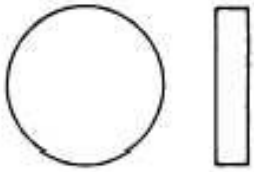
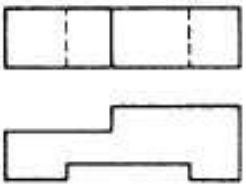
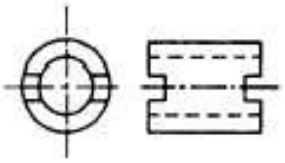
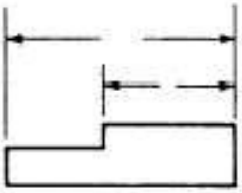
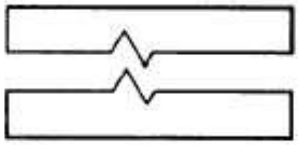
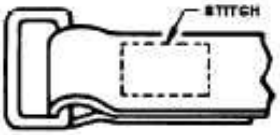
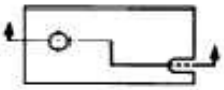
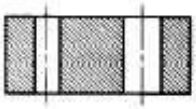
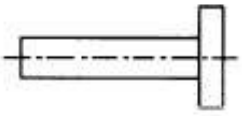
Blueprint Reading Basics
For
Welding Fabrication

Matt Scott

Definitions of Lines

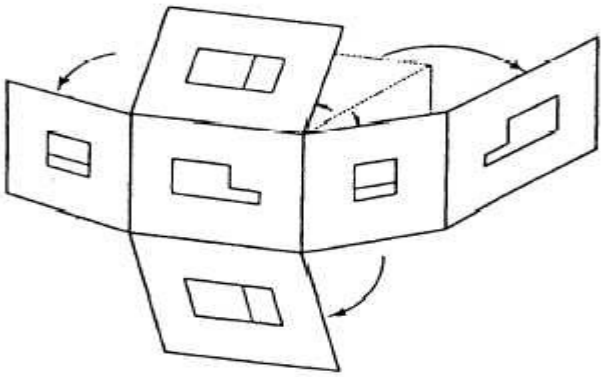
Lines are the basic communication tool used in blueprints. Listed below are examples of the most common lines used in blueprints today. Take the time to memorize each type of line and know its uses too.

LINE STANDARDS			
NAME	**CONVENTION**	**DESCRIPTION AND APPLICATION**	**EXAMPLE**
VISIBLE LINES		HEAVY UNBROKEN LINES USED TO INDICATE VISIBLE EDGES OF AN OBJECT	
HIDDEN LINES		MEDIUM LINES WITH SHORT EVENLY SPACED DASHES USED TO INDICATE CONCEALED EDGES	
CENTER LINES		THIN LINES MADE UP OF LONG AND SHORT DASHES ALTERNATELY SPACED AND CONSISTENT IN LENGTH USED TO INDICATE SYMMETRY ABOUT AN AXIS AND LOCATION OF CENTERS	
DIMENSION LINES		THIN LINES TERMINATED WITH ARROW HEADS AT EACH END USED TO INDICATE DISTANCE MEASURED	
EXTENSION LINES		THIN UNBROKEN LINES USED TO INDICATE EXTENT OF DIMENSIONS	

LINE STANDARDS			
NAME	CONVENTION	DESCRIPTION AND APPLICATION	EXAMPLE
BREAK (LONG)		THIN, SOLID RULED LINES WITH FREE-HAND ZIG-ZAGS USED TO REDUCE SIZE OF DRAWING REQUIRED TO DELINEATE OBJECT AND REDUCE DETAIL	
BREAK (SHORT)		THICK, SOLID FREE HAND LINES USED TO INDICATE A SHORT BREAK	
PHANTOM OR DATUM LINE		MEDIUM SERIES OF ONE LONG DASH AND TWO SHORT DASHES EVENLY SPACED ENDING WITH LONG DASH USED TO INDICATE ALTERNATE POSITION OF PARTS, REPEATED DETAIL OR TO INDICATE A DATUM PLANE	
STITCH LINE		MEDIUM LINE OF SHORT DASHES EVENLY SPACED AND LABLED USED TO INDICATE STITCHING OR SEWING	
CUTTING-PLANE LINE VIEWING-PLANE LINE		USED TO DESIGNATE WHERE AN IMAGINARY CUTTING TOOK PLACE USED TO INDICATE DIRECTION OF SIGHT WHEN A PARTIAL VEW IS USED	 
SECTION LINES		USED TO INDICATE THE SURFACE IN THE SECTION VIEW IMAGINED TO HAVE BEEN CUT ALONG THE CUTTING-PLANE LINE	
CHAIN LINE		USED TO INDICATE THAT A SURFACE OR ZONE IS TO RECEIVE ADDITIONAL TREATMENT OR CONSIDERATIONS	

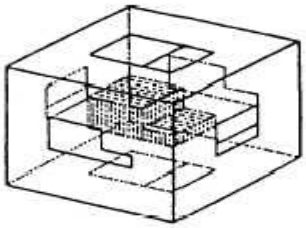
Orthographic Blueprints

Orthographic (ortho) views are two-dimensional drawings used to represent or describe three-dimensional objects. The ortho views represent the exact shape of an object seen from one side at a time as you are looking perpendicularly to it without showing any depth to the object.



