{ tens} + 9 \text{ units} \\
217 & \quad 2 \text{ hundreds} + 1 \text{ ten} + 7 \text{ units}
\end{align*}
\]

you must think

You can see you changed the Minuend from

\[
4 \text{ hundreds} + 7 \text{ tens} + 6 \text{ units}
\]

to

\[
4 \text{ hundreds} + 6 \text{ tens} + 16 \text{ units}
\]

You borrowed 1 ten from the tens column and added it to the units column so that you can now subtract: 16 units - 9 units = 7 units.

Now, you try this one.

\[
\begin{align*}
937 & \quad 9 \text{ hundreds} + 3 \text{ tens} + 7 \text{ units} \\
- \ 569 & \quad -5 \text{ hundreds} + 6 \text{ tens} + 9 \text{ units}
\end{align*}
\]
BORROWING REVIEW PROBLEM

1,000,002
- 99,999
= 900,003

Before finding the difference for the above problem, you first must borrow 10 from the tens column so that you can subtract 9 from a number that is equal to it or larger than it. In this example, you have to go left all the way to the millions column to get the 10.

Do you understand the use of zero in subtraction?

1. Zero subtracted from any number is______________________.
2. What is 25 - 0 = ____________________?
3. Subtract 278 – 100 = ____________________.
4. Subtract 0 - 0 = ____________________.
ANSWERS:

(1) that number, or the same number

(2) $25 - 0 = 25$

(3) \[
\begin{array}{c}
2 \ 7 \ 8 \\
- \ 1 \ 0 \ 0 \\
\hline
1 \ 7 \ 8
\end{array}
\]
8 minus 0 = 8
7 minus 0 = 7
2 minus 1 = 1

(4) $0 - 0 = 0$

SOLVE THESE PROBLEMS

(1) \[
\begin{array}{c}
7 \ 5 \ 6 \\
- \ 2 \ 3 \ 4 \\
\hline
5 \ 2 \ 2
\end{array}
\]

(2) \[
\begin{array}{c}
7 \ 5 \ 6 \\
- \ 2 \ 8 \ 9 \\
\hline
4 \ 6 \ 7
\end{array}
\]

(3) \[
\begin{array}{c}
1 \ 0 \ 0 \ 0 \\
- \ 4 \ 2 \ 0 \ 6 \\
\hline
6 \ 8 \ 9
\end{array}
\]

(4) \[
\begin{array}{c}
8 \ 6 \ 3 \ 7 \ 5 \\
- \ 2 \ 8 \ 4 \ 8 \ 6 \\
\hline
5 \ 7 \ 8 \ 9
\end{array}
\]

(5) Subtract 8,241 from 10,041.
ANSWERS:

(1) \[ \begin{array}{c}
756 \\
- 234 \\
\hline
522 \\
\end{array} \]

(2) \[ \begin{array}{c}
756 \\
- 289 \\
\hline
467 \\
\end{array} \]

(3) \[ \begin{array}{c}
10000 \\
- 4206 \\
\hline
5794 \\
\end{array} \]

(4) \[ \begin{array}{c}
86375 \\
- 28486 \\
\hline
57889 \\
\end{array} \]

(5) \[ \begin{array}{c}
10041 \\
- 8241 \\
\hline
1800 \\
\end{array} \]

SUBTRACTION REVIEW

Let’s review what we have learned about subtraction.

1. When you subtract two numbers, you call the answer the ______.

2. To be able to subtract correctly, you must know the ______________ table well.

3. Sometimes you have to borrow in order to subtract. How much will you borrow to solve this problem?______________

\[ \begin{array}{c}
82 \\
- 64 \\
\end{array} \]

What will the difference be?____________________
ANSWERS:

(1) Difference

(2) Subtraction Table - page 64.

(3) 1 ten, or 10 units.

\[
\begin{array}{c|c|c}
82 & 7 \text{ tens} + 12 \text{ units} \\
-64 & 6 \text{ tens} + 4 \text{ units} \\
difference & 18 & 1 \text{ ten} + 8 \text{ units}
\end{array}
\]

If you feel you need sore extra practice solving subtraction problems, turn to page 24.

If you are getting the correct answers and you are able to solve subtraction problems without any trouble, turn to page 26.
EXTRA PRACTICE IN SUBTRACTION

(1)  1 0 0 0 0  
     - 7 4 2 1 

(2)  8 2 0 4  
     - 1 1 1 1 

(3)  7 5 2 3 1  
     - 2 4 3 4 3 

(4)  8 9 7 5  
     - 8 6 3 7 

(5)  1 0 0 1  
     - 6 9 2 

(6)  8 0 1 0  
     - 7 0 9 0 

(7)  7 5 2 0 1  
     - 2 0 1 7 

(8)  4 1 0 0 7  
     - 1 0 0 8 

(9)  6 0 2 0 1  
     - 8 9 4 2 

(10) Fred paid $350 for a motor bike at Store A; Bill paid $317 for the same bike at Store B. How much did Bill save by buying his bike at Store B?

