Plumbing
Lesson Five: Pipe Fittings and Parts

Facilitator Guide
Plumbing
Pipe Fittings and Parts

Building Plan / Blue Prints / Specs (Getting Ready to Teach)

Lifeskill Objective: Learners will be able to identify common home appliances and fixtures related to plumbing and describe common home plumbing problems.

EFF Skills: Speak So Others Can Understand, Work Together, Cooperate with Others, Convey Ideas in Writing, Listen Actively, Observe Critically, Solve Problems and Make Decisions, Take Responsibility for Learning

SCANS Skills: Resources (allocate facility and material resources)
Interpersonal (participate as a member of a team; teach others; work with individuals from a variety of ethnic, social or educational backgrounds; work and communicate with co-workers; provide basic leadership and negotiation skills)
Information (acquire and evaluate the information related to home plumbing systems; this information is then interpreted and communicated through a variety of methods)
Systems (provide basic understanding of systems)
Technology (determine the procedures and tools needed to produce the desired results)

Lesson Length: 2 hours

Tools

Realia: A small PVC pipe with a fitting attached
Small fittings or parts made of brass, PVC, cast iron and copper

Laying the Foundation: Complete Home Plumbing System--overhead; from "Part Four: Plumbing System Plan"
A small PVC pipe with a fitting attached
Pipe Fittings and Parts Handout
Understanding Pipe Fitting Name Handout

Activity #1: Pipe Fittings and Parts Handout
Understanding Pipe Fitting Names Handout
Pipe Fitting Names: Shapes and Sizes Handout

Activity #2: Pipe Fittings and Parts Drawings--cut up; multiple sets for pair activity
Pipe Fittings and Parts Handout
Activity #3:  Pipe Fittings and Parts Handout
Can You Hand Me A . . . ? Handout A
Can You Hand Me A . . . ? Handout B
Can You Hand Me A . . . ? Handout C
Pipe Fittings and Parts Drawings--overhead; for optional review/extension activity
## Target Vocabulary

### Nouns:
- bend
- coupling
- degree
- diameter
- elbow
- fitting
- heel
- hub
- pipe
- tee
- trap
- pipe
- tee
- U
- wye (Y)

### Verbs:
- sweep

### Adjectives:
- double
- eighth
- fifth
- P
- quarter
- running
- sanitary
- single
- sixth
- straight
**Laying the Foundation**
**Warm-Up / Presentation**

