



# THE VIRGINIA ADULT LEARNING RESOURCE CENTER

V i r g i n i a C o m m o n w e a l t h U n i v e r s i t y

## **Plumbing** **Lesson Five: Pipe Fittings and Parts** **Facilitator Guide**

*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.*

## 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				

### Verbs:

sweep

### Adjectives:

double	eighth	fifth	P	quarter
running	sanitary	single	sixth	straight
U	wye (Y)			

## Laying the Foundation Warm-Up / Presentation



Actions	Materials				
<p>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 <b>Complete Home Plumbing System Overhead</b> on the OHP.</p>	<p><b>Complete Home Plumbing System–Overhead</b></p>				
<p>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 <i>fittings</i> on the board. Ask the group which smaller word they see in this word. Then circle the <i>f-i-t</i> in <i>fittings</i> and write the word <i>fit</i> on the board next to <i>fittings</i>.</p>	<p><b>Complete Home Plumbing System–Overhead</b></p> <p><b>Markers</b></p>				
<p>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 <i>fitting</i> by thinking that fittings are parts that fit together. Ask learners for other examples of how we use the word <i>fit</i>; e.g., "The clothing fits/doesn't fit."</p>	<p><b>PVC Pipe and Fitting</b></p>				
<p>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) <i>the material, size and special shape</i>, and <i>name</i> on the board. Make a chart on the board using these words as headings. Example:</p> <p style="text-align: center;"><b><u>PIPE FITTINGS</u></b></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><b><u>MATERIAL</u></b></td> <td style="text-align: center;"><b><u>SIZE</u></b></td> <td style="text-align: center;"><b><u>SPECIAL SHAPE</u></b></td> <td style="text-align: center;"><b><u>TYPE</u></b></td> </tr> </table>	<b><u>MATERIAL</u></b>	<b><u>SIZE</u></b>	<b><u>SPECIAL SHAPE</u></b>	<b><u>TYPE</u></b>	<p><b>PVC Pipe and Fitting</b></p>
<b><u>MATERIAL</u></b>	<b><u>SIZE</u></b>	<b><u>SPECIAL SHAPE</u></b>	<b><u>TYPE</u></b>		

Actions	Materials
<p>5. <b>If you have beginners</b>, you may need to discuss the meanings of these words by asking for examples of each using everyday topics. For example, ask learners about the size, shape and materials of objects in the room, such as a table, the black/white board, a book or clothing.</p>	
<p>6. <b>If the group has some plumbing experience</b>, go back to the <i>Materials/Sizes/Shapes/Name</i> chart on the board. Ask the whole group what words they already know to describe plumbing fittings. If any learner can provide any words, ask them where the word fits in the chart. Ask, "Is that the material, the size, or the shape name?" Write that fitting word in the chart on the board under the correct category.</p>	
<p>7. Give each learner the <b>Pipe Fittings and Parts Handout</b> and the <b>Understanding Pipe Fitting Names Handout</b>. Draw the first fitting type on both handouts on the board and write its name under it. Read the name of the fitting. Draw a line between the different parts of the name (<i>PVC/90 degree/elbow</i>) on the board. Say the name again, stopping after each part of the name. Have students repeat each part after you. Ask the learners to identify what the first word describes. You might ask, "Is this a size, shape or type of material?" Do the same for the other words in the fitting's name in the order they appear. Point to the chart on the board and explain that plumbers say the complete name of the fitting in this order: <i>material, size, special shape, name</i>. Write each part of the name under the appropriate category in the chart on the board.</p> <div style="text-align: center;">  <p><b>PVC 90 degree elbow</b></p> </div>	<p><b>Pipe Fittings and Parts Handout</b></p> <p><b>Understanding Pipe Fitting Names Handout</b></p>