(11) A storage tank can hold a total of 10,000 gallons of gasoline. The tank now has 4,728 gallons in it. How much more gasoline can be put into the tank?
ANSWERS FOR EXTRA PRACTICE IN SUBTRACTION

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<table>
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<tr>
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</thead>
<tbody>
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<td>(2)</td>
<td>8, 2 0 4</td>
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<td>- 7, 4 2 1</td>
<td></td>
<td>- 1, 1 1 1</td>
</tr>
<tr>
<td></td>
<td>2, 5 7 9</td>
<td></td>
<td>7, 0 9 3</td>
</tr>
<tr>
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<td>7 5, 2 3 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 2 4, 3 4 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 0, 8 8 8</td>
<td></td>
<td></td>
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<td></td>
<td>3 3 8</td>
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<td></td>
</tr>
<tr>
<td>(5)</td>
<td>1 0, 0 0 1</td>
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<tr>
<td></td>
<td>- 6 9 2</td>
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<td></td>
<td>9, 3 0 9</td>
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<tr>
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<td>8, 0 1 0</td>
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<tr>
<td>(7)</td>
<td>7 5, 2 0 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 2, 0 1 7</td>
<td></td>
<td></td>
</tr>
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<td></td>
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</tr>
<tr>
<td>(8)</td>
<td>4 1, 0 0 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 1, 0 0 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 9, 9 9 9</td>
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<tr>
<td>(9)</td>
<td>6 0, 2 0 1</td>
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<td></td>
<td>- 8, 9 4 2</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>5 1, 2 5 9</td>
<td></td>
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<tr>
<td>(10)</td>
<td>$ 3 5 0</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>- 3 1 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$ 3 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bill saved $33.00.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(11) 1 0, 0 0 0
- 4, 7 2 8
5, 2 7 2 gallons

GO ON TO PAGE 26.
MULTIPLICATION OF WHOLE NUMBERS

Instead of adding $3 + 3 + 3 + 3 = 12$, you usually write $3 \times 4 = 12$. You say that you have multiplied 3 by 4 and that 12 is the **product** of 3 times 4.

$$
3 \quad \text{multiplicand} \\
\times \quad 4 \quad \text{multiplier} \\
12 \quad \text{product}
$$

In the multiplication problem above, the 4 is called the ________________, the 3 is called the ________________, and the answer you get is called the __________.

The simplest way to avoid mistakes in multiplication is to form the habit of checking. To check multiplication, you use the principle that the order in which the numbers are multiplied does not affect the product. For example, $6 \times 9 = 9 \times 6$. You can see that the answer is the same if you multiply $16 \times 18$ or $18 \times 16$.

<table>
<thead>
<tr>
<th>Multiplicand</th>
<th>18</th>
<th>Check</th>
<th>16</th>
<th>Multiplicand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplier</td>
<td>16</td>
<td></td>
<td>18</td>
<td>Multiplier</td>
</tr>
<tr>
<td></td>
<td>108</td>
<td></td>
<td>128</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td></td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>288</td>
<td></td>
<td>288</td>
<td>Product</td>
</tr>
</tbody>
</table>

Now, solve these multiplication problems to test your multiplication skills.

(1) $19 \times 7$
(2) $20 \times 21$
(3) $17 \times 0$
(4) $220 \times 56$
(5) $819 \times 706$
(6) $563 \times 400$
(7) $14,960 \times 251$
(8) $31,416 \times 3,141$
Solutions to multiplication problems, page 26.

(1)  1 9
    x 7
   1 3 3

(2)  2 0
    x 2 1
   2 0

(3)  1 7
    x 0
   0

When any number is multiplied by zero, the answer is zero.

(4)  2 2 0
    x 5 6
   1 3 2 0

(5)  8 1 9
    x 7 0 6
   4 9 1 4

(6)  5 6 3
    x 4 0 0
   2 2 5 2 0 0

(7)  1 4, 9 6 0
    x 2 5 1
   1 4 9 6 0

(8)  3 1, 4 1 6
    x 3, 1 4 1
   3 1 4 1 6

If you had no trouble in solving these problems of multiplication, then you should not need additional review. However, if you did make mistakes and if you are not certain about how to multiply and check your answers, you should review.

Which of the following statements describes you best?

1. I made no mistakes and understand how to multiply. Turn to page 33.
2. I made several mistakes, and I went to review how to multiply properly. Turn to page 28.
HOW TO USE THE MULTIPLICATION TABLE

As stated before, multiplication is just a quick way to do addition problems. To add $10 + 10 + 10 + 10 + 10 = 50$ is the same as multiplying $10 \times 5 = 50$. However, to be able to solve more difficult problems quickly and accurately, you must understand and know the multiplication table below.

The same table can be found on page 65 for easy reference.

Here’s how to use the table: Any number in the left-hand column multiplied by any number in the top line equals the number under the one in the top line and opposite the one in the left-hand column. Let’s multiply 7 (left-hand column) by 8 (top line): $7 \times 8 = 56$. What is $9 \times 9$?

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<td>108</td>
<td>120</td>
<td>132</td>
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</tbody>
</table>
ANSWER: $9 \times 9 = 81$

---

**STEPS IN MULTIPLICATION**

This example will show you the multiplication procedure one step at a time.

