ABSTRACT

Developed by the ABCs of Construction National Workplace Literacy Project, this fifth-grade level module teaches word attack skills for technical terms used by pipefitters, using word parts and root words. Basic information on structural analysis covers roots, prefixes and suffixes, its limitations, and defining words using structural analysis. Next, the module provides hints for retaining meanings by building a card file with visual representations of terminology. Twenty-seven exercises are included. (YLB)
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MODULES OF INSTRUCTION DEVELOPED IN GRANT CYCLE

1. Writing Frame for Construction Workers (10 exercises)

   for low-level readers; consists of 10 "paragraphs" with open-ended sentences for workers to complete and recopy in their notebooks. Topics deal with work and training, such as "My Job," "Classroom Behavior," and "Listening to Myself."

2. Writing About Your Craft (10 topics)

   for all students; list of 10 topics, such as "My Boss," "The Main Beef About My Job," and "How Work Orders Are Delivered," Used for integrating reading and writing in a job-specific context.

3. Building Workplace Vocabulary for E & I: Structural Analysis (80 pages)
   Building Workplace Vocabulary for Millwrights: Structural Analysis (79 pages)
   Building Workplace Vocabulary for Pipefitters: Structural Analysis (79 pages)

   5th grade level; teaches word attack skills for technical terms, utilizing word parts and root words; includes hints for retaining meanings by building card file with visual representations of terminology.

4. Building Workplace Vocabulary for E & I: General, Specialized, & Technical Terms (58 pages)
   Building Workplace Vocabulary for Millwrights: General, Specialized & Technical Terms (29 pages)
   Building Workplace Vocabulary for Pipefitters: General, Specialized, & Technical Terms (32 pages)

   5th grade level; teaches different kinds of vocabulary words encountered in work-related texts; drills for remembering new words; tips for building vocabulary; some dictionary use.

5. Building Workplace Vocabulary for E & I: Compound Words (28 pages)
   Building Workplace Vocabulary for Pipefitters: Compound Words (18 pages)
   Building Workplace Vocabulary for Millwrights: Compound Words (22 pages)

   5th grade level; strategies for finding the meanings of compound words used in technical writing; works with words in context
6. Improving Listening Skills: Hazards Communication (18 pages)
   Improving Listening Skills: Fire Extinguishers (22 pages)

   A viewing, study guide that accompanies a commercial training video used in the
   required 8-hour OSHA safety course; learning new words, main ideas, and drawing
   conclusions are covered.

7. Measuring Decimals: Millwright (28 pages)

   Instruction and application problems

8. Improving Study Skills/Test Taking (60 pages)

   6th grade level; good study skills are needed for success in the ABC Training
   program; explores strategies for organizing class notes and study time; analysis sheet for
   determining weaknesses in test preparation; how to schedule to arrange study time and
   work time

   Computer Program

   "Math for Pipefitters" is an interactive, multi-media program that covers fractions,
   decimals, angles, and right triangle geometry in a pipefitting context (88 screens)
OBJECTIVE: To use word parts to define new terms.

Think about drills. They do many jobs. The work a drill does depends on the bit you add to it. If you want to drill a hole in concrete, you use one bit. If you want to drill a hole in wood, you use a different one. The parts you add to the drill change it so that it can do the work you need. Separate parts work together to get the job done.

In the same way, words have parts which build meanings. The parts combine "to get the job done." Here, the job is making meaning. Sometimes the meaning of a new word becomes clear when you look at its parts. Splitting words into parts to find meaning is called STRUCTURAL ANALYSIS.

ROOTS of words provide key meanings. The root may even be a word by itself. As such, it can be used alone. Other word parts cannot be used alone. They add to or change the meanings of the roots. These word parts are called PREFIXES and SUFFIXES. You always find prefixes at the beginnings of words. Suffixes come at the ends of words. Suffixes change how a word looks. They tell how a word is used in a sentence. They seldom change basic meaning. Roots are found after prefixes, before suffixes, or between the two. There is a trick to help you recall a word's structure.
Think of where the letters P, R, and S go in the alphabet. This is your clue. The order is the same in words. Prefixes come first. Roots are in the middle. Suffixes come last.

Studying word parts tells you many things. The base of a word gives you an overall meaning for the unknown word. Prefixes and suffixes tell you more about the word. Sometimes they tell you about meaning. Sometimes they tell you about the part of speech of the word.

Read the sentence below:

Forcing a tool to work beyond the limits of its design wears out the tool prematurely.
Can you tell what *prematurely* means in this sentence? Look at the parts of the word.