<b>Actions</b>	<b>Materials</b>
<p><b>Activity #1: Understanding Pipe Fitting Names</b></p> <p>1. Distribute the <b>Understanding Pipe Fitting Names: Shapes and Sizes Handout</b>. In their small groups, learners continue to look at the fittings on the <b>Pipe Fittings and Parts Handout</b>, 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.</p>	<p><b>Pipe Fittings and Parts Handout</b></p> <p><b>Understanding Pipe Fitting Names Handout</b></p> <p><b>Pipe Fitting Names: Shapes and Sizes Handout</b></p>
<p>2. Then, they write the parts of the name on the lines under the appropriate category on the <b>Understanding Pipe Fitting Names Handout</b>. Note that not each fitting has all of this information in its name. Tell the learners to fill in the entire worksheet.</p>	<p><b>Understanding Pipe Fitting Names Handout</b></p>
<p>3. Assist all groups with the pronunciation of the terms. Help beginning groups to decide under which category to write each word.</p>	<p><b>Understanding Pipe Fitting Names Handout</b></p>
<p>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).</p>	<p><b>Understanding Pipe Fitting Names Handout</b></p>

## Building on the Foundation Practicing the New Language



Actions	Materials
<p><b>Activity #2: Find It, Sort It</b></p> <p>In preparation for this activity, cut out the 35 (or fewer for lower levels) drawings of pipe fittings from <b>Pipe Fitting and Parts Drawings</b>. Be sure to leave the identifying number and drawing intact.</p> <p>Have learners <b>pair up</b> 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 <b>Pipe Fittings and Parts Drawings</b>). Learners can refer to their <b>Pipe Fittings and Parts Handout</b> 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 <i>elbows</i>. Each group sorts through the fittings to find all of the elbows.</p> <p>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.</p> <p>Repeat this procedure with some or all of the following categories: <i>tees, crosses, couplings, flanges, nuts, plugs</i> or <i>caps</i>.</p> <p>Have one partner from each pair collect all of the fittings pictures for next activity.</p>	<p><b>Pipe Fittings and Parts Drawings</b></p> <p><b>Pipe Fittings and Parts Handout</b></p>

Actions	Materials
<p><b>Activity 3:</b>      <i>Can You Hand Me A . . . ?</i></p> <p>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 <b>Pipe Fittings and Parts Handout</b>.</p> <p>Give each learner the <b>Can You Hand Me A . . . ? Handout</b>. 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.</p> <p>Model one of the conversations from <b>Handout A</b> 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.</p> <p>Have two higher level learners model a conversation from <b>Handout B</b>. Ask questions such as:</p> <ul style="list-style-type: none"> <li>➤ What does _____ need?</li> <li>➤ Does _____ have one?</li> <li>➤ How many does he have?</li> <li>➤ Which one does _____ want?</li> </ul> <p>Remind partners to ask for either an even numbered or an odd numbered fitting from the <b>Pipe Fittings and Parts Handout</b>, depending on what numbered fittings their partner is holding in his/her hand.</p> <p>Have partners begin conversations with each other. Assist beginning learner pairs, as needed. Circulate among other groups to provide assistance.</p> <p>If time permits, have partners perform conversations for the whole group.</p>	<p><b>Pipe Fittings and Parts Handout</b></p> <p><b>Can You Hand Me A...? Handout A</b></p> <p><b>Can You Hand Me A...? Handout B</b></p> <p><b>Can You Hand Me A...? Handout C</b></p> <p><b>Pipe Fittings and Parts Drawings</b></p>

<b>Actions</b>	<b>Materials</b>
<p><b>Review or Extension Activity: SWAT!</b></p> <p>With the transparency <b>Pipe Fittings and Parts Drawings</b> 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., <i>PVC double tee</i>, 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.</p>	<p><b>Pipe Fittings and Parts Drawings– Overhead</b></p>