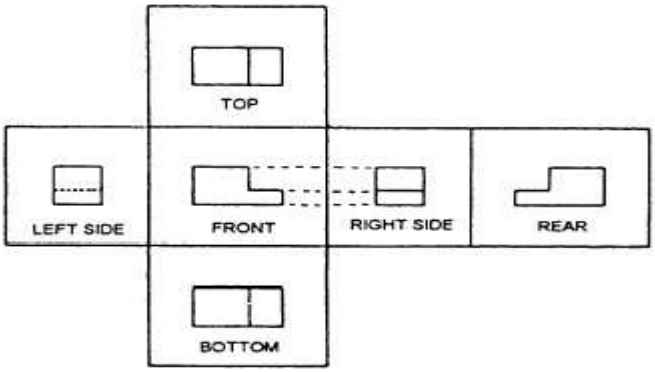
A

Primarily, three ortho views (top, front, and right) adequately depict the necessary information to illustrate the object. Sometimes, only two ortho views are needed as in a cylinder. The diameter of the cylinder and its length are the only dimension information needed to complete the drawing. A sphere only needs the diameter. It is the same from all angles and remains a perfect circle in the ortho drawing.

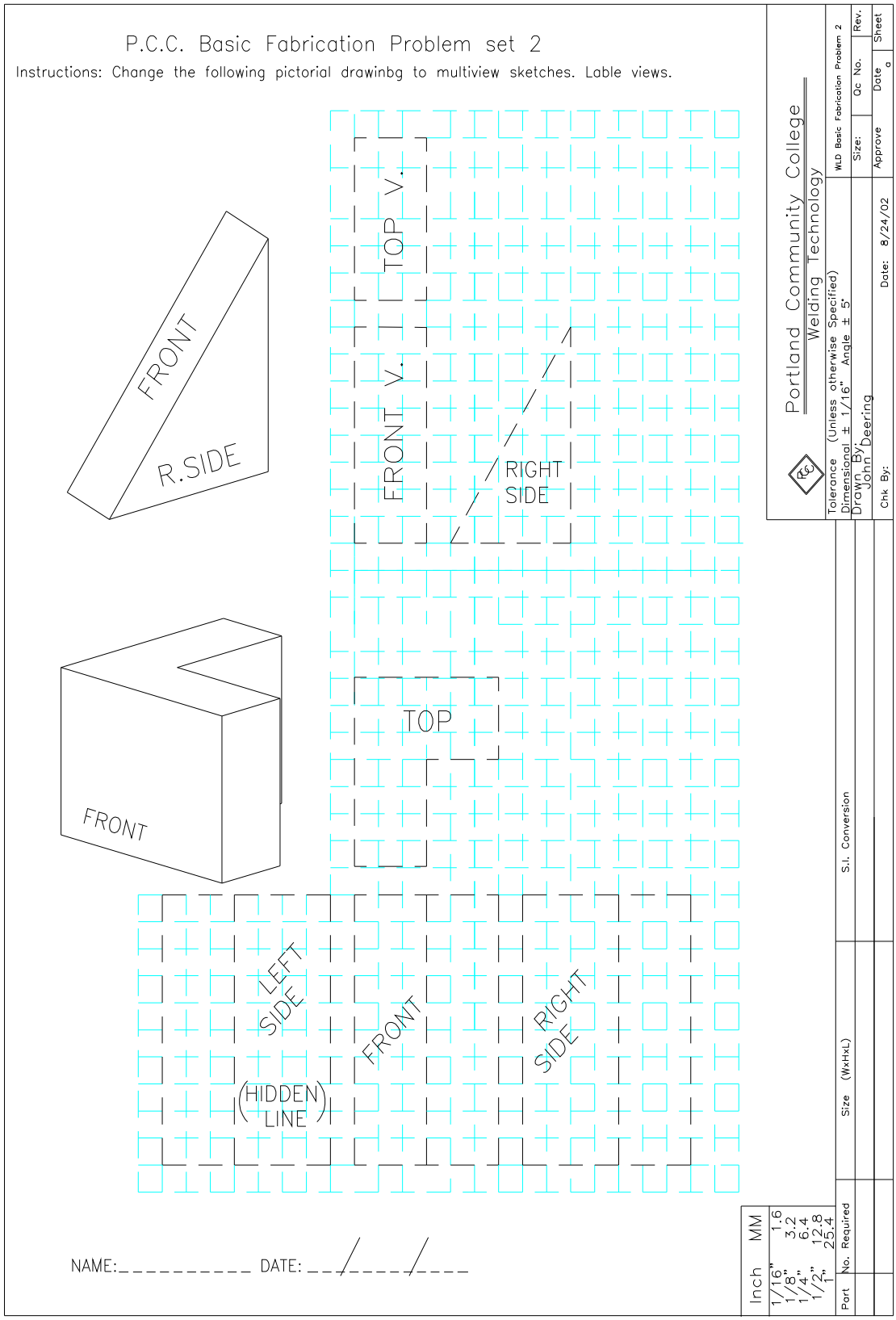


B

The "six" side method is a process of making six primary ortho views that represent the entire image. This method gives you all the information to create the object from different isometric views.