<table>
<thead>
<tr>
<th>Actions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ask learners to sit together in groups of four according to language level. Place several plumbing fittings as well as the PVC pipe and its fitting on the table or desk in front of the room. Put the Complete Home Plumbing System Overhead on the OHP.</td>
<td>Complete Home Plumbing System–Overhead</td>
</tr>
<tr>
<td></td>
<td>Markers</td>
</tr>
<tr>
<td>2. Tell learners that they have already learned about the types of pipes in a plumbing system and today they will look at the many smaller parts between the pipes, called fittings. Circle the fittings between the pipes in the picture on the transparency. Write the word fittings on the board. Ask the group which smaller word they see in this word. Then circle the f-i-t in fittings and write the word fit on the board next to fittings.</td>
<td>PVC Pipe and Fitting</td>
</tr>
<tr>
<td>3. Hold up and show how the parts of the plastic pipe and its fitting fit together. Tell the learners that they can remember the word fitting by thinking that fittings are parts that fit together. Ask learners for other examples of how we use the word fit, e.g., &quot;The clothing fits/doesn't fit.&quot;</td>
<td>PVC Pipe and Fitting</td>
</tr>
<tr>
<td>4. Still holding the PVC pipe and fitting, ask the learners what is important to know when deciding what parts or fittings to use with each pipe. As learners volunteer answers, write the possibilities on the board. You want to have (at least) the material, size and special shape, and name on the board. Make a chart on the board using these words as headings. Example:</td>
<td>PVC Pipe and Fitting</td>
</tr>
<tr>
<td><strong>PIPE FITTINGS</strong></td>
<td></td>
</tr>
<tr>
<td>MATERIAL</td>
<td>SIZE</td>
</tr>
<tr>
<td>PVC Pipe and Fitting</td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>Materials</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>5. If you have beginners, you may need to discuss the meanings</td>
<td></td>
</tr>
<tr>
<td>of these words by asking for examples of each using everyday</td>
<td></td>
</tr>
<tr>
<td>topics. For example, ask learners about the size, shape and</td>
<td></td>
</tr>
<tr>
<td>materials of objects in the room, such as a table, the black/white</td>
<td></td>
</tr>
<tr>
<td>board, a book or clothing.</td>
<td></td>
</tr>
<tr>
<td>6. If the group has some plumbing experience, go back to the</td>
<td></td>
</tr>
<tr>
<td>Materials/Sizes/Shapes/Name chart on the board. Ask the</td>
<td></td>
</tr>
<tr>
<td>whole group what words they already know to describe plumbing</td>
<td></td>
</tr>
<tr>
<td>fittings. If any learner can provide any words, ask them where the</td>
<td></td>
</tr>
<tr>
<td>word fits in the chart. Ask, &quot;Is that the material, the size, or the</td>
<td></td>
</tr>
<tr>
<td>shape name?&quot; Write that fitting word in the chart on the board</td>
<td></td>
</tr>
<tr>
<td>under the correct category.</td>
<td></td>
</tr>
<tr>
<td>7. Give each learner the Pipe Fittings and Parts Handout and</td>
<td>Pipe Fittings and Parts Handout</td>
</tr>
<tr>
<td>the Understanding Pipe Fitting Names Handout. Draw the</td>
<td>Understanding Pipe Fitting Names Handout</td>
</tr>
<tr>
<td>first fitting type on both handouts on the board and write its</td>
<td></td>
</tr>
<tr>
<td>name under it. Read the name of the fitting. Draw a line</td>
<td></td>
</tr>
<tr>
<td>between the different parts of the name (PVC/90 degree/</td>
<td></td>
</tr>
<tr>
<td>elbow) on the board. Say the name again, stopping after each part of</td>
<td></td>
</tr>
<tr>
<td>the name. Have students repeat each part after you. Ask the</td>
<td></td>
</tr>
<tr>
<td>learners to identify what the first word describes. You might</td>
<td></td>
</tr>
<tr>
<td>ask, “Is this a size, shape or type of material?” Do the same for</td>
<td></td>
</tr>
<tr>
<td>the other words in the fitting’s name in the order they appear.</td>
<td></td>
</tr>
<tr>
<td>Point to the chart on the board and explain that plumbers say the</td>
<td></td>
</tr>
<tr>
<td>complete name of the fitting in this order: material, size, special</td>
<td></td>
</tr>
<tr>
<td>shape, name. Write each part of the name under the appropriate</td>
<td></td>
</tr>
<tr>
<td>category in the chart on the board.</td>
<td></td>
</tr>
</tbody>
</table>

PVC 90 degree elbow
**Actions** | **Materials**
---|---
**Activity #1: Understanding Pipe Fitting Names** | **Pipe Fittings and Parts Handout**
1. Distribute the *Understanding Pipe Fitting Names: Shapes and Sizes Handout*. In their small groups, learners continue to look at the fittings on the *Pipe Fittings and Parts Handout*, reading the names of each fitting. Together, they decide which words in the name mean the material, the size, the special shape and, finally, the type or fitting name. | *Understanding Pipe Fitting Names Handout*

2. Then, they write the parts of the name on the lines under the appropriate category on the *Understanding Pipe Fitting Names Handout*. Note that not each fitting has all of this information in its name. Tell the learners to fill in the entire worksheet. | *Understanding Pipe Fitting Names Handout*

3. Assist all groups with the pronunciation of the terms. Help beginning groups to decide under which category to write each word. | *Understanding Pipe Fitting Names Handout*

4. Ask groups to stop the activity when most of the groups have filled in most of the blanks on their sheets (or they look tired of doing it). | *Understanding Pipe Fitting Names Handout*
Activity #2: Find It, Sort It

In preparation for this activity, cut out the 35 (or fewer for lower levels) drawings of pipe fittings from Pipe Fitting and Parts Drawings. Be sure to leave the identifying number and drawing intact.