<table>
<thead>
<tr>
<th>PRE</th>
<th>MATURE</th>
<th>LY</th>
</tr>
</thead>
<tbody>
<tr>
<td>(before)</td>
<td>(fully aged)</td>
<td>(adverb--tells about verb)</td>
</tr>
</tbody>
</table>

*Pre* comes first. It is a prefix. It means *before*. In *prematurely*, *mature* is a root word. It means *fully aged*. *Ly* comes at the end. It is a suffix. It tells you *prematurely* is an adverb. Adverbs usually tell about verbs or other describing words. The parts tell you two things about the word. One, the word is an adverb. Two, it means *before fully aged*. In this sentence *prematurely* tells when a tool may no longer work.

Structural analysis doesn't always show a word's entire meaning. Sometimes all you get is an idea of the word's meaning. But, often, an idea is all you need.

**LIMITATIONS OF STRUCTURAL ANALYSIS.**

Using word parts seems quick and easy. The bad news is that it doesn't always work. Some words contain sets of letters that are the same as common word parts. The letters, however, do not have the same meaning as the word parts they look like. Consider the word *industry*. *Industry* begins with the letters *in*. *In* is a prefix meaning *not*. In the word *industry*, however, the *in* doesn't mean anything. It just happens to be the way the word begins.
Now you know that all words cannot be divided into parts and defined exactly. How can you know when to use structural analysis? There is one test that sometimes works. Mentally remove what seems like a prefix or suffix from the word. Does a "real" or base word remain? If so, you found a word you can define by its parts. For example, look again at *industry*. Removing *in* leaves only *dustry*. *Dustry* is not a word.

Using word parts works most of the time. Your skill in finding when they do and don't will improve with practice.

**DEFINING WORDS USING STRUCTURAL ANALYSIS.**

Despite its limits, using word parts is a good way to find new meanings. Now you need a plan for attacking new words with structural analysis. The steps which follow provide one.
STEPS IN USING STRUCTURAL ANALYSIS

1. Look at the unknown word. Do you see any set of letters you know from other words? Do you see any word parts you learned from these materials? If so, draw a line between them and the rest of the word. This line may or may not be where a word part begins or ends.

2. Look at the word part you marked. Think of words you know that contain this part. Do the meanings of these words have anything in common? What?

3. The common meaning of the words you know is probably the meaning of the word part. Use this meaning to help you define the new word.

4. Look at the rest of the word. Is what's left a word or word part you recognize? Do you know what it means? You might need to use a dictionary.

5. Now put these meanings together. The result should be the definition of the new word.
For example, read the paragraph below:

Respirators used by only one person should be cleaned after each day of use and more often if necessary. Those used by more than one person should be cleaned and disinfected after each use.

What does disinfected mean? To find out, you use the steps listed on page 5. First, you identify any word parts you recognize. Now draw a line between the word part and the rest of the word.

\[ \text{D I S} \ | \ \text{I N F E C T E D} \]

Dis is a word part that probably seems common to you. What are some other words that begin with dis? What do they mean?

DISABLE -- not able

DISAPPROVE -- not approve

DISAPPEAR -- not appear

What is the common word in each of these meanings? Not appears in all three definitions. You think, then, that dis means not. Now, you look at the second part of the word. You probably know that infected has to do with germs and sickness. When you put the two word parts together, you find the meaning of disinfected. Disinfected means not having germs or causing illness.
LISTS OF WORD PARTS. Look at the prefixes, suffixes, and roots in the following tables. They contain lists of word parts by topics. They are not all the word parts in the English language. They are, however, a good start at learning structural analysis. The first three tables contain word parts which tell you position. The fourth group are word parts found in action words. The fifth table is a list of word parts that mean negative, or not. When these word parts occur in front of or behind a root, the word means the opposite of the root. For example, consider the word unsafe. The negative prefix un tells you unsafe means not protected. The sixth group contains word parts that tell how many. They show numbers. The seventh table shows size word parts. The final groups are from fields of science and technology. They are words you might often find in the field of pipefitting. Beside each word part is an example of a word containing that word part. As you look at each word part, try to think of an example you know. This will help you remember the parts.
### TABLE 1

**LIST OF WORD PARTS MEANING IN, OUT, & MIDDLE, DEFINITIONS AND EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>en/em/in</td>
<td>in</td>
<td>enroll/incision</td>
<td></td>
</tr>
<tr>
<td>inter</td>
<td>between</td>
<td>interstate</td>
<td></td>
</tr>
<tr>
<td>trans</td>
<td>across</td>
<td>through</td>
<td></td>
</tr>
<tr>
<td>med/mid</td>
<td>middle</td>
<td>median</td>
<td></td>
</tr>
<tr>
<td>e/ex/exo</td>
<td>out</td>
<td>eject</td>
<td></td>
</tr>
</tbody>
</table>
**EXERCISE 1**