C


P.C.C. Basic Fabrication Problem set 2
Instructions: Change the following pictorial drawinbg to multiview sketches. Lable views.
FRONT
R.SIDE
FRONT V.
TOP V.
RIGHT SIDE
FRONT
TOP
LEFT SIDE
FRONT
RIGHT SIDE
(HIDDEN) LINE
NAME:_____ DATE: ___/___/____
Portland Community College
Welding Technology
WLD Basic Fabrication Problem 2
Tolerance (Unless otherwise Specified)
Dimensional ± 1/16" Angle ± 5'
Drawn By: John Beering
Date: 8/24/02
Chk By:
Size: Qc No. Rev.
Approve Date Sheet
S.I. Conversion
Size (WxHxL)
Part No. Required
Inch MM
1/16" 1.6
1/8" 3.2
1/4" 6.4
1/2" 12.8
1" 25.4

Pictorial Drawings to Orthographic Projections

In this section the student is to convert the pictorial drawing to an orthographic view by using the correct lay out technique.

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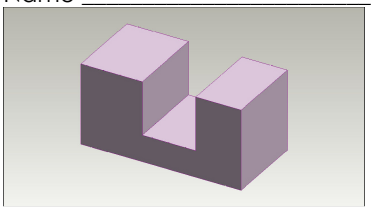
Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

Name _____ Date _____



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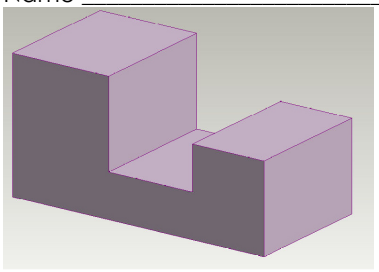
Welding Technology Class Project – Convert the pictorial drawing to an orthographic projection.

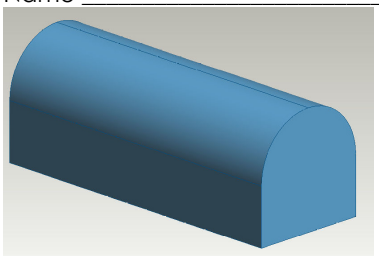
Name _____ Date _____



Portland Community College

Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

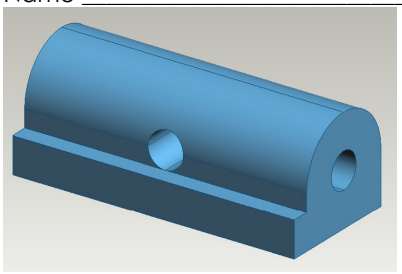
Name _____ Date _____



Portland Community College

Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

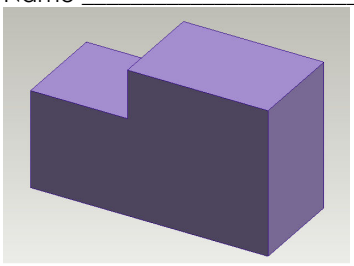
Name _____ Date _____



Portland Community College

Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

Name _____ Date _____



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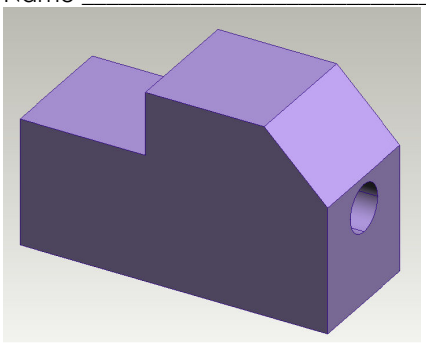
Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

Name _____ Date _____



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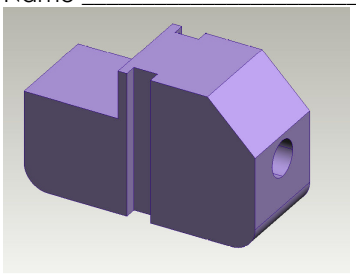
Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

Name _____ Date _____



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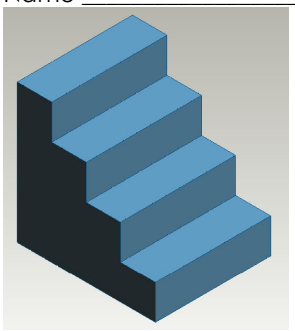
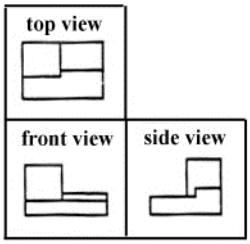
Welding Technology Class Project –
Convert the pictorial drawing to an orthographic projection.

