JOINT APPRENTICESHIP & TRAINING

COMMITTEE OF PIPE FITTERS LOCAL UNION 211

STUDY GUIDE

PLEASE MAKE SURE YOU HAVE ALL REQUIRED DOCUMENTS BEFORE CALLING TO SCHEDULE AN APPOINTMENT FOR TESTING. (713) 649-0201

YOU HAVE ONE HOUR TO TEST. NO CALCULATORS OR CELL PHONES ARE ALLOWED IN THE TEST ROOM.

THE TEST CAN BE TAKEN UP TO 3 TIMES.

AN OSHA 10 IS REQUIRED- YOU WILL BE PROVIDED WITH THE INFORMATION TO AQUIRE AN OSHA 10, AFTER YOU PASS THE TEST.

* Mr. Math on YouTube is also a great resource if additional study material is needed.*

APPOINTMENT REQUIRED FOR TESTING/APPLICATION PROCESS

INTRODUCTION TO WHOLE NUMBER
STUDY SHEET

ADDITION: The process of finding the total or sum of 2 or more numbers.

SIGN: + or plus or add.

EXAMPLE:

Tens -------> 85

Hundreds ----------> 664

Thousands ----------> 7,563

Sign ----------> + 4 – Units

8,316 ----- Sum or Total

PROBLEM:

614	312
03	6,984
+ 1,498	Add: 21

798	2
211	100
390	290
100	311
2	608
+ 603	Plus: 793

INTRODUCTION TO WHOLE NUMBERS
STUDY SHEET

SUBTRACTION: The process of finding the difference between 2 numbers.

SIGN: - or minus or subtract

EXAMPLE:

$$\begin{array}{r} 529 \\ -\ 156 \\ \hline 373 \end{array}$$

TO CHECK ANSWER:

$$\begin{array}{r} 156 \\ +\ 373 \\ \hline 529 \end{array}$$

PROBLEM:

$$\begin{array}{r} 309 \\ -\ 154 \\ \hline \end{array} \qquad \begin{array}{r} 631 \\ -\ 28 \\ \hline \end{array}$$

$$\begin{array}{r} 628 \\ -\ 31 \\ \hline \end{array} \qquad \begin{array}{r} 7{,}315 \\ -\ 6{,}429 \\ \hline \end{array}$$

INTRODUCTION TO WHOLE NUMBERS
STUDY SHEET

DIVISION: The process of finding how many times one number is contained within another.

SIGN: ÷ or $\overline{)}$

EXAMPLE:

$$3\overline{)6}\quad 2 \qquad 4\overline{)16}\quad 4 \qquad 9\overline{)180}\quad 20$$

WRITTEN EXAMPLE:

Six ÷ Three	All of these
Six divided by three	have the
6 ÷ 3	same meaning

PROBLEM:

25 divided by five

Eighteen ÷ 6

$7\overline{)42}$

$9\overline{)81}$

INTRODUCTION TO FRACTIONS
STUDY SHEET

FRACTION:	This term is used mathematically to indicate that a number is less than a whole.
EXAMPLE:	A half dollar is a part of one whole dollar. One half is written ½, meaning the whole (1) has been divided into 2 equal parts. Thus ½.
NUMERATORS AND DENOMINATORS:	Two numbers must be used to state a fraction. The upper is called the numerator and the lower is called the denominator. The denominator indicates the number of times the whole number has been divided. The numerator indicates the number of parts under discussion.
EXAMPLE:	3/8, 1/3, 1/6, 3/16

These are all Proper Fractions because they all are less than 1. (The numerator is smaller than the denominator.)

INTRODUCTION TO FRACTIONS
STUDY SHEET

IMPROPER FRACTIONS: A fraction that is equal to one or more than one is called an improper fraction.

EXAMPLE: 6/6 4/3 3/2 16/7 5/8

These are all equal to one or more than one.

MIXED NUMBER: A number made up of a whole number and a fraction is called a mixed number.

1 ¾ 2 7/8 9 1/3 These all represent a whole number plus part of another number.

REDUCING TO THE LOWEST TERMS: A fraction is usually expressed in its lowest term. Whenever the numerator and denominator can be divided evenly by the same number the fraction can be reduced.

EXAMPLE: 5/10 both numbers may be divided by 5

THUS:

$$\frac{5 \div 5}{10 \div 5} = \frac{1}{2}$$

OR:

$$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$$

INTRODUCTION TO FRACTIONS
STUDY SHEET

CHANGING MIXED NUMBERS TO IMPROPER FRACTIONS:

Multiplication and division are required to change a mixed number into an improper fraction.
3 steps are required.