Multiply 232 by 3

(Also written 232 times 3, $232 \times 3$, or $(232)(3)$)

\[
\begin{array}{c}
232 \text{ Multiplicand} \\
\times 3 \text{ Multiplier} \\
\hline
696 \text{ Product}
\end{array}
\]

Step 1. Set the multiplier down under the number to be multiplied. Put the multiplier under the units digit of the multiplicand.

Step 2. Draw a line and start to multiply with the first (units) digit of the multiplicand.

\[
\begin{align*}
3 \times 2 &= 6 & \text{put down 6 under 2} \\
3 \times 3 &= 9 & \text{put down 9 under 3} \\
3 \times 2 &= 6 & \text{put down _ under 2}
\end{align*}
\]
ANSWER: 6

Here's another example:

Multiply 345 x 320

\[
\begin{array}{c}
345 \\
\times 320 \\
\hline
6900 \\
1035 \\
\hline
110400
\end{array}
\]

multiplier

product

You should know that 0 times any number is 0, but you cannot throw it away if it comes at the end of a number. If the multiplier ends with one or more zero, you can move the multiplier over to the right, so that the first figure comes under the first digit of the number to be multiplied. Draw a line, bring down the 0, and start to multiply from right to left.

\[
\begin{align*}
2 \times 5 &= 10 \quad \text{put down 0 under 2 and carry 1} \\
2 \times 4 &= 8 \quad \text{add 1 carried and put down 9 under 4} \\
2 \times 3 &= 6 \quad \text{put down 6 under the 3} \\
3 \times 5 &= 15 \quad \text{put down 5 under 3 and carry 1} \\
3 \times 4 &= 12 \quad \text{add 1 carried, put don 3 under 6, and carry 1 again} \\
3 \times 3 &= 9 \quad \text{add 1 carried and put down 10 to the left of 3}
\end{align*}
\]

Draw another line and add to get the product, _______________________.

30
ANSWER:

\[ \text{product} = 110,400 \]

SOLVE THESE MULTIPLICATION PROBLEMS

(1) \( 7 \times 8 \times 4 = \) ________________

(2) \( 2 \cdot 6 \cdot 14 = \) ________________

(3) \( 203 \times 100 = \) ________________

(4) \( 871 \times 629 = \) ________________

(5) \[
\begin{array}{c}
40001 \\
\times 2742 \\
\end{array}
\]

(6) \[
\begin{array}{c}
14017 \\
\times 3141 \\
\end{array}
\]

(7) \[
\begin{array}{c}
75421 \\
\times 6210 \\
\end{array}
\]

(8) \[
\begin{array}{c}
25000 \\
\times 50 \\
\end{array}
\]
SOLUTION TO MULTIPLICATION PROBLEMS, PAGE 31

(1) \(7 \times 8 \times 4 = 56 \times 4 = 224\)

(2) \(2 \cdot 6 \cdot 14 = 12.14 = 168\)

(3) \(203 \times 100 = 20,300\)

(4) \(871 \times 629 = 547,859\)

(5)

(6)

\[
\begin{array}{c}
400001 \\
x 2742 \\
800002 \\
1600004 \\
2800007 \\
800002 \\
1096802742
\end{array}
\]

\[
\begin{array}{c}
14017 \\
x 3141 \\
14017 \\
56068 \\
14017 \\
42051 \\
44027397
\end{array}
\]

(7) \(25,000 \times 5 = 125,000\)

(8) \(75421 \times 6210 = 468,644,100\)

Check your answers. If you were able to solve these problems, turn to page 33.
ZERO IN MULTIPLICATION

One trouble spot in multiplication is the zero (0). You should know by now that the zero is not included in the multiplication table because any number times zero is zero.

So: \( 17 \times 0 = 0 \)

What is \( 0 \times 17 = \) _____

Remember, the rule says that any number times zero is ________________; zero times any number is__________________.

Here are some ways that zeros are likely to appear in multiplication. Study each example carefully.

(a) \[
\begin{array}{c}
20 \\
10 \\
200
\end{array}
\]

(b) \[
\begin{array}{c}
53 \\
x203
\end{array}
\]

(c) \[
\begin{array}{c}
309 \\
x256
\end{array}
\]

\[
\begin{array}{c}
106 \\
10854 \\
1545 \\
618
\end{array}
\]

\[
\begin{array}{c}
79104
\end{array}
\]

See if you can solve these problems without a single mistake.

(1) \( 207 \times 12 = \) ____________

(2) \( 214 \times 800 = \) ____________

(3) \( 30,406 \times 14 = \) ____________
ANSWERS:

a. 0 x 17 = 0  

b. 0  

c. 0

(1) 2 0 7  

   x 1 2  

  4 1 4  

  2 0 7  

  2,4 8 4

(2) 2 1 4  

   x 8 0 0  

  1 7 1,2 0 0

(3) 3 0 4 0 6  

   x 1 4  

  1 2 1 6 2 4  

  3 0 4 0 6  

  4 2 5,6 8 4

If you got them correct -- good work!