Have learners pair up with one of their group members from the previous activity. Give each pair a packet (envelope or plastic bag) containing the small pictures of fittings (cut apart from the Pipe Fittings and Parts Drawings). Learners can refer to their Pipe Fittings and Parts Handout to help them identify the drawings. Learners work together to sort the pictures of fittings into groups according to the categories the instructor writes on the board. For example, the instructor writes elbows. Each group sorts through the fittings to find all of the elbows.

When most groups have finished finding the elbows, ask them how many elbows they found. Have the group with the most fittings in that category hold up each picture and say the number of each drawing they put in that category. Check that all the fittings they have in the elbow group are correct. The group with the most correctly identified fittings in the category, in this case elbows, gets a point.

Repeat this procedure with some or all of the following categories: tees, crosses, couplings, flanges, nuts, plugs or caps.

Have one partner from each pair collect all of the fittings pictures for next activity.
Activity 3: Can You Hand Me A . . . ?

Have learners switch partners so that each is working with a new partner from their previous group of 4. Have new pairs sort through one complete set of fitting pictures, separating them into even and odd numbered pictures. Each partner takes one set (even or odd) of the pictures. Explain that they will need to look at the Pipe Fittings and Parts Handout.

Give each learner the Can You Hand Me A . . . ? Handout. Tell the learners that they will be having short conversations with each other, asking their partners to find a fitting and to give it to them.

Model one of the conversations from Handout A with a learner with strong speaking skills. Then have the group repeat each line of the conversations after you. You should break each sentence into natural phrases if learners cannot repeat the entire line.

Have two higher level learners model a conversation from Handout B. Ask questions such as:

- What does _____ need?
- Does _____ have one?
- How many does he have?
- Which one does _______ want?

Remind partners to ask for either an even numbered or an odd numbered fitting from the Pipe Fittings and Parts Handout, depending on what numbered fittings their partner is holding in his/her hand.

Have partners begin conversations with each other. Assist beginning learner pairs, as needed. Circulate among other groups to provide assistance.

If time permits, have partners perform conversations for the whole group.
<table>
<thead>
<tr>
<th>Actions</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Review or Extension Activity:</strong> SWAT!</td>
<td><strong>Pipe Fittings and Parts Drawings– Overhead</strong></td>
</tr>
</tbody>
</table>

With the transparency Pipe Fittings and Parts Drawings on the OHP, learner groups compete in a game to practice matching fitting name with fitting picture. After the instructor calls out a fitting type, e.g., **PVC double tee**, a member from each of the two teams comes up to overhead screen and "swats" the picture that he or she thinks matches the name. A team earns points by swatting the correct image first.
### Actions

1. Learners visit home building supply company (Lowe’s or Home Depot) and find the parts and fittings section. Learners list all of the part and fitting *types* that they see there.

2. Learners view website catalogues of major parts and fittings manufacturers and view what types of parts and fittings they make.
   - [www.swagelok.com/products.htm](http://www.swagelok.com/products.htm)
   - [www.msi-products.com](http://www.msi-products.com)
   - [www.charlottepipe.com](http://www.charlottepipe.com)
   - [www.usplastic.com/catalog](http://www.usplastic.com/catalog)

3. Learners inspect their home plumbing to report back to the group on the types of fittings used in their home plumbing system.

### Materials

**Website Catalogs of Parts and Fittings Manufacturers**
Building Basics was paid for under an EL Civics grant from the U. S. Department of Education administered by the Virginia Department of Education. It was paid for under the Adult Education and Family Literacy Act of 1998; however, the opinions expressed herein do not necessarily represent the position or policy of the U. S. Department of Education, and no official endorsement by the U. S. Department of Education should be inferred. This document was designed and created by the Virginia Adult Learning Resource Center at Virginia Commonwealth University, 817 West Franklin Street, Suite 221, P.O. Box 842037, Richmond, VA 23284-2020. It may be reproduced for nonprofit, educational purposes only.
Pipe Fittings and Parts