## Finishing Work Extension or Out-of-Class Practice



Actions	Materials
<ol style="list-style-type: none"><li>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 <i>types</i> that they see there.</li><li>2. Learners view website catalogues of major parts and fittings manufacturers and view what types of parts and fittings they make.<ul style="list-style-type: none"><li>➤ <a href="http://www.swagelok.com/products.htm">www.swagelok.com/products.htm</a></li><li>➤ <a href="http://www.msi-products.com">www.msi-products.com</a></li><li>➤ <a href="http://www.charlottepipe.com">www.charlottepipe.com</a></li><li>➤ <a href="http://www.usplastic.com/catalog">www.usplastic.com/catalog</a></li></ul></li><li>3. Learners inspect their home plumbing to report back to the group on the types of fittings used in their home plumbing system.</li></ol>	<p><b><i>Website Catalogs of Parts and Fittings Manufacturers</i></b></p>

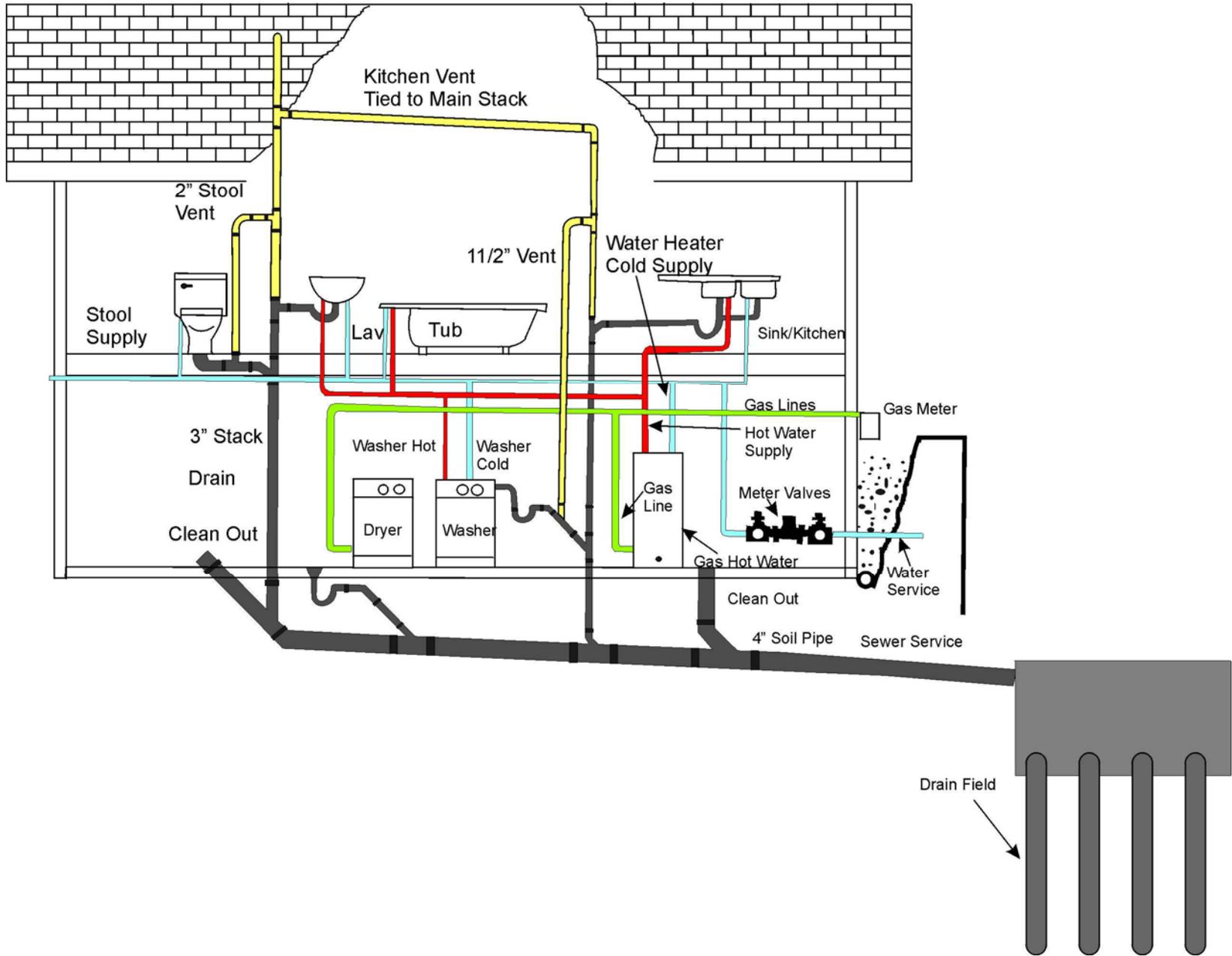


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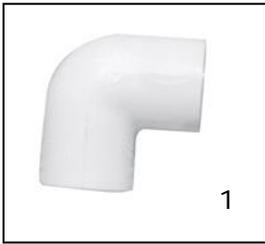
V i r g i n i a C o m m o n w e a l t h U n i v e r s i t y

## **Plumbing** **Lesson Five: Pipe Fittings and Parts** **Facilitator Materials**

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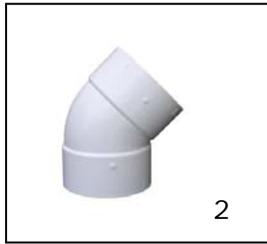