**Match the following:**

<table>
<thead>
<tr>
<th></th>
<th>1. ex</th>
<th>2. mid</th>
<th>3. trans</th>
<th>4. em</th>
<th>5. med</th>
<th>6. inter</th>
<th>7. in</th>
<th>8. en</th>
<th>9. exo</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>in</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>between</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>across</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>middle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front

Back

elex/exp

MEANING:
out

EXAMPLE:
exit

inter

MEANING:

EXAMPLE:
<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>de</td>
<td>away/later than</td>
<td>devalue</td>
<td></td>
</tr>
<tr>
<td>super</td>
<td>above/greater</td>
<td>superimpose</td>
<td></td>
</tr>
<tr>
<td>sub</td>
<td>under</td>
<td>subsoil</td>
<td></td>
</tr>
<tr>
<td>meta</td>
<td>beyond</td>
<td>metacenter</td>
<td></td>
</tr>
<tr>
<td>over</td>
<td>over and beyond</td>
<td>oversimplify</td>
<td></td>
</tr>
</tbody>
</table>
### EXERCISE 3

<table>
<thead>
<tr>
<th>Match the following:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. de . . . .</td>
<td>a. down</td>
</tr>
<tr>
<td>2. super . . .</td>
<td>b. beyond</td>
</tr>
<tr>
<td>3. sub . . .</td>
<td>c. away</td>
</tr>
<tr>
<td>4. meta . . .</td>
<td>d. under</td>
</tr>
<tr>
<td>5. over . . .</td>
<td></td>
</tr>
</tbody>
</table>

Page 13
EXERCISE 4

Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front
sub

Back
MEANING:
under
EXAMPLE:
subway train

Front
dec

Back
MEANING:
EXAMPLE:
Front

super

Back

MEANING:

EXAMPLE:

Front

meta

Back

MEANING:

EXAMPLE:

Front

over

Back

MEANING:

EXAMPLE:
# TABLE 3

## LIST OF RELATIVE POSITION

### WORD PARTS, DEFINITIONS AND EXAMPLES

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre</td>
<td>before</td>
<td>preheat</td>
<td></td>
</tr>
<tr>
<td>post</td>
<td>after/later than</td>
<td>postmortem</td>
<td></td>
</tr>
<tr>
<td>pro</td>
<td>in front/positive</td>
<td>proceed</td>
<td></td>
</tr>
<tr>
<td>re</td>
<td>back/again</td>
<td>return</td>
<td></td>
</tr>
<tr>
<td>circ/circum</td>
<td>around/round</td>
<td>circumference</td>
<td></td>
</tr>
<tr>
<td>tele</td>
<td>far</td>
<td>telephone</td>
<td></td>
</tr>
<tr>
<td>para</td>
<td>beside/equal</td>
<td>paramedic</td>
<td></td>
</tr>
<tr>
<td>peri</td>
<td>around</td>
<td>periscope</td>
<td></td>
</tr>
<tr>
<td>term</td>
<td>end</td>
<td>terminate</td>
<td></td>
</tr>
</tbody>
</table>
### EXERCISE 5

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. term</td>
<td>a. end</td>
<td></td>
</tr>
<tr>
<td>2. peri</td>
<td>b. before</td>
<td></td>
</tr>
<tr>
<td>3. para</td>
<td>c. in front/positive</td>
<td></td>
</tr>
<tr>
<td>4. tele</td>
<td>d. and</td>
<td></td>
</tr>
<tr>
<td>5. circ</td>
<td>e. far</td>
<td></td>
</tr>
<tr>
<td>6. re</td>
<td>f. back/again</td>
<td></td>
</tr>
<tr>
<td>7. pro</td>
<td>g. after/later than</td>
<td></td>
</tr>
<tr>
<td>8. post</td>
<td>h. around/round</td>
<td></td>
</tr>
<tr>
<td>9. pre</td>
<td>i. beside/equal</td>
<td></td>
</tr>
<tr>
<td>10. circum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

**Example**

Front: tele

Back:

MEANING: far
EXAMPLE: telephone
<table>
<thead>
<tr>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>re</em></td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td><em>circ/circum</em></td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td><em>para</em></td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
</tbody>
</table>
# TABLE 4

LIST OF ACTION
ROOTS, DEFINITIONS, AND EXAMPLES

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>vers/vert</td>
<td>turn</td>
<td>convert</td>
<td></td>
</tr>
<tr>
<td>ject</td>
<td>throw</td>
<td>project</td>
<td></td>
</tr>
<tr>
<td>port</td>
<td>carry</td>
<td>transport</td>
<td></td>
</tr>
<tr>
<td>vis</td>
<td>see</td>
<td>vision</td>
<td></td>
</tr>
<tr>
<td>rupt</td>
<td>break</td>
<td>disrupt</td>
<td></td>
</tr>
<tr>
<td>junct</td>
<td>join</td>
<td>conjunction</td>
<td></td>
</tr>
<tr>
<td>cede</td>
<td>go</td>
<td>precede</td>
<td></td>
</tr>
</tbody>
</table>
# EXERCISE 7