EXAMPLE: Change 2 3/8 to an improper fraction.

Step 1. Multiply the denominator of the fraction by the whole number
2 x 8= 16.

Step 2. Add the numerator to the product of Step 1.
3 +16=19

Step 3. Place the sum in Step 2 over the denominator 19/8

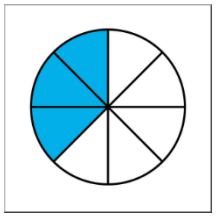
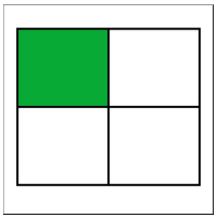
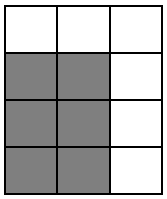
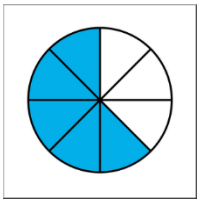
EXAMPLE PROBLEM: Change 5 ¾ to an improper fraction.

SOLUTION: 5 x 4= 20

$$\frac{20}{4} + 3 = \frac{23}{4}$$

INTRODUCTION TO FRACTIONS
EXAMPLE PROBLEMS

PROBLEMS: What fractional part of these figures is shaded.

Ans. 3/8 _____ _____ _____

(circle is divided into 8 parts—3 are shaded)

Reduce the following fractions to their lowest terms/

2/4= _____ 6/8= _____ 14/16= _____

Change the following to improper fractions.

2 ½= 5/2 6 3/8=_____ 5 ¾=_____

(2 x 2 = 4 + 1= 5)

Change the following improper fractions to mixed numbers.

7/3= 2 1/3 23/4= _____ 16/5=_____

$$\begin{array}{r} 2 \\ 3\overline{)\,7} \\ \underline{-6} \\ 1 \end{array}$$

DECIMALS
STUDY SHEET

I. DECIMAL FRACTIONS

A. When a fraction has a denominator of 10 or the denominator is a multiple of 10, such as 100, 1,000, 10,000 etc., it is read the same as a fraction but is written as a decimal. This decimal number is called a DECIMAL FRACTION.

EXAMPLE:
- 3/10 is read three tenths but is written .3
- 7/100 is read seven hundredths but is written .07
- 9/1,000 is read nine thousandths but is written .009
- 268/10,000 is read two hundred sixty-eight ten thousandths but is written .0268

B. When a Decimal Fraction contains a whole number it is called a "Mixed Decimal." A mixed decimal is also read like a fraction but written as a decimal.

EXAMPLE: 24.347 is read twenty-four and three hundred forty-seven thousandths.

NOTE: Digits to the left of a decimal point are whole numbers. Digits to the right of the decimal point are fractional parts of a whole unit. Digits to the right of a decimal point are referred to as decimal places.

C. When a whole number is written by itself it is understood, but not always shown, to have a decimal point to the immediate right of the last digit of the whole number.

EXAMPLE: 7 is 7., 89 is 89., 3756 is 3756.

NOTE: Showing the decimal point at the end of a whole number does not change its value.

II. ADDITION & SUBTRACTION OF DECIMALS

A. Always remember to keep the decimal point in line vertically, even into the answer, when adding or subtracting decimals.

EXAMPLE:

```
  3.15          2.76
   .076       - 1.5
356.75           1.26
+ 30.0075
 389.9835
```

B. When subtracting a decimal from a whole number you should show the decimal point in the whole number and add zeros to the right of the decimal to balance out the problem. Perform the subtraction in the same manner as with the whole numbers, keeping the decimal point in line vertically.

Example:

```
 76.          76.000
-  .578  or  - .578
             75.422
```

DECIMALS
STUDY SHEET

III. MULTIPLICATION OF DECIMALS

A. The added step is multiplying decimals, as compared to multiplying whole numbers, is the placing of the decimal point in the product (answer) correctly. The procedure to follow should be:

Step 1. Perform the multiplication in the same manner as with multiplying whole numbers.

Step2. Count the total digits, to the right of decimal point, in both numbers being multiplied together.

Step3. Beginning with the space between the last two digits in the product and counting each space, from right to left in the product, place the decimal point in the space that corresponds to the total digits in step two.

Step4. Add zeros to the left of the product when there are not enough spaces.

EXAMPLE:

```
  24.3
X 3.04      total of 3
  972       digits (decimal places)
 7290
-------
73.872
```

```
  .31254
x   .22     total of 7
 62508      decimal places
 62508
-------
**added two zeros 0.0687588
```

NOTE: Always drop the last zero added after placing your decimal point in the product.