# Pipe Fittings and Parts



1

**PVC 90° elbow**



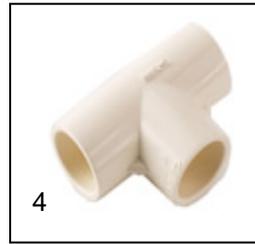
2

**PVC 1/4 bend**



3

**PVC threaded coupling**



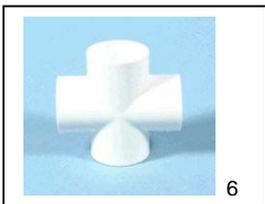
4

**CPVC tee**



5

**PVC double tee**



6

**PVC cross**



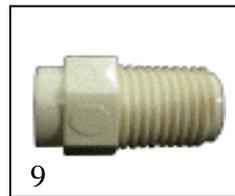
7

**PVC bushing**



8

**PVC union**



9

**CPVC male adapter**



10

**PVC clean out**



11

**ABS closet flange**



12

**ABS cap**



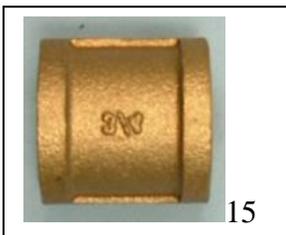
13

**ABS p-trap**



14

**ABS wye**



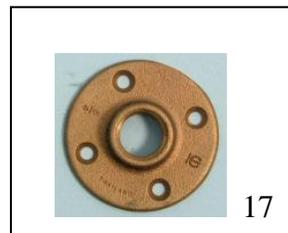
15

**brass coupling**



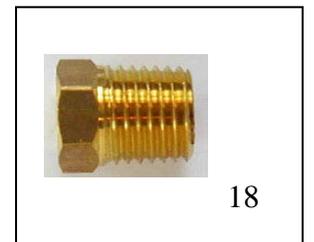
16

**brass cross**



17

**brass floor flange**



18

**brass bushing**



**copper double elbow**



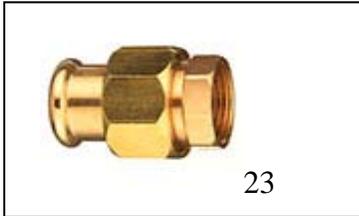
**copper wye**



**copper double wye**



**copper cross**



**copper union**



**copper female adapter**



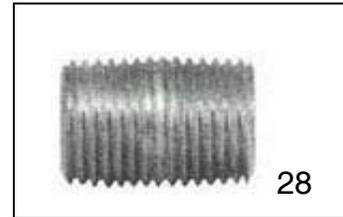
**copper male adapter**



**galvanized steel 90° elbow**



**galvanized steel 45° elbow**



**galvanized steel nipple**



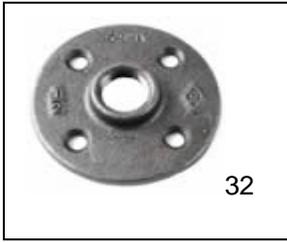
**black iron reducing tee**



**black iron 90° street elbow**



**black iron plug**



**black iron floor flange**



**black iron hex bushing**

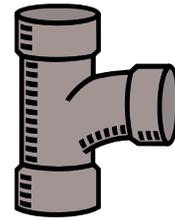


**cast iron clean out**



**chrome p-trap**

# Understanding Pipe Fittings: Names



	<u>Material</u>	<u>Size or Special Shape</u>	<u>Fitting Name</u>
1.	PVC	90 degree	elbow
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____
11.	_____	_____	_____
12.	_____	_____	_____
13.	_____	_____	_____