Match the following:

<table>
<thead>
<tr>
<th></th>
<th>1. cede</th>
<th>a. thrown</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>vers</td>
<td>b. turn</td>
</tr>
<tr>
<td>3.</td>
<td>junct</td>
<td>c. see</td>
</tr>
<tr>
<td>4.</td>
<td>vis</td>
<td>d. join</td>
</tr>
<tr>
<td>5.</td>
<td>vert</td>
<td>e. go</td>
</tr>
<tr>
<td>6.</td>
<td>port</td>
<td>f. carry</td>
</tr>
<tr>
<td>7.</td>
<td>ject</td>
<td>g. break</td>
</tr>
<tr>
<td>8.</td>
<td>rupt</td>
<td></td>
</tr>
</tbody>
</table>
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front | Back
--- | ---
**port** | **MEANING:**
 | **carry**
 | **MEANING:**
 | **transport**

Front | Back
--- | ---
**vers** | **MEANING:**
 | **EXAMPLE:**
### Building Workplace Vocabulary for Pipefitters

<table>
<thead>
<tr>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>vert</strong></td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td><strong>ject</strong></td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>MEANING:</td>
</tr>
<tr>
<td><strong>vis</strong></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td></td>
<td>MEANING:</td>
</tr>
</tbody>
</table>
**Structural Analysis**

**Front**

- **rupt**

**Back**

EXAMPLE:

MEANING:

**Front**

- **junct**

**Back**

MEANING:

EXAMPLE:

**Front**

- **cede**

**Back**

MEANING:

EXAMPLE:
# TABLE 5

**LIST OF NEGATIVE WORD PARTS, DEFINITIONS, AND EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>neg</td>
<td>deny</td>
<td>neglect</td>
<td></td>
</tr>
<tr>
<td>mis</td>
<td>bad/wrong</td>
<td>mistake</td>
<td></td>
</tr>
<tr>
<td>non/a/</td>
<td>not</td>
<td>nonverbal/asexual/</td>
<td></td>
</tr>
<tr>
<td>dis/il/</td>
<td>not</td>
<td>disarm/informal/</td>
<td></td>
</tr>
<tr>
<td>ir/im/in</td>
<td></td>
<td>irrational</td>
<td></td>
</tr>
</tbody>
</table>
### EXERCISE 9

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>non</td>
<td>a. thrown</td>
</tr>
<tr>
<td>2.</td>
<td>neg</td>
<td>b. turn</td>
</tr>
<tr>
<td>3.</td>
<td>a</td>
<td>c. see</td>
</tr>
<tr>
<td>4.</td>
<td>mis</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>dis</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>il, ir, im, in</td>
<td></td>
</tr>
</tbody>
</table>
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

**Example**

**Front**

```
neg
```

**Back**

```
MEANING: deny
EXAMPLE: negative
```
Structural Analysis

Front Back
mis

MEANING:
EXAMPLE:

Front Back
a

MEANING:
EXAMPLE:

dis

MEANING:
EXAMPLE:
### TABLE 6

**LIST OF NUMBER WORD PARTS, DEFINITIONS, AND EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>uni/mono</td>
<td>one</td>
<td>universe</td>
<td></td>
</tr>
<tr>
<td>bi/di/du</td>
<td>two</td>
<td>bisect/dual</td>
<td></td>
</tr>
<tr>
<td>tri</td>
<td>three</td>
<td>triangle</td>
<td></td>
</tr>
<tr>
<td>octa</td>
<td>eight</td>
<td>octagonal</td>
<td></td>
</tr>
<tr>
<td>dec</td>
<td>ten</td>
<td>decade</td>
<td></td>
</tr>
<tr>
<td>centi</td>
<td>hundred</td>
<td>centipede</td>
<td></td>
</tr>
<tr>
<td>kilo</td>
<td>thousand</td>
<td>kilogram</td>
<td></td>
</tr>
<tr>
<td>mega</td>
<td>millions</td>
<td>megaton</td>
<td></td>
</tr>
<tr>
<td>milli</td>
<td>thousands (1/1000)</td>
<td>millimeter</td>
<td></td>
</tr>
</tbody>
</table>
### EXERCISE 11