KEEPING THE UNITS STRAIGHT

While you have been multiplying numbers and getting answers, you have not been concerned with a unit of measure, like inches, feet, gallons, barrels.

When you have problems about measure, you must be very careful that the units you are using are correct, or you cannot get the right answer. For example, suppose you were told that a pipeline you were building was to be 1 mile long, but you now had 2,000 feet of pipe. Let's find how much more pipe you will need.

1. The first step is to change 1 mile into feet because you must have the unit of measure the same before you can work the problem.

   1 mile = 5,280 feet.

2. Then subtract the 2,000 feet of pipe on hand from 5,280 feet.

   5, 2 8 0  feet  
   - 2, 0 0 0  feet  
   3, 2 8 0  feet of pipe required.

As you can see, you used only one unit -- feet.
Now you try this one:

A pipe is 200 feet long. How many inches long is the pipe? ____________

How many yards long is the pipe? ________________

(HINT: 1 foot = 12 inches)
(1 yard = 3 feet)
ANSWER: Pipe is 200 feet long

(1) 200 x 12 inches (in each foot) = 2400 inches

(2) 200 ÷ 3 feet (in each yard) = 66 2/3 yards

You can see that, if the units are kept straight, finding the answer is very easy,

MULTIPLICATION REVIEW

(1) \[
\begin{array}{c}
6 \\
\times 2 \\
\hline
12
\end{array}
\]

Fill in the correct names of the parts of No. (1).

(2) Zero times any number equals_____________________.

(3) Multiplication is a quick method of______________________.

(4) 5 6 0 \times 2 7 0

(5) 3 6 0 \times 2 5 3

(6) 6 7 3 \times 9 0 1

(7) 2 4 2 \times 1 0

(8) 2 4 2 \times 1 0 0

(9) 2 4 2 \times 1 0 0 0

(10) A soldier can pump 50 gallons of gasoline in 1 minute (50 GPM). How many gallons can he pump in 1 hour?
SOLUTIONS FOR MULTIPLICATION REVIEW

(1) 6  \text{ Multiplicand} \\
\times 2  \text{ Multiplier} \\
12  \text{ Product}

(2) Zero

(3) Addition, or adding

(4) 560  \times 270 \\
\underline{39200} \\
\underline{1120} \\
151200

(5) 360  \times 253 \\
\underline{1080} \\
\underline{180} \\
720

(6) 673  \times 901 \\
\underline{673} \\
\underline{60570} \\
606373

(7) 242  \times 10 \\
\underline{2420} \\
2420

(8) 242  \times 100 \\
\underline{24200} \\
24200

(9) 242  \times 1000 \\
\underline{242000} \\
242000

(10) 50 \text{ gallons} \times 60 \text{ (number of minutes in 1 hr)} = 3,000 \text{ gallons/hour}

This completes the review of multiplication; turn to page 38 to start the review of division.
DIVISION OF WHOLE NUMBERS

Division is the reverse of multiplication. It is the method of finding out how many times one number goes into another number. To divide 8 by 4 means to find out how many times 4 will go into 8.

As in multiplication, you have a division table; and you should be familiar with it. If you do not know the division table, turn to page 65 and review it now.

The sign for division is ÷ or )

When the division sign appears between two numbers, it means that the first number is to be divided by the second number. For example 16 ÷ 4, means to ) 16 by 4. 4 16

Look at this division problem.

```
Divisor    3 4 5
Divedend   3 4 5
            )
Quotient   1 1 5
```

or the same problem could be written like this:

```
Dividend     3 4 5
Divisor      3 = 1 1 5 Quotient

In the problem 2 3 5

The divisor is ____.
The dividend is___________________.
The quotient is___________________.
```
ANSWER: Divide

25

125

5

SHORT AND LONG DIVISION

There are two methods of division, short division and long division. Both methods will be illustrated in the following problems.

To make the process quicker, short division is used when the divisor has only one digit. You should be able to do short division without writing anything except the quotient, or answer.

Solve the following problems by short division to test your division skills:

(1) \[ \underline{3} \underline{5} 1 \]
(2) \[ \underline{2} \underline{4} 0 4 \]
(3) \[ \underline{2} \underline{4} 3 6 \]
(4) \[ \underline{1} \underline{0} 4 0 \]
(5) \[ \underline{1} \underline{0} 0 1 \]
(6) \[ \underline{2} \underline{9} 5 8 5 7 \]

Solve the following problems by long division:

(1) \[ 1 \underline{2} \underline{2} 5 \]
(2) \[ 8460 \div 36 = \]
(3) \[ 1 2 \underline{2} 7 5 0 \]
(4) \[ 7 \underline{9} 0 0 \]
(5) \[ 3 \underline{2} 5 5 0 0 \]
(6) \[ 2 \underline{3} 7 5 4 \]
SOLUTIONS TO PROBLEMS ON SHORT AND LONG DIVISION

Short Division:

(1) \[ \begin{array}{c}
1 & 1 & 7 \\
3 & 5 & 1
\end{array} \]

(2) \[ \begin{array}{c}
6 & 0 & 1 \\
2 & 4 & 0 & 4
\end{array} \]