14.	_____	_____	_____
15.	_____	_____	_____
16.	_____	_____	_____

Material

Size or Special Shape

Fitting Name

17.	_____	_____	_____
18.	_____	_____	_____
19.	_____	_____	_____
20.	_____	_____	_____
21.	_____	_____	_____
22.	_____	_____	_____
23.	_____	_____	_____
24.	_____	_____	_____
25.	_____	_____	_____
26.	_____	_____	_____
27.	_____	_____	_____
28.	_____	_____	_____
29.	_____	_____	_____
30.	_____	_____	_____
31.	_____	_____	_____
32.	_____	_____	_____
33.	_____	_____	_____
34.	_____	_____	_____
35.	_____	_____	_____

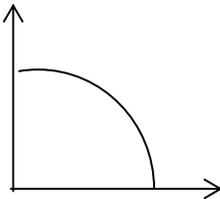
## Understanding Pipe Fittings: Shapes and Sizes

### Angles and Fractions

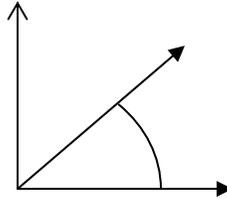
When a fitting has an angle or curve in it, its name will have a degree ( $^{\circ}$ ) or a fraction ( $\frac{1}{4}$ ) in it. The degree or fraction describes how big the curve is in the fitting.



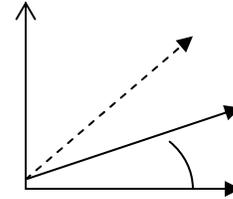
#### Degrees of Angles or Curves



90 degree angle  
 $90^{\circ}$  angle

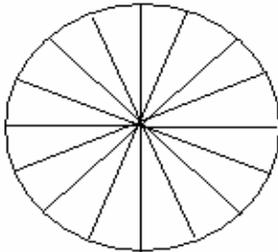


45 degree angle  
 $45^{\circ}$  angle



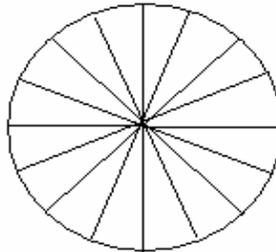
22  $\frac{1}{2}$  degree angle  
22  $\frac{1}{2}^{\circ}$  angle

#### Fractions



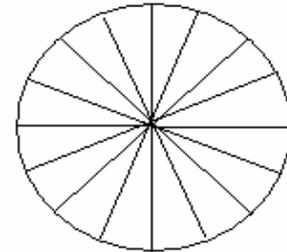
$\frac{1}{4}$  bend  
one quarter bend

Color  $\frac{1}{4}$  of the circle.



$\frac{1}{8}$  bend  
one eighth bend

Color  $\frac{1}{8}$  of the circle.



$\frac{1}{16}$  bend  
one sixteenth bend

Color  $\frac{1}{16}$  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.

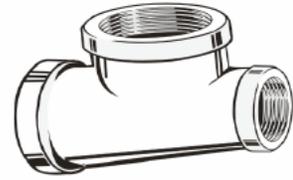
B: You owe me.