1. PVC 90° elbow
2. PVC 1/4 bend
3. PVC threaded coupling
4. CPVC tee
5. PVC double tee
6. PVC cross
7. PVC bushing
8. PVC union
9. CPVC male adapter
10. PVC clean out
11. ABS closet flange
12. ABS cap
13. ABS p-trap
14. ABS wye
15. Brass coupling
16. Brass cross
17. Brass floor flange
18. Brass bushing
copper double elbow

copper wye

copper double wye

copper cross

copper union

copper female adapter

copper male adapter

galvanized steel 90° elbow

galvanized steel 45° elbow

galvanized steel nipple

black iron reducing tee

black iron 90° street elbow

black iron plug
**black iron floor flange**

**black iron hex bushing**

**cast iron clean out**

**chrome p-trap**
### Understanding Pipe Fittings: Names

<table>
<thead>
<tr>
<th>Material</th>
<th>Size or Special Shape</th>
<th>Fitting Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>90 degree</td>
<td>elbow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Plumbing
Pipe Fittings and Parts
Virginia Adult Learning Resource Center
Understanding Pipe Fitting Names Handout
Lesson Five Facilitator Materials
<table>
<thead>
<tr>
<th>Material</th>
<th>Size or Special Shape</th>
<th>Fitting Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Understanding Pipe Fittings: Shapes and Sizes

Angles and Fractions

When a fitting has an angle or curve in it, its name will have a degree (°) or a fraction (¼) in it. The degree or fraction describes how big the curve is in the fitting.

Degrees of Angles or Curves

90 degree angle  
90° angle

45 degree angle  
45° angle

22 1/2 degree angle  
22 ½° angle

Fractions

1/4 bend  
one quarter bend  
Color 1/4 of the circle.

1/8 bend  
one eighth bend  
Color 1/8 of the circle.

1/16 bend  
one sixteenth bend  
Color 1/16 of the circle.
Activity #3: Can You Hand Me A . . . ?

Handout A

Conversation #1

A: Hey, __________________,
B: Yeah? What do you need?
A: Can you **hand** me a 90° elbow?
B: Sure. Just a minute.  (looks for fitting)  
Here you go.  (gives fitting to partner)
A: Thanks a lot.
B: You’re welcome.

Conversation #2

A: Maria?
B: Yes. What is it?
A: Can you **get** me a floor flange?
B: Let me see.  (looks for fitting and gives it to his/her partner)  
Here it is.
A: Thanks a lot.
B: No problem.
Activity #3: Can You Hand Me A . . . ?

Handout B

Conversation #1

A: Hey, ________________,
B: Yeah? What do you need?
A: Can you **hand** me a 2 ½ inch tee?
B: Sure. Just a minute. (looks for fitting)  
    I only found one. (gives fitting to partner)
A: That’s all I need.
B: Here you go. Do you need anything else?

Conversation #2

A: Maria?
B: Yes. What is it?
A: Can you **give** me a few locknuts?
B: How many?
A: Three or four will be enough.
B: Ok, let me look. (looks for fitting and gives it to partner)  
    I found some. Hold out your hand.
A: I got them. Thanks a lot.
B: No problem.
Activity #3: Can You Hand Me A . . . ?

Handout C

Conversation #1

A: Hey, ________________,
B: Yeah? What do you need?
A: Can you get me a 1/8 bend from the truck?
B: Let me see if we have any. I’ll be right back. (looks for fitting in truck)
I'm back. Okay, do you want the 3-inch or the 3 1/2 inch 1/8 bend?
A: I'll take the 3-inch one.
B: Can you get it? (Can you reach it?)
A: Got it. I appreciate it.
B: Let me know if you need anything else.
A: Thanks.
B: You’re welcome.

Conversation #2

A: __________? Are you there?
B: Yes. What can I do for you?
A: Can you get me a copper double wye?
B: I'll look. Is it in the van?
A: I’m not sure.
B: Ok, let me look. (looks for fitting and show something to his/her partner)
I found a PVC double wye, but I didn’t see a copper one.
A: Okay. I'll need to go back to the shop.
B: I'll go get it for you.
A: Thanks, and bring me back a coke, too.
B: You owe me.
coupling
female connector
female union
male connector
90 degree male elbow
union
45 degree male elbow
tee
union elbow
branch tee
reducing coupling
cap
branch tee
90 degree male elbow
cross
face bushing

hex nipple

hex coupling

male run tee

45 degree street elbow