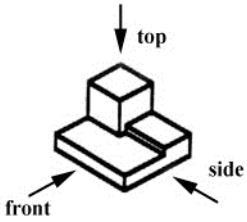
Name _____ Date _____



Orthographic Blueprints

Orthographic Views

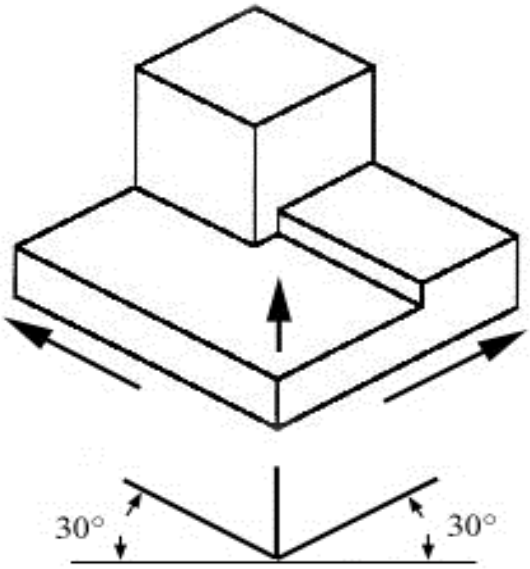


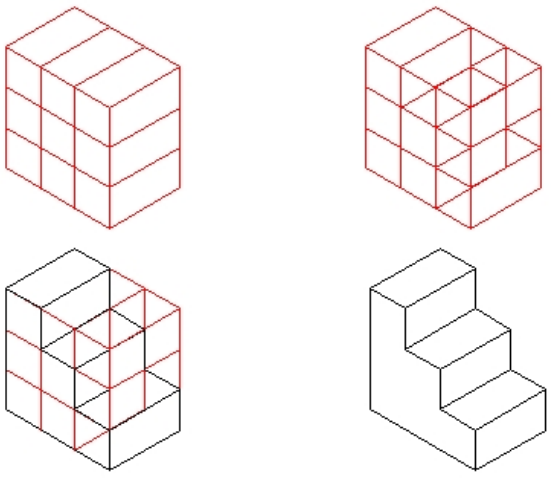


Isometric means "equal measurement". The true dimension of the object is used to construct the drawing. You get the true dimension from either orthographic views or by measuring the object. Because of the convenience of using actual measurements to create the isometric image, it has become the industry standard for parts manuals, technical proposals, patent illustrations and maintenance publications.

The height of the object is measured along vertical lines. The width and depth of the object are measured along the 30 degree to the horizontal plane.

Isometric Views





Isometric Construction Process

Orthographic Drawings to Isometric Projections

In this section the student is to convert the orthographic drawing to an isometric view by using the correct lay out technique

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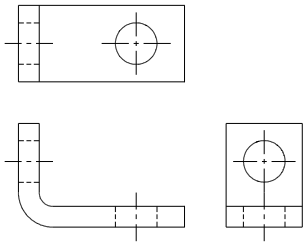
Welding Technology Class Project

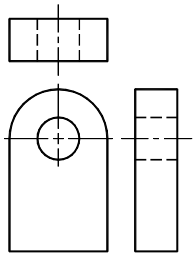
Name _____ Date _____



Portland Community College

Welding Technology Class Project

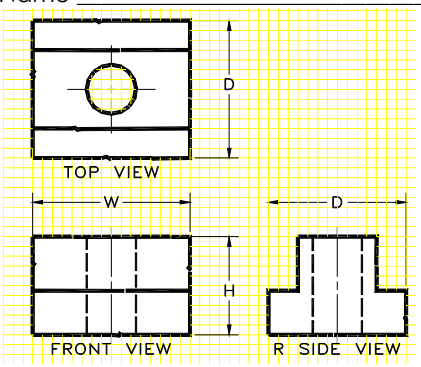
Name _____ Date _____



Portland Community College

Welding Technology Class Project

Name _____ Date _____



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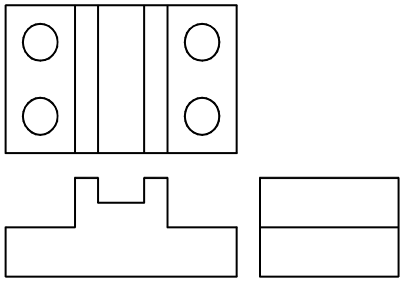
Welding Technology Class Project

Name _____ Date _____



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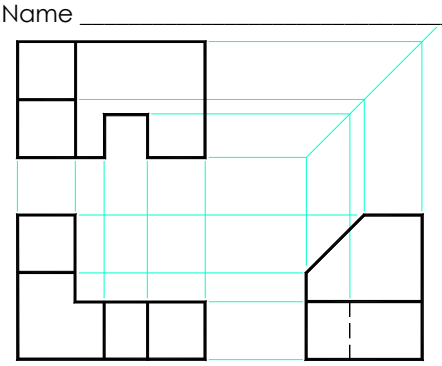
Welding Technology Class Project