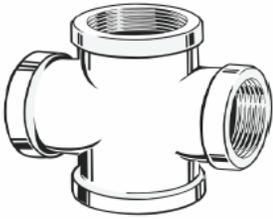
1



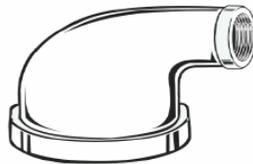
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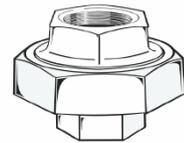
3



4



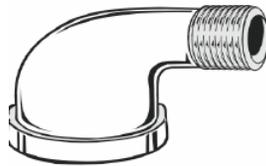
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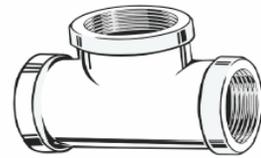
6



7



8



9



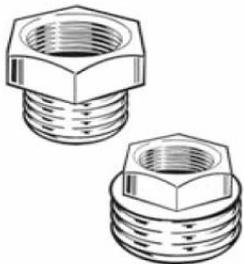
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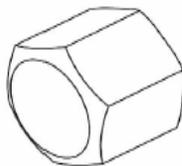
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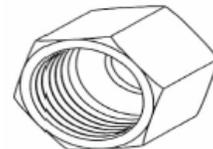
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13



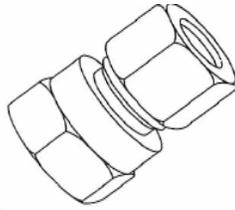
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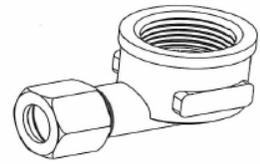
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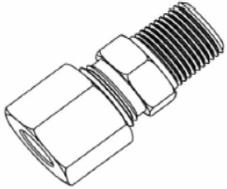
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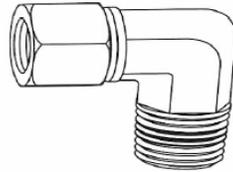
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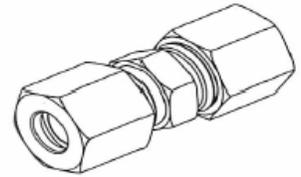
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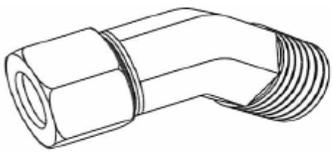
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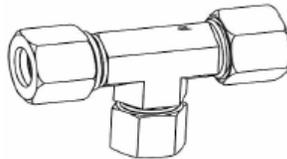
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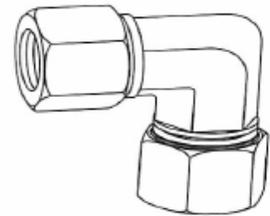
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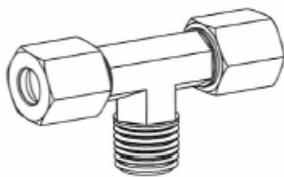
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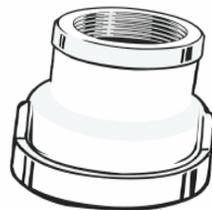
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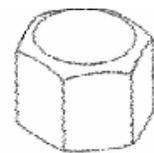
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25



26



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28



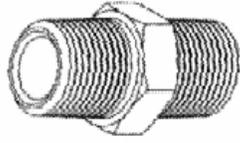
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30



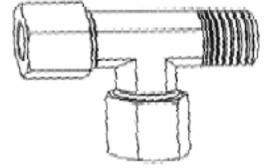
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32



33



34



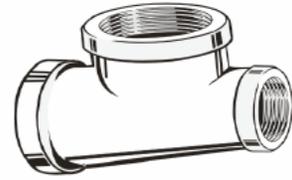
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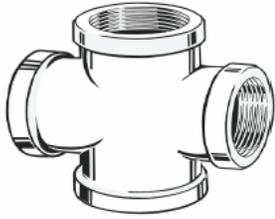
90 degree elbow (or bend)