IV. DIVISION OF DECIMALS

A. The added step in dividing decimals, as compared to dividing whole numbers, is placing the decimal point in the quotient (answer) correctly. The procedure should be as follows:

Step 1. Move the decimal point, in the divisor, to the right, as many spaces as needed to make the divisor a whole number.

Step 2. Move the decimal point in the dividend the same number of spaces to the right as you moved in step 1. Add zeros if more spaces are required.

Step 3. Place the decimal point in the quotient directly above the new location of the decimal point in the dividend. Perform the division the same as with whole numbers.

EXAMPLE:

$3.756.\overline{)27.775.4}$ $.07.\overline{)3.65.}$ $5.673.\overline{)347.600.0}$

DECIMALS
STUDY SHEET

NOTE: In this class we will work to an accuracy of three decimal places. This means you will carry your division out four digits to the right of the decimal point and round off to three for your final answer.

V. CHANGING DECIMALS TO FRACTIONS

A. Simply convert the decimal into a fraction the same as you read it.

EXAMPLE: 0887 is read eight hundred eighty-seven thousandths.
In its fraction form it will be written 887/1,000
.346 is 346/1,000, .75 is 75/100, .9 is 9/10

B. To change a decimal to a fraction with a denominator of 16, multiply the decimal by 16. Round the quotient off to a whole number and place the whole number over 16 to form the fraction. Always reduce the fraction to its lowest terms.

EXAMPLE:

.7568 = 12/16= ¾
x 16
45408
7568
12.1088 round off

.411 = 7/16
x 16
2466
411
6.576 round off

NOTE: This procedure will work with any number desired to be the denominator. In cases of mixed decimals, multiply only the decimal by the desired denominator.

VI. CHANGING FRACTIONS TO DECIMALS

A. To change a fraction to a decimal divide the numerator by the denominator.

```
          .21875
7/32= 32)7.00000
        6.4
          60
         -32
          280
         - 256
            240
          - 224
              160
            - 160
                0
```

NOTE: Work to an accuracy of 4 decimal places and round off to three decimal places for your final answer.

INTRODUCTION TO PERCENT
STUDY SHEET

PERCENT: Abbreviation for the Latin words "Per Centum" and means "by the hundred."

SIGN: % or %, thus 2% is read "TWO PERCENT" and means 2/100 which is 2 – 100= .02.

NOTICE: To write a percent as a decimal move the "decimal point" two (2) places to the LEFT (thus 2%= .02)

NOTE: In most calculations using percent you must first express the percent as a fraction or decimal before working with it.

EXPRESSING PERCENT AS A FRACTION OR AS A DECIMAL.

FRACTION: 12%= 12/100 DECIMAL: 12%= .12

Remembering this you should have no trouble changing percent to either a fraction or a decimal.

EXAMPLE: Express as a fraction and then as a decimal.

A. 26%= _____ or _____

B. 7 ½ %= _____ or _____

C. 250%= _____ or _____

NOTICE: Do not make the common mistake of not recognizing a percent greater than 100% is greater than a single unit.

EXAMPLE: 150% is 1 ½ units.

Study Guide
Practice Problems

Please solve the following problems with paper and pencil only in preparation of the applicant math test. Check your answers using the key after solving to check your preparation.

Adding & Subtracting Fractions

1. 7 5/12 + 3 3/4 =

2. 4 1/4 + 3 3/4 =

3. 1 7/16 – 3/4 =

4. 7 3/4 – 2 1/2=

Multiplying & Dividing Fractions

5. 5/6 x 4/5=

6. 1 1/8 x 2 2/3 x 11/15=

7. 1/2 ÷ 7/16 =

8. 4 1/4 ÷ 3/5 =

Adding & Subtracting Decimals

9. 0.43 + 0.89 =

10. 6.74 + 9.3 + 1.87 =

11. 375.3 – 190.4 =

12. 0.076 – 0.043=

Multiplying & Dividing Decimals

13. 3.14 x 0.002 =

14. 2.423 x 9.146 =

15. 87.92 ÷ 0.7 =

16. 101.92 ÷ 19.6 =

Study Guide
Practice Key

Adding & Subtracting Fractions

1. **11 1/6**

2. **8**

3. **11/16**

4. **5 1/4**

Multiplying & Dividing Fractions

5. **2/3**

6. **2 1/5**

7. **1 1/7**

8. **7 1/12**

Adding & Subtracting Decimals

9. **1.32**

10. **17.91**

11. **184.9**

12. **0.033**

Multiplying & Dividing Decimals

13. **0.006**

14. **22.161**

15. **125.6**

16. **5.2**

NOTES