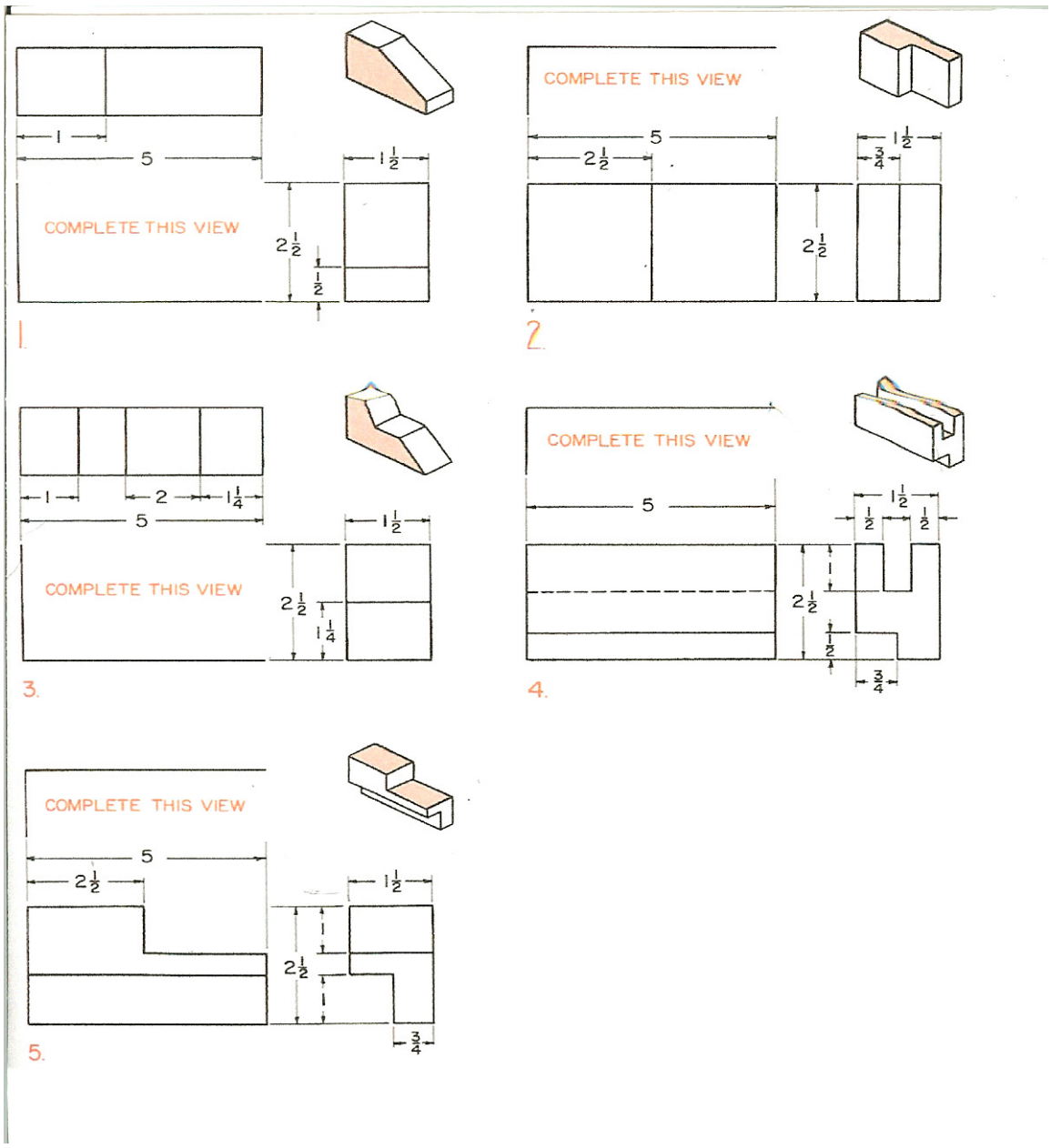
Name _____ Date _____



Ortho Completion

Name _____ Date _____

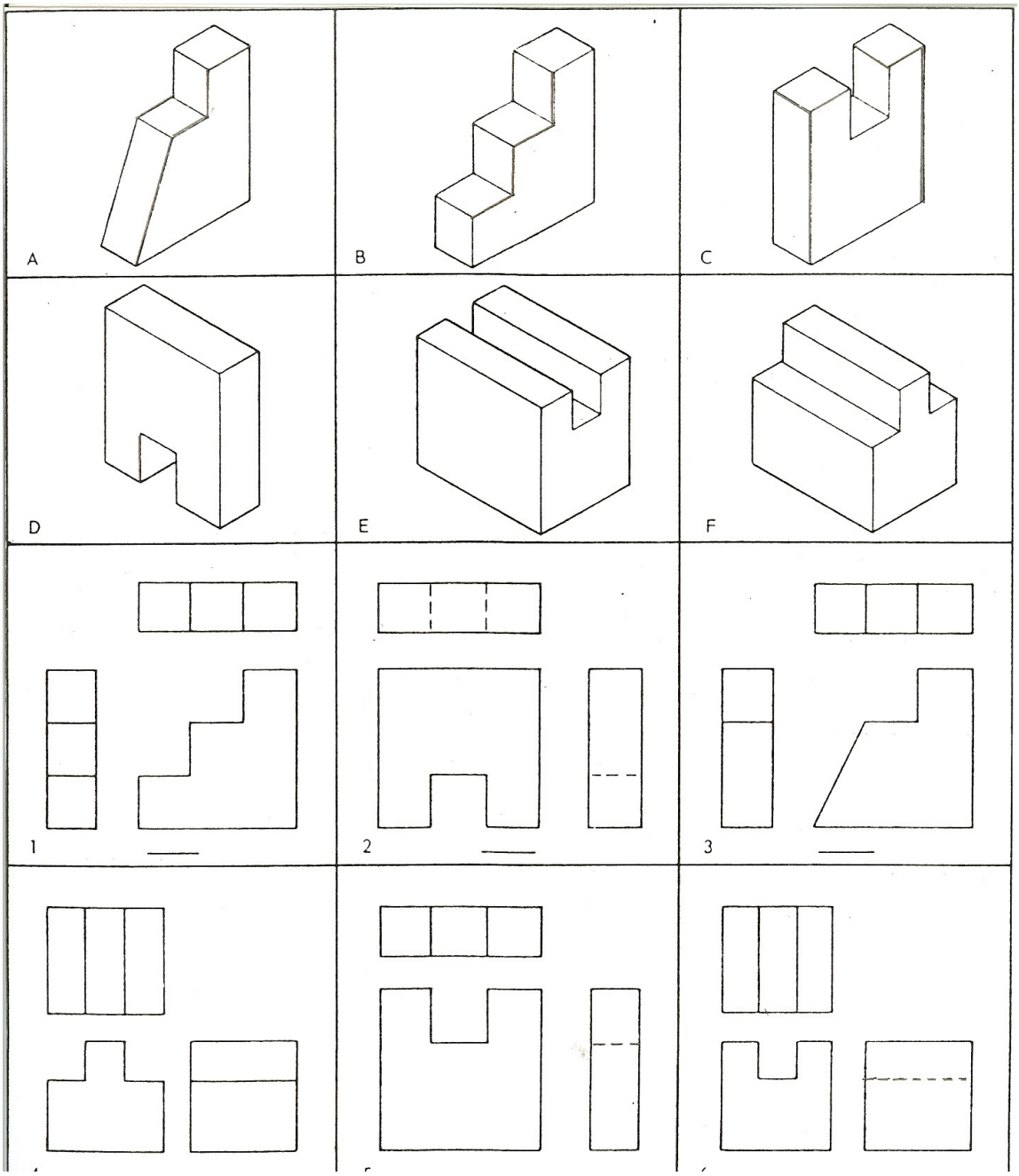
Complete the following drawings given the information