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. uni</td>
<td>a. 1/1000</td>
<td></td>
</tr>
<tr>
<td>2. bi</td>
<td>b. 2</td>
<td></td>
</tr>
<tr>
<td>3. tri</td>
<td>c. 3</td>
<td></td>
</tr>
<tr>
<td>4. octa</td>
<td>d. 8</td>
<td></td>
</tr>
<tr>
<td>5. dec</td>
<td>e. 1</td>
<td></td>
</tr>
<tr>
<td>6. centi</td>
<td>f. 1,000</td>
<td></td>
</tr>
<tr>
<td>7. kilo</td>
<td>g. 1,000,000</td>
<td></td>
</tr>
<tr>
<td>8. mega</td>
<td>h. 100</td>
<td></td>
</tr>
<tr>
<td>9. milli</td>
<td>i. 10</td>
<td></td>
</tr>
<tr>
<td>10. du</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EXERCISE 12

Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front

bi

Back

MEANING:
two

EXAMPLE:
bicycle
<table>
<thead>
<tr>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td>uni</td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td>di</td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
<tr>
<td>tri</td>
<td>MEANING:</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE:</td>
</tr>
</tbody>
</table>
Building Workplace Vocabulary for Pipefitters

**Front**
- **octa**

**Back**
- **MEANING:**
- **EXAMPLE:**

**Front**
- **centi**

**Back**
- **MEANING:**
- **EXAMPLE:**

**Front**
- **milli**

**Back**
- **MEANING:**
- **EXAMPLE:**
### TABLE 7

**LIST OF SIZE WORD PARTS, DEFINITIONS, AND EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>micro</td>
<td>small</td>
<td>micrometer</td>
<td></td>
</tr>
<tr>
<td>multi</td>
<td>many</td>
<td>multiply</td>
<td></td>
</tr>
<tr>
<td>numer</td>
<td>number</td>
<td>numeral</td>
<td></td>
</tr>
<tr>
<td>poly</td>
<td>many</td>
<td>polygon</td>
<td></td>
</tr>
<tr>
<td>hemi/semi</td>
<td>half</td>
<td>hemisphere</td>
<td></td>
</tr>
<tr>
<td>equi</td>
<td>equal</td>
<td>equivalent</td>
<td></td>
</tr>
</tbody>
</table>
## EXERCISE 13

<table>
<thead>
<tr>
<th>Match the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. semi ..........</td>
</tr>
<tr>
<td>2. micro ..........</td>
</tr>
<tr>
<td>3. multi ..........</td>
</tr>
<tr>
<td>4. numer ..........</td>
</tr>
<tr>
<td>5. poly ..........</td>
</tr>
<tr>
<td>6. hemi ..........</td>
</tr>
<tr>
<td>7. equ ..........</td>
</tr>
<tr>
<td>a. equal</td>
</tr>
<tr>
<td>b. many</td>
</tr>
<tr>
<td>c. number</td>
</tr>
<tr>
<td>d. half</td>
</tr>
<tr>
<td>e. small</td>
</tr>
</tbody>
</table>

Building Workplace Vocabulary for Pipefitters
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

**Example**

Front

micro

Back

MEANING: small
EXAMPLE: microscope
**Building Workplace Vocabulary for Pipefitters**

**Front**

- **multi**
- **poly**
- **hemi**

**Back**

- **MEANING:**
- **EXAMPLE:**
<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>therm/cal(or)</td>
<td>heat</td>
<td>thermometer/calorie</td>
<td></td>
</tr>
<tr>
<td>chrom</td>
<td>color</td>
<td>kodachrome</td>
<td></td>
</tr>
<tr>
<td>luc/lumen/lumin/cand/photo</td>
<td>light</td>
<td>lumination/photography</td>
<td></td>
</tr>
<tr>
<td>helio/sol</td>
<td>sun</td>
<td>heliograph/solarium</td>
<td></td>
</tr>
<tr>
<td>flagr/flam/pry/pyro</td>
<td>fire</td>
<td>flagrant</td>
<td></td>
</tr>
<tr>
<td>rad/ray</td>
<td>ray</td>
<td>radiant</td>
<td></td>
</tr>
</tbody>
</table>
## Structural Analysis

### EXERCISE 15

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. term</td>
<td></td>
<td>a. tire</td>
</tr>
<tr>
<td>2. chrom</td>
<td></td>
<td>b. sun</td>
</tr>
<tr>
<td>3. luc</td>
<td></td>
<td>c. color</td>
</tr>
<tr>
<td>4. sol</td>
<td></td>
<td>d. ray</td>
</tr>
<tr>
<td>5. cal</td>
<td></td>
<td>e. heat</td>
</tr>
<tr>
<td>6. flagr</td>
<td></td>
<td>f. light</td>
</tr>
<tr>
<td>7. cand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. rad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. photo</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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EXERCISE 16

Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front
flam

Back
MEANING:
fire
EXAMPLE:
flammable
Structural Analysis

Front

therm

Back

MEANING:

EXAMPLE:

Front

lumin

Back

MEANING:

EXAMPLE:

Front

helio

Back

MEANING:

EXAMPLE:
Building Workplace Vocabulary for Pipefitters

Front

pyro

Back

MEANING:

EXAMPLE:

Front

ray

Back

MEANING:

EXAMPLE:

Front

chrom

Back

MEANING:

EXAMPLE:
### TABLE 9

**SCIENCE WORD PARTS OF EARTH DEFINITIONS, AND EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydro/aqua</td>
<td>water</td>
<td>hydroplane/aquarium</td>
<td></td>
</tr>
<tr>
<td>cav</td>
<td>hole</td>
<td>cavern</td>
<td></td>
</tr>
<tr>
<td>geo</td>
<td>earth</td>
<td>geography</td>
<td></td>
</tr>
</tbody>
</table>
### EXERCISE 17

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>hydro</td>
<td>a. hole</td>
</tr>
<tr>
<td>2.</td>
<td>cav</td>
<td>b. water</td>
</tr>
<tr>
<td>3.</td>
<td>geo</td>
<td>c. earth</td>
</tr>
<tr>
<td>4.</td>
<td>aqua</td>
<td></td>
</tr>
</tbody>
</table>
Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front

hydro

Back

MEANING:

water

EXAMPLE:

hydraulic
Structural Analysis

Front

aqua

Back

MEANING:

EXAMPLE:

Front

cav

Back

MEANING:

EXAMPLE:

Front

geo

Back

MEANING:

EXAMPLE:
### TABLE 10

**SCIENCE WORD PARTS**
**OF POSITION OR MOVEMENT, DEFINITIONS & EXAMPLES**

<table>
<thead>
<tr>
<th>Word Part</th>
<th>Definition</th>
<th>General Example</th>
<th>Your Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>meter</td>
<td>measure</td>
<td>diameter</td>
<td></td>
</tr>
<tr>
<td>fract</td>
<td>broken</td>
<td>fracture</td>
<td></td>
</tr>
<tr>
<td>fus(e)</td>
<td>pour</td>
<td>interfuse</td>
<td></td>
</tr>
<tr>
<td>struct</td>
<td>build or arrange</td>
<td>structure</td>
<td></td>
</tr>
<tr>
<td>centri</td>
<td>center</td>
<td>centrifuge</td>
<td></td>
</tr>
<tr>
<td>pel/pul</td>
<td>pull</td>
<td>propel</td>
<td></td>
</tr>
<tr>
<td>flu/flux</td>
<td>flow</td>
<td>flux</td>
<td></td>
</tr>
<tr>
<td>cycl</td>
<td>circle or wheel</td>
<td>kilocycle</td>
<td></td>
</tr>
<tr>
<td>angle/angul</td>
<td>corner</td>
<td>triangle</td>
<td></td>
</tr>
<tr>
<td>gon</td>
<td>angle</td>
<td>octagon</td>
<td></td>
</tr>
<tr>
<td>lev</td>
<td>raise</td>
<td>leverage</td>
<td></td>
</tr>
<tr>
<td>grad/gress</td>
<td>move by steps</td>
<td>gradual process</td>
<td></td>
</tr>
</tbody>
</table>
## Exercise 19

Match the following:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>fract</td>
<td>a. build</td>
</tr>
<tr>
<td>2.</td>
<td>fus(e)</td>
<td>b. circle</td>
</tr>
<tr>
<td>3.</td>
<td>struct</td>
<td>c. center</td>
</tr>
<tr>
<td>4.</td>
<td>centri</td>
<td>d. pull</td>
</tr>
<tr>
<td>5.</td>
<td>meter</td>
<td>e. flow</td>
</tr>
<tr>
<td>6.</td>
<td>pel</td>
<td>f. pour</td>
</tr>
<tr>
<td>7.</td>
<td>flu</td>
<td>g. broken</td>
</tr>
<tr>
<td>8.</td>
<td>cyc</td>
<td>h. corner</td>
</tr>
<tr>
<td>9.</td>
<td>angle</td>
<td>i. move by steps</td>
</tr>
<tr>
<td>10.</td>
<td>gon</td>
<td>j. raise</td>
</tr>
<tr>
<td>11.</td>
<td>gress</td>
<td>k. angle</td>
</tr>
<tr>
<td>12.</td>
<td>lev</td>
<td>l. measure</td>
</tr>
</tbody>
</table>
EXERCISE 20

Complete each of the following word cards by writing the meaning of the word part and your example on the back of the card. Then draw a picture that shows your example on the front. The first one is done for you.