(3) \[ \begin{array}{c}
4 & 0 & 6 \\
2 & 4 & 3 & 6
\end{array} \]

(4) \[ \begin{array}{c}
2 & 0 & 8 \\
1 & 0 & 4 & 0
\end{array} \]

(5) \[ \begin{array}{c}
1 & 4 & 3 \\
1 & 0 & 0 & 1
\end{array} \]

(6) \[ \begin{array}{c}
3 & 2 & 8 & 7 & 3 \\
2 & 9 & 5 & 8 & 5 & 7
\end{array} \]

Long Division:

(1) \[ \begin{array}{c}
1 & 5 \\
2 & 2 & 5
\end{array} \]

(2) \[ \begin{array}{c}
2 & 3 & 5 \\
7 & 2
\end{array} \]

(3) \[ \begin{array}{c}
2 & 2 \\
2 & 7 & 5 & 0
\end{array} \]

(4) \[ \begin{array}{c}
1 & 2 \\
9 & 0 & 0
\end{array} \]

(5) \[ \begin{array}{c}
8 & 5 & 0 \\
2 & 4 & 0
\end{array} \]

(6) \[ \begin{array}{c}
1 & 3 & 4 \\
3 & 7 & 5 & 4
\end{array} \]

If you had no trouble solving these division problems and you feel you understand how to divide, then you should not need additional review. However, if you made some mistakes, you should review.

Which of these statements describes you best?

1. I made no mistakes and understand how to divide. Turn to page 46.

2. I made several mistakes, and I want to review how to divide. Turn to page 41.
In this division exercise, 1 2 6 0 , you really ask and answer a question. The question is: How many twelves in 60?

The answer is________________________.

The exercise 2 ⎮ 1 2 5 answers the question:

How many____________in____________?

You will now see that division is a quick way to do subtraction.

DIVIDE:

3 ⎮ 1 0 5

You could solve the problem like this:

- 3 5 (1) But you can see that dividing 35 into 105 is faster than subtracting all those figures.

- 3 5 (2)

- 3 5 (3)
ANSWER: 5

Twenty fives in 125

3

**LONG DIVISION**

DIVIDE: 28 | 3752

Could you solve this problem by repeated subtraction? Yes, but it will be a lot of work and take a lot of time.

You would not want to subtract like this:

\[
\begin{array}{c}
3752 \\
-28 \\
\hline
3724 \\
-28 \\
\hline
3696 \\
-28 \\
\hline
\end{array}
\]

You will be subtracting for a long time.

That is why division is such quicker

\[
\begin{array}{c}
\underline{1} \\
\hline
28 \overline{3752} \\
28 \\
\hline
95 \\
\hline
\end{array}
\]

Step 1: See how many times 28 will go into 37? Answer ____________ .

\[
\begin{array}{c}
\underline{1} \\
\hline
28 \overline{3752} \\
28 \\
\hline
95 \\
\hline
84 \\
\hline
112 \\
\hline
\end{array}
\]

Step 2: Subtract 28 from 37 and bring down the 5.

\[
\begin{array}{c}
\underline{13} \\
\hline
28 \overline{3752} \\
28 \\
\hline
95 \\
\hline
84 \\
\hline
112 \\
\hline
\end{array}
\]

Step 3: Start with the same procedure in step 1. How many times will 28 go into 95? Answer ____________ .

\[
\begin{array}{c}
\underline{134} \\
\hline
28 \overline{3752} \\
28 \\
\hline
95 \\
\hline
84 \\
\hline
112 \\
\hline
\end{array}
\]

Step 4: Subtract again and bring down the 2.

\[
\begin{array}{c}
\underline{134} \\
\hline
28 \overline{3752} \\
28 \\
\hline
95 \\
\hline
84 \\
\hline
112 \\
\hline
\end{array}
\]

Step 5: Again, how many times will 28 go into 112? Answer ____________ .

The quotient is ________________ .

42
ANSWER: (a) 1
(b) 3
(c) 4

Quotient = 134.

When you divide, you often have a number left over that is too small to be divided by the divisor. This left-over number is called the remainder.

Example:

\[
\begin{array}{c}
  1 \underline{3} \\
  \underline{6} \\
  \underline{4} \\
  \underline{2} \\
  3 \underline{0} \\
  1 \underline{2} \\
\end{array}
\]

Remainder
DIVISION PRACTICE

Solve the following:

(1) \[ \underline{288} \]

(2) \[ \underline{1813} \]

(3) \[ 900 \underline{9367280} \]

(4) \[ 3 \underline{25410} \]

(5) \[ 13 \underline{304076} \]

(6) \[ 28 \underline{27774} \]

HINT: Be careful, look for remainders:
SOLUTIONS FOR DIVISION PRACTICE

(1) \[
\begin{array}{c}
96 \\
288 \\
27 \\
18 \\
18
\end{array}
\]

(2) \[
\begin{array}{c}
49 \\
1813 \\
148 \\
333 \\
333
\end{array}
\]

(3) \[
\begin{array}{c}
900 \div 9367280 \\
9007 \\
36028 \\
36028 \\
0 \\
0
\end{array}
\]

(4) \[
\begin{array}{c}
847 \\
25410 \\
240 \\
141 \\
120 \\
210 \\
210
\end{array}
\]

(5) \[
\begin{array}{c}
2321 \div 131, \text{ r } 25 \\
262 \\
420 \\
393 \\
277 \\
262 \\
156 \\
131 \\
25
\end{array}
\]

(6) \[
\begin{array}{c}
96 \div 27774, \text{ r } 222 \\
2583 \\
1944 \\
1722 \\
222 \\
222
\end{array}
\]

You should now be able to solve division problems.