Matching the Drawings

Name _____ Date _____

Study the pictorial views and match each orthographic drawing with its pictorial drawing by inserting the correct letter in the space provided.



Welding Symbol

Information

Welding Symbols

The use of welding symbols enables a designer to indicate clearly to the welder important detailed information regarding the weldment. The information in the welding symbol can include the following details for the weld:

- Length,
- Depth of penetration
- Height of reinforcement
- Groove type
- Groove dimensions
- Location, process
- Filler metal
- Strength, number of welds
- Weld shape
- Surface finishing.

All this information would normally be included on the welding assembly drawings.

Indicating Types of Welds

Weld types are classified as follows:

- Fillets
- Grooves
- Flange
- Plug or slot
- Spot or protecting
- Seam
- Back or backing
- Surfacing

Each type of weld has a specific symbol that is used on drawings to indicate the weld. A fillet weld, for example, is designated by a right triangle.

Weld Location

Welding symbols are applied to the joint as the basic reference. All joints have an arrow side (near side) and another side (far side). Accordingly, the terms arrow side, other side, and both sides are used to indicate the *weld location* with respect to the joint. The reference line is always drawn horizontally. An arrow line is drawn from one end or both ends of a reference line to the location of the weld. The arrow line can point to either side of the joint and extend either upward or downward.

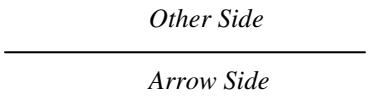
Location Significance of the Arrow

In the case of fillet and groove welding symbols, the arrow connects the welding symbol reference line to one side of the joint. The surface of the joint the arrow point actually touches is considered to be the arrow side of the joint. The side opposite the arrow side of the joint is considered to be the other (far) side of the joint.

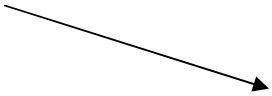
Parts of a Weld Symbol

The standard weld symbol consists of a reference line, an arrow and a tail.

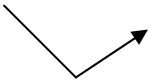
Reference Line
Reference line
Horizontally Only



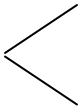
Arrow
The arrow is always
Drawn at an angle to
Reference line