Example

Front

struct

Back

MEANING:

build

EXAMPLE:

structure
Structural Analysis

Front

meter

Back

MEANING:

EXAMPLE:

Front

fract

Back

MEANING:

EXAMPLE:

Front

centi

Back

MEANING:

EXAMPLE:
structural analysis

angle/angul

lev

grad/gress
EXERCISE 21

Jeannie's boss called her. He tells her to install a new T-bar to expand the refinery discharge system. When Jeannie goes home, she checks her text. This is what it says about T-bar installation:

Installation of the T-bar clamps is quick and easy. The T-bar is placed between the pipe and/or fitting so that it is parallel to the run of pipe. This can be checked by noting the position of the handle in relation to the pipe. The pipe is then brought tight against the shaft about the T-bar. This sets the correct root opening. The clamp is tightened against the pipe by screwing down the torque lever. This butts the shoe against the pipe, tightening and aligning the pipe. Only hand tightening is necessary.

1. Look at the word below. It has been divided into word parts.

PARA | LLEL
2. Listed below are three words that contain the word part *para*. Read their definitions.

   **PARALEGAL** -- Person who works beside a lawyer

   **PARATHYROID** -- Gland on the side of the thyroid

   **PARADE** -- People marching side-by-side

3. Look at the definitions in #2. On the line below, write the common word you see in them.

   __________________________

4. Based on the meaning you found in #3, describe how the T-bar should look in relation to the run of pipe.

   __________________________
Joe is new to pipefitting. His boss tells him to get some backing rings from the supply truck. Joe sees the rings are split. He waits all day for the boss to yell at him. That night in class, Joe learns about backing rings.

It is evident from the photographs that backing rings are split at one point along the circumference. During welding, the heat will draw the backing ring tight against the inner wall of the pipe, eliminating crevices and openings between the ring and the pipe. This insures a smooth unobstructed flow of material through the pipe.

1. Draw a line between the word part you recognize and the rest of the word.
2. Listed below are three words that begin with the word part *photo*. Define them. Use a dictionary, if necessary.

PHOTOJOURNALISM -- ________________________________

PHOTOSTAT -- ________________________________

PHOTOSYNTHESIS -- ________________________________

3. Look at the definitions in #2. On the line below, write the common word(s) you see in them.

______________________________________________

4. What does *graph* mean?

______________________________________________

5. Combine the meaning you wrote in #3 with that in #4.

PHOTOGRAPH -- ________________________________
6. Draw a line between the word part you recognize and the rest of the word.

**CIRCUMFERENCE**

7. Listed below are two words that begin with or contain the word part *circ*. You supply a third. Define them. Use a dictionary, if needed.

   CIRCULATE --

   CIRCLE --

   _______ --

8. Look at the definitions in #7. On the line below, write the common word(s) you see in them.
9. *Umference* is not a word.

10. Based on your definition of *circ*, describe the place where the backing rings were split.

11. Draw a line between the word part you recognize and the rest of the word.

   ![Line drawn between words]

12. Listed below are three words that begin with or contain the word part *un*. Define them. Use a dictionary, if needed.

   - **UNKNOWN** --
   - **UNFORGIVEN** --
   - **UNSTEADY** --
13. Look at the definitions in #12. On the line below, write the common word(s) you see in them.

14. **Obstructed** is a word. What does it mean?

15. Combine the meaning you wrote in #13 and the one in #14 to define *obstructed*.
Leroy is installing pipe to an underground storage tank. The alignment needs to be exact. This is important all the time. It is even more important here. Why? Leakage from the tank could pollute groundwater. Leroy decides to check his text for alignment information:

High-low refers to the alignment of one pipe or fitting in relation to the other. Ideally, there should be no misalignment between the internal diameters. The pieces should be as concentric as two coins placed one over the other. However, because of this, a certain amount of variation from the ideal high-low is tolerated. High-low can be measured with a high low mismatch gauge.

1. Draw a line between the word part you recognize and the rest of the word.

M I S A L I G N M E N T

M I S M A T C H
2. List on the shorter lines below, three words that begin with the word part *mis*. Define them. Use a dictionary, if needed.

____________________________________________________

____________________________________________________

____________________________________________________

3. Look at the definitions in #2. On the line below, write the common word(s) you see in them.

____________________________________________________

____________________________________________________

____________________________________________________

4. *Alignment* and *match* are words. What do they mean?

____________________________________________________

____________________________________________________
5. Combine the meaning you wrote in #3 with the ones in #4 to define the following:

MISALIGNMENT -- .................................................................

MISMATCH -- .................................................................

6. Draw a line between the word part you recognize and the rest of the word.

D I A M E T E R

7. List below three words that begin with the word part *di*. Define them. Use a dictionary, if needed.

--- -- .................................................................

--- -- .................................................................

--- -- .................................................................
8. On the line below, write the common word(s) you see in the above definitions.