If you now are able to solve division problems without making mistakes, turn to page. 46.
A fraction consists of two parts: an upper part and a lower part.

The upper part is called the numerator.

The lower part is called the denominator.

\[ \text{Fraction} = \frac{\text{numerator}}{\text{denominator}} \]

(1) In the fraction \( \frac{3}{4} \)

3 is the __________.

4 is the __________.

(2) In the fraction \( \frac{5}{9} \)

the numerator is__________.

the denominator is__________.

(3) The upper part of the fraction is called the______________________.

(4) The lower part of the fraction is called the______________________.
Solve the following problems to test your skills in adding and subtracting fractions:

(1) \[ \frac{1}{8} + \frac{3}{4} + \frac{1}{2} = \_\_\_\_\_\_\_\_\_\_\_ \]

(2) \[ \frac{7}{4} - \frac{4}{3} + \frac{3}{4} = \_\_\_\_\_\_\_\_\_\_\_ \]

(3) \[ \frac{3}{4} - \frac{3}{8} = \_\_\_\_\_\_\_\_\_\_\_ \]

(4) \[ \frac{7}{4} \frac{1}{8} - \frac{4}{5} = \_\_\_\_\_\_\_\_\_\_\_ \]
ANSWERS:

(1) \[ \frac{1}{8} + \frac{3}{4} + \frac{1}{2} = \frac{1}{8} + \frac{6}{8} + \frac{4}{8} + \frac{11}{8} = \frac{13}{8} \]

(2) \[ \frac{7}{4} - \frac{4}{3} + \frac{3}{4} = \frac{6}{4} = \frac{1}{4} = \frac{1}{1} \]

(3) \[ \frac{3}{4} - \frac{3}{8} = \frac{6}{8} - \frac{3}{8} = \frac{3}{8} \]

(4) \[ \frac{7}{4} \frac{1}{8} - \frac{5}{4} = \frac{29}{8} - \frac{37}{8} = \frac{58}{8} - \frac{37}{8} = \frac{21}{8} \]

If you were able to solve these problems without any mistakes, you probably do not need any more review of addition and subtraction of fractions.

However, if you made one or more mistakes or had trouble finding the answers, you should review fractions.

Which of the following statements describes you best?

1. I made at least one mistake and need to review fractions. Turn to page 49.

2. I did not make any mistakes and feel that I understand fractions completely. Turn to page 62.
When two or more fractions have the same denominator, we say that these fractions have a common denominator.

If fractions have a common denominator, it means that their denominators are the same.

The fractions \( \frac{4}{7} \), \( \frac{21}{7} \), and \( \frac{6}{7} \) all have the same denominator.

Their common denominator is \( \frac{7}{7} \).

Which of the following fractions have a common denominator?

\[
\frac{4}{3}, \frac{3}{6}, \frac{3}{7}, \frac{2}{3}, \frac{3}{4}, \frac{1}{2}, \frac{1}{3}
\]
ANSWER: same

7

\[
\frac{4}{3}, \frac{2}{3}, \frac{1}{3}
\]

__________________________________________________________________________

**ADDDING FRACTIONS**

We may add fractions if they have a common denominator.

We may add: \(\frac{3}{7} + \frac{2}{7} = \frac{3}{7}\) because \(\frac{3}{7}\) and \(\frac{2}{7}\) have the common denominator \(\frac{7}{7}\).

May we add: \(\frac{11}{9} + \frac{3}{9} + \frac{6}{9} = ?\) (Yes or No)

What is the common denominator? ________________________

Add the following fractions:

(1) \(\frac{17}{11} + \frac{4}{11} + \frac{6}{11} + \frac{1}{11} = \)

(2) \(\frac{3}{4} + \frac{5}{4} + \frac{1}{4} = \)
ANSWERS:  
7

Yes

9

(1) \(\frac{28}{11}\) or \(\frac{2}{11}\)

(2) \(\frac{9}{4}\) or \(\frac{1}{4}\)

SUBTRACTING FRACTIONS

We may subtract fractions if they have a common denominator.

We may subtract: \(\frac{5}{8} - \frac{3}{8}\) because \(\frac{5}{8}\) and \(\frac{3}{8}\) have the common denominator ____________________.

May we subtract \(\frac{11}{12} - \frac{6}{12} = ?\) (Yes or No)__________________________

The common denominator is__________________________.

Subtract the following fractions:

(1) \(\frac{7}{13} - \frac{3}{13} = \)

(2) \(\frac{14}{10} - \frac{6}{10} - \frac{8}{10} = \)
ADDITION AND SUBTRACTING FRACTIONS

We may both add and subtract fractions if they have a common denominator.