Arrow with Break

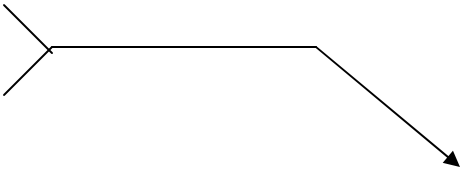


Tail

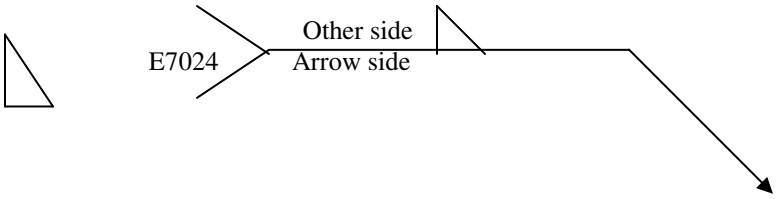


To include Specification
Process or other References

Standard Weld Symbol

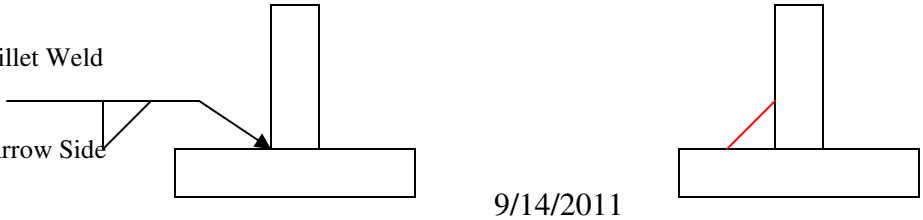


Symbol for a Fillet Weld
The symbol to be centered
On the reference line



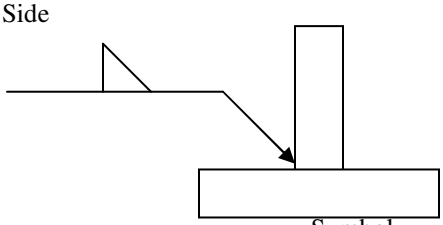
Fillet Weld

Arrow Side

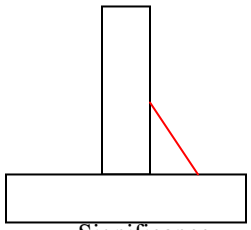


Symbol Significance

Other Side

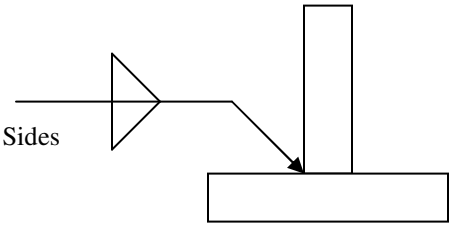


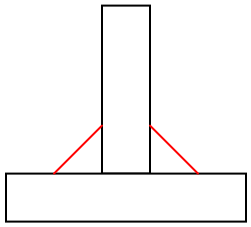
Symbol

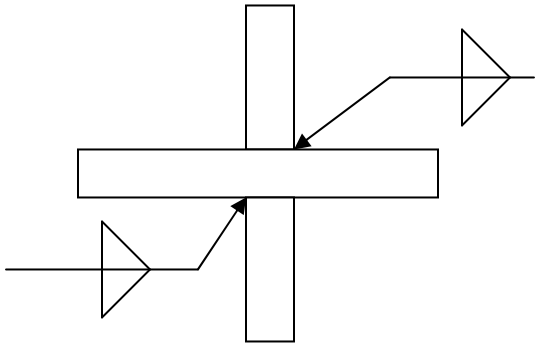


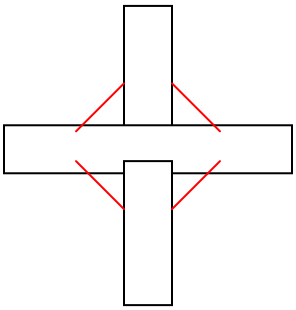
Significance

Both Sides

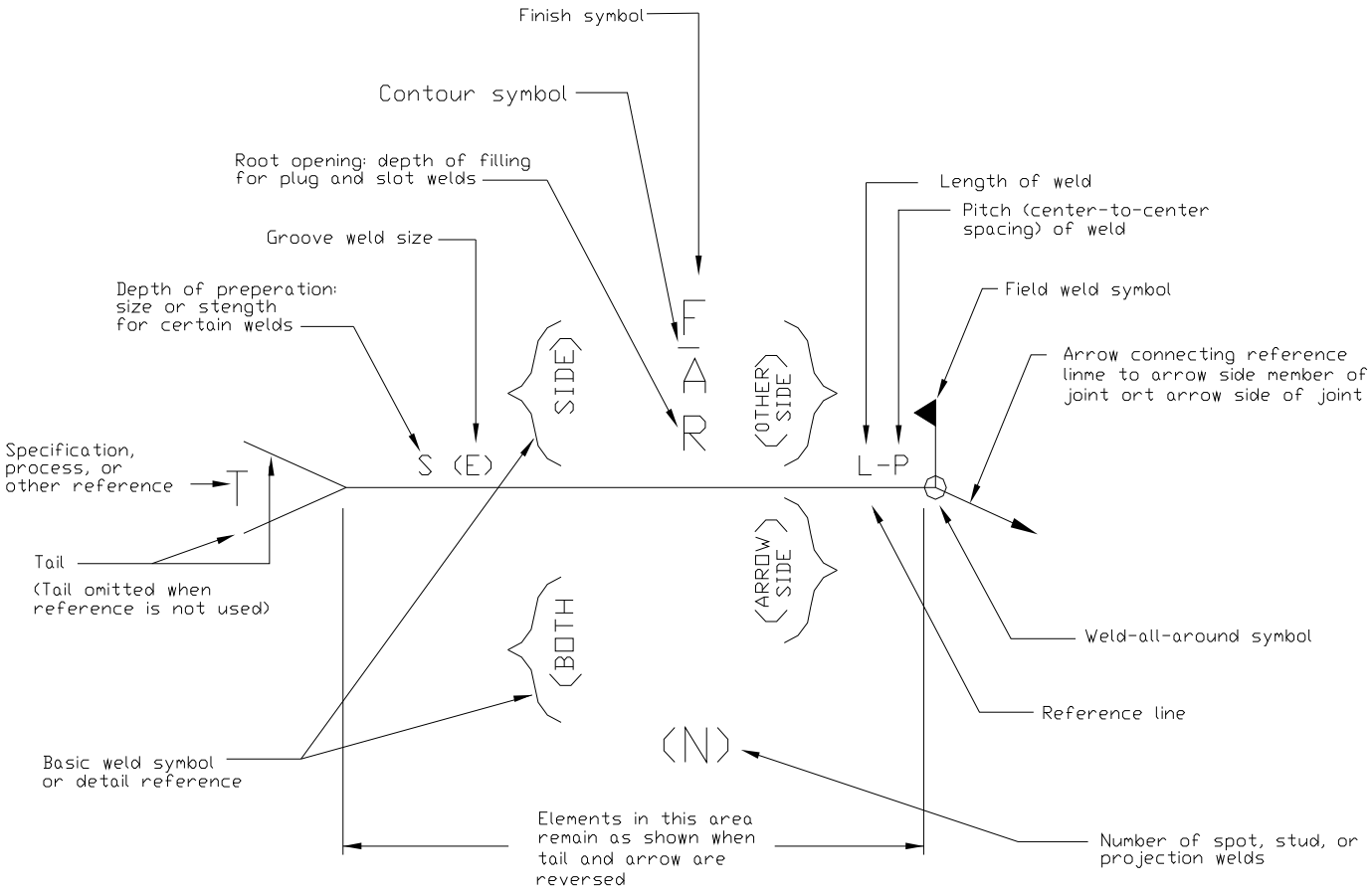








Location of Elements of a Welding Symbol

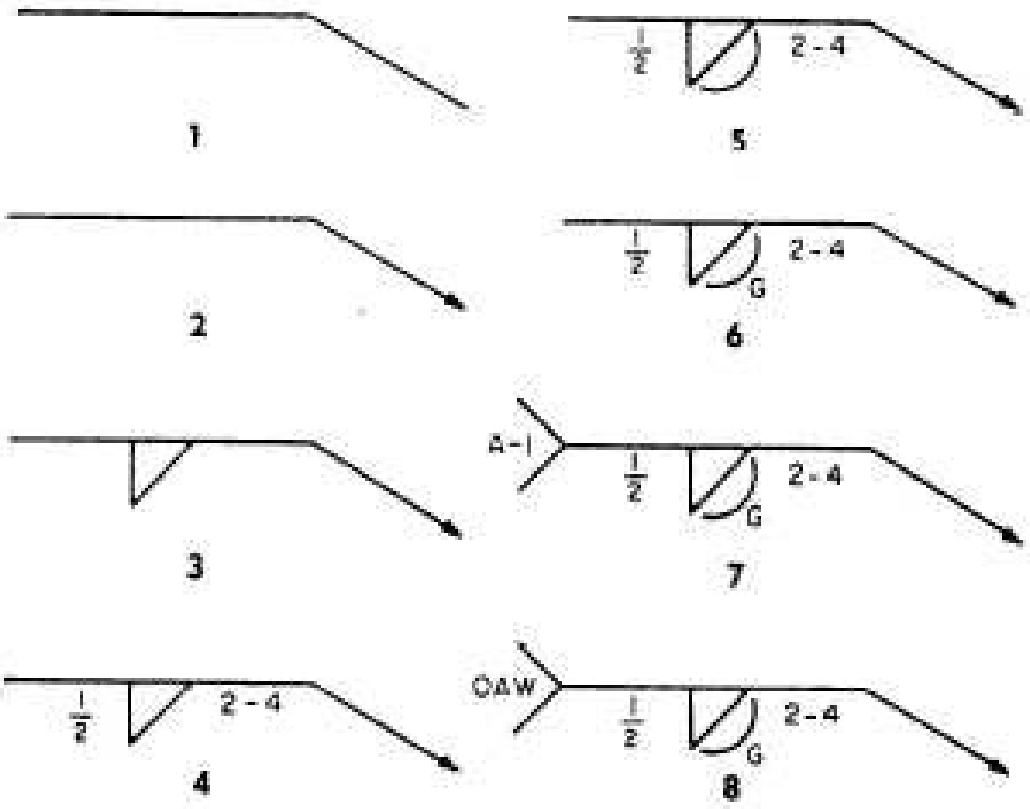


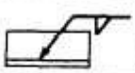
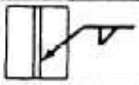
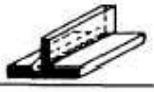
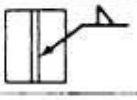
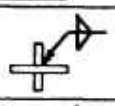
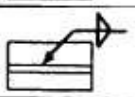
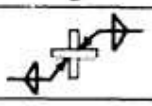
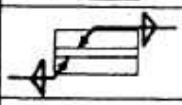
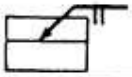
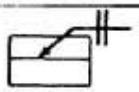
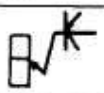
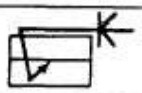
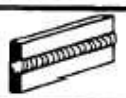
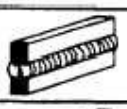
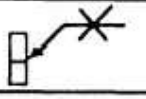
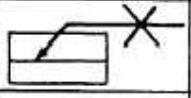
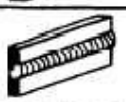
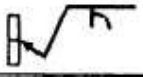
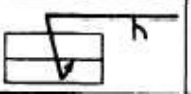
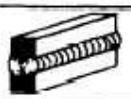
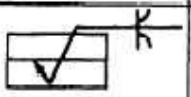