________________________________________

9. List on the shorter lines below three words that begin with the word meter. Define them on the longer lines.

______ --  ___________________________________________

______ --  ___________________________________________

______ --  ___________________________________________

10. On the line below, write the common word(s) you see in the above definitions.

________________________________________

11. Combine the meaning you wrote in #8 with the one in #10 to define diameter.

________________________________________
Mic has to install stainless steel pipe in the plant's discharge system. He decides to TIG weld it because of what he's read in his text:

Sometimes, gas tungsten-arc welding is used. This process is more commonly known as TIG welding, which stands for "Tungsten inert gas". This is an electric arc process that uses a nonconsumable tungsten electrode. An inert gas, usually argon or helium, shields the weld. The gas is supplied through the welding torch from an external cylinder. A filler rod of the same material as the base metal is sometimes added to the weld. TIG welding produces very high quality welds on pipe with thin walls, on alloy pipe, and in other applications when the previously mentioned processes are undesirable.

1. Draw a line between the word part you recognize and the rest of the word.

NONCONSUMABLE
2. List below three words that begin with or contain the word part *non*. Define them. Use a dictionary, if needed.

   _______  --  ________________________________

   _______  --  ________________________________

   _______  --  ________________________________

3. Look at the definitions in #2. On the line below, write the common word(s) you see in them.

   _____________________________________________

   _____________________________________________

4. *Consumable* is a word. What does it mean?

   _____________________________________________

5. Combine the meaning you wrote in #3 with the one in #4 to define *nonconsumable*.

   _____________________________________________
6. Draw a line between the word part you recognize and the rest of the word.

UNDESIRABLE

7. Based on what you learned in Exercise 22, what does it mean?

UNDESIRABLE --
Molly needs to measure the wall thickness on several existing pipe risers. She decides to use a micrometer wrench to insure she gets the right measurement. A helper asks her why she choose this wrench. Molly tells him about what she knows about micrometer setting torque wrenches:

The *micrometer* setting torque wrench is commonly called the click, or the breakaway, torque wrench. When the proper torque is reached, the wrench *makes a click* and the handle releases, or “breaks,” and moves freely for a short distance. This makes sure that the proper torque has been applied.

1. Draw a line between the word part you recognize and the rest of the word.

   **MICROMETER**
2. List below three words that begin with or contain the word part *micro*. Define them. Use a dictionary, if needed.

   _______  --  ________________________________

   _______  --  ________________________________

   _______  --  ________________________________

3. Look at the definitions in #2. On the line below, write the common word(s) you see in them.

   __________________________________________

4. Based on what you learned in Exercise 23, what does *meter* mean?

   __________________________________________

5. Combine the meaning you wrote in #3 with the one in #4 to define *micrometer*.

   MICROMETER  -  __________________________________

   ✷
Lolly's daughter knows he cuts pipe. She wants him to bring home one of his "big pipe knives". Lolly tells her about dies. He used information he's read in his text:

Dies do the actual cutting. Dies are interchangeable and vary according to the type of thread being cut. There are special dies that cut the tapered pipe thread.

1. Draw a line between the word part you recognize and the rest of the word.

INTERCHANGEABLE
2. List on the shorter lines below, three words that begin with the word part *inter*. Define them. Use a dictionary, if needed.


3. On the line below, write the common word(s) you see in the above definition.


4. *Changeable* is a word. To best define it, look at its parts.

CHANGE --

ABLE --
5. Combine the definitions in #3 and #4 to define *interchangeable*.

INTERCHANGEABLE --

6. Could Lolly's daughter understand his text? Why or why not?

7. Rewrite the text description in words Lolly's daughter might better understand.
Tobias and his crew are installing pipe from the holding tank to the refinery. The boss tells Tobias to check the angles at which pipe must be set. Tobias is not sure how he should do that. He asks one of his coworkers, Moe. Moe gets a protractor and tells Tobias what he learned in class:

A protractor is a device used to measure or construct angles. It is usually *semicircular* in shape with *graduations* for various angles.

1. Draw a line between the word part you recognize and the rest of the word.

   **SEMICIRCULAR**
2. Listed below are three words that begin with the word part *semi*. Define them. Use a dictionary, if needed.

**SEMIAUTOMATIC** -- ____________________________

**SEMIFINAL** -- ____________________________

**SEMICONSCIOUS** -- ____________________________

3. On the lines below, write the common word(s) you see in the above definitions.

__________________________________________

__________________________________________

4. What does *circular* mean? To define it, examine its parts. Based on what you learned in Exercise 22, what does *circ* mean?

__________________________________________

5. Combine the definitions in #3 and #4 to define *semicircular*.

**SEMICIRCULAR** -- ____________________________
6. Draw a line between the word part you recognize and the rest of the word.

GRADUATIONS

7. List on the shorter lines below, three words that begin with the word part **grad**. Define them on the longer lines. Use a dictionary, if needed.

__________  --  ________________

__________  --  ________________

__________  --  ________________
8. On the lines below, write the common word(s) you see in the above definitions:

9. *Uations* is not a word.

10. Use these meanings to rewrite the description of a protractor.