We may add and subtract: \( \frac{6}{5} - \frac{2}{5} + \frac{4}{5} - \frac{3}{5} = \frac{5}{5} \), or 1, because they have the common denominator \( \frac{5}{5} \).

We may add and subtract: \( \frac{12}{3} - \frac{10}{3} + \frac{2}{3} = \frac{4}{3} \) (True or False)

The common denominator is \( \frac{3}{3} \).

Do the following examples:

(1) \( \frac{9}{8} + \frac{4}{8} - \frac{9}{8} - \frac{1}{8} + \frac{3}{8} = \)

(2) \( \frac{11}{17} - \frac{12}{17} + \frac{4}{17} - \frac{2}{17} = \)
**FINDING THE LEAST COMMON DENOMINATOR (LCD)**

We may add or subtract fractions only if they have a common denominator.

If they do not have a common denominator, they must be converted to a common denominator before adding or subtracting.

We may not add: \( \frac{1}{4} + \frac{1}{2} + \frac{1}{6} \) yet, because the denominators are

\[ \text{______________________________} \text{ the same.} \]

In order to add fractions such as \( \frac{1}{4} + \frac{1}{2} + \frac{1}{6} \), we must change the denominators to make them the__________.

The procedure for making the denominators the same is called finding the least common denominator.

The least common denominator is also called the lowest or smallest common denominator.

It is called least or lowest because it is the smallest number that we can use as a common denominator.

The smallest number that we can use as a common denominator is called the________

_______________________________.

ANSWERS: 5

True

3

(1) \( \frac{6}{8} \) or \( \frac{2}{4} \)

(2) \( \frac{1}{17} \)
There are several ways to find the common denominator, but the easiest way is simply to multiply the denominators together as in this example:

Let's try adding \( \frac{1}{2} + \frac{1}{3} \)

\[ 2 \cdot 3 = 6 \]  Lowest common denominator is__________________.

Now that you have 6 as the lowest common denominator, you must change the two numerators \((1 + 1)\) to sixths.

You make this change by multiplying both numerator and denominator by the same number, so that the fraction will keep its same value.

To change \( \frac{1}{2} \) to sixths, multiply both numerator and denominator by 3:

\[ \frac{1 \times 3}{2 \times 3} = \frac{3}{6} \]

To \( \frac{1}{3} \) change to sixths, multiply both by 2:

\[ \frac{1 \times 2}{3 \times 2} = \frac{2}{6} \]

You can now add the fractions, because they have the same denominator.

\[ \frac{2}{6} + \frac{2}{6} = \frac{5}{6} \]
Another way to find the LCD is to divide the smaller denominator into the larger one. If it divides evenly, the larger number is the LCD.

Example:

$$\frac{3}{4} + \frac{1}{8}$$

4 will divide into 8 evenly. LCD is______________.

You must now change the $\frac{3}{4}$ to eighths.

$$\frac{6}{8} + \frac{1}{8} = \text{______________}$$
MIXED NUMBERS

A mixed number is a whole number and a fraction written together. An example would be $10 \frac{3}{8}$.

A whole number and a fraction written together is called a_____________ ____________

______________.

$9 \frac{1}{3}$ is a mixed number because it is a_________________________ ______________

__________________

and__________________________written together.

Which of the following are mixed numbers:

$\frac{7}{3}, \frac{4}{8}, \frac{16}{32}, \frac{23}{9}, \frac{5}{100}$
ANSWERS: Mixed number

Whole number = Fraction

All of them.

______________________________

IMPROPER FRACTIONS

An improper fraction is a fraction whose numerator is greater than its denominator.

If the numerator of a fraction is greater than its denominator, it is called an ____________

The fraction \( \frac{4}{3} \) is an_________________________ because the _____, 4, is

greater than the___________________, 3.

Which of the following is not an improper fraction?

\[
\begin{array}{c c c c c c}
\frac{3}{1} & \frac{7}{6} & \frac{19}{20} & \frac{193}{192} & \frac{18}{17}
\end{array}
\]
ANSWERS: Improper fraction

Improper fraction

Numerator, denominator

\[
\begin{array}{c}
19 \\
20
\end{array}
\]

REDUCING IMPROPER FRACTIONS

An improper fraction may be reduced to a mixed number.

Example: Reduce the improper fraction \( \frac{32}{7} \) to a mixed number.

We divide the denominator into the numerator.

The denominator is \( 7 \).

The numerator is \( 32 \).

So, we divide \( 32 \) into \( 7 \).

\[
\begin{array}{c}
(1) \quad \frac{32}{7} \\
\bigg/ \bigg/ \bigg/ \bigg/ \\
\underline{28} \quad \underline{4} \\
\quad \quad \text{remainder}
\end{array}
\quad
\begin{array}{c}
(2) \quad \frac{32}{7} \\
\bigg/ \bigg/ \bigg/ \bigg/ \\
\underline{28} \quad \underline{4} \\
\quad \quad \text{remainder}
\end{array}
\]

The remainder is \( 4 \).