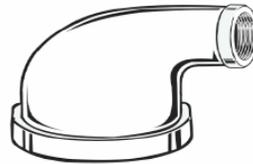
45 degree elbow



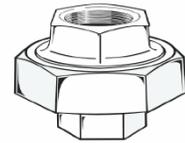
reducing tee



cross



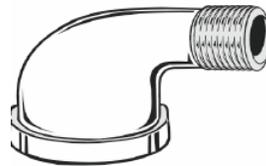
90 degree reducing elbow



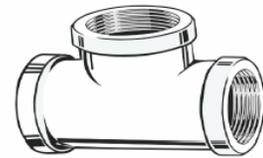
union



flange



90 degree reducing elbow



tee



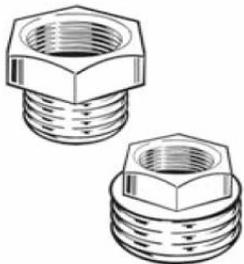
locknut



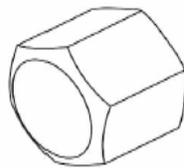
cap



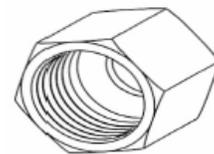
square head plug



hex bushing



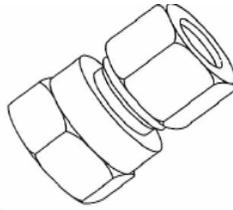
cap



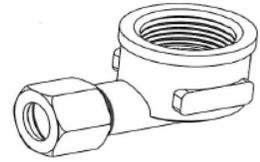
nut



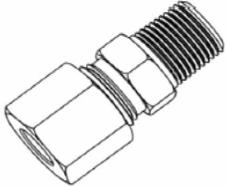
coupling



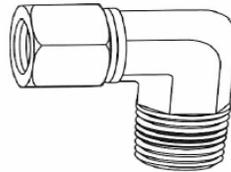
female connector



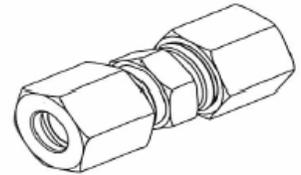
female union



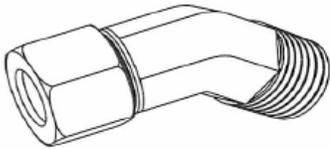
male connector



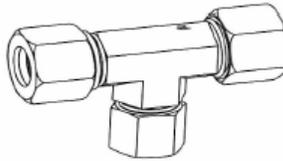
90 degree male elbow



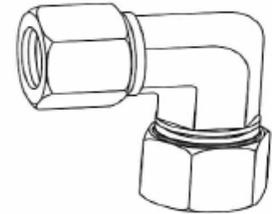
union



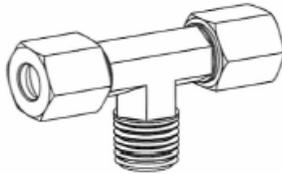
45 degree male elbow



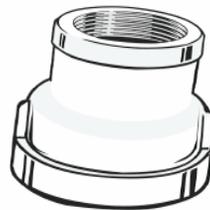
tee



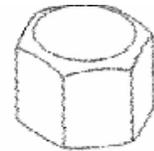
union elbow



branch tee



reducing coupling



cap



branch tee



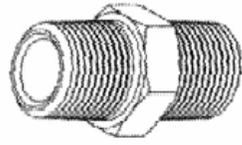
90 degree male elbow



cross



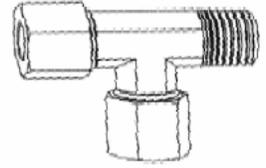
face bushing



hex nipple



hex coupling



male run tee



45 degree street elbow