Reducing \( \frac{32}{7} \) to a mixed number, we have \( \frac{32}{7} = \underline{4} \frac{4}{7} \).
ANSWERS:  7

32

7, 32

4  4
 7

Reduce the improper fraction \( \frac{99}{27} \) to a mixed number.

We divide \( \frac{99}{27} \) into \( \frac{99}{27} \).

(1) \( \frac{99}{27} \) \( \overline{\underline{27}} \) remainder

(2) \( \frac{99}{27} \) = \( \frac{3}{3} \) remainder

If you found that \( \frac{99}{27} = 3 \frac{18}{27} \), you are not finished.

Is \( \frac{18}{27} \) in lowest terms? (Yes or No)

Let's reduce \( \frac{18}{27} \) by factoring, that is, by finding what numbers multiplied together give us \( \frac{18}{27} \) and \( \frac{27}{27} \).

Factoring, we have: \( \frac{18}{27} = \frac{9 \times 3}{9 \times 3} = \frac{2}{3} \)

We can mark out the 9 because it appears in both the numerator and the denominator. So our complete answer should be \( \frac{99}{27} = \)

Reduce to mixed numbers:

(2) \( \frac{73}{3} = \)

(4) \( \frac{156}{50} = \)

(3) \( \frac{92}{91} = \)

(5) \( \frac{111}{10} = \)

59
REDUCING MIXED NUMBERS TO IMPROPER FRACTIONS

You have noticed that mixed numbers must be changed to improper fractions before you can add or subtract them. If you wanted to add $4 \frac{1}{3}$ and $2$, you would first make $4 \frac{1}{3}$ an improper fraction as follows:

$$4 \times 3 = 12$$  Multiply the whole number (4) by the denominator (3)

$$+ \frac{1}{3}$$  Add the numerator (1).

$$\frac{13}{3}$$  Place this answer over the denominator, and you have $\frac{13}{3}$

$$\frac{13}{3} + \frac{2}{3} = \frac{15}{3} = 5$$

Now change $2 \frac{4}{5}$ to an improper fraction.

Answer____________________.
ANSWER: \[
\frac{14}{5}
\]

If you did not get all the answers right, you should return to page 57 and review improper fractions once more.

If you are able to solve these problems and can work well with fractions, then turn to page 62 and solve the review problems.

After this review, you will have completed Basic Mathematics I.
REVIEW OF FRACTIONS

Solve the following problems:

(1) \( \frac{1}{3} + \frac{1}{4} = \) ________________

(2) \( \frac{2}{3} + \frac{1}{8} + \frac{1}{12} = \) ________________

(3) \( \frac{7}{8} \frac{1}{8} - \frac{4}{8} \frac{3}{8} = \) ________________

(4) \( \frac{4}{8} \frac{3}{8} - \frac{3}{2} \frac{1}{2} = \) ________________

(5) What is the lowest common denominator of the following problem:

\( \frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \) ________________

(6) Reduce to lowest terms:

(a) \( \frac{72}{5} = \) ________________

(b) \( \frac{108}{3} = \) ________________

(7) Change to improper fractions:

(a) \( 7 \frac{3}{5} = \) ________________

(b) \( 3 \frac{1}{16} = \) ________________
ANSWERS TO REVIEW OF FRACTIONS PROBLEM, PAGE 62

(1) \( \frac{1}{3} + \frac{1}{4} = \frac{4}{12} + \frac{3}{12} = \frac{7}{12} \)  

*pp 52-55

(2) \( \frac{2}{3} + \frac{1}{8} + \frac{1}{12} = \frac{16}{24} + \frac{3}{24} + \frac{2}{24} = \frac{21}{24} \) or \( \frac{7}{8} \)  

pp 52-55

(3) \( 7 \frac{1}{8} - 4 \frac{3}{8} = 57 \frac{8}{8} - 35 \frac{8}{8} = 22 \frac{8}{8} = 2 \frac{6}{8} \) or \( 2 \frac{3}{4} \)  

pp 52 & 60

(4) \( 4 \frac{3}{8} - 3 \frac{1}{2} = 4 \frac{3}{8} - 3 \frac{4}{8} = \frac{35}{8} - \frac{28}{8} = \frac{7}{8} \)  

pp 52 & 60

(5) LCD = 2 \cdot 3 \cdot 5 = 30

\( \frac{1}{2} + \frac{1}{3} + \frac{1}{5} = \frac{15}{30} + \frac{10}{30} + \frac{6}{30} = \frac{31}{30} \) or \( 1 \frac{1}{30} \)  

pp 53 & 54

(6) (a) \( \frac{72}{5} = \frac{14}{2} \)  

p 58

(b) \( \frac{108}{3} = 36 \)

(7) (a) \( \frac{38}{5} \)  

p 60

(b) \( \frac{49}{16} \)

*Page numbers show where you can find information about problems that gave you trouble.
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**Example:**

\[9 + 2 = 11\]

## SUBTRACTION TABLE

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**Example:**

\[7 - 2 = 5\]

64
## Multiplication Table

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### Example

$7 \times 8 = 56$

## Division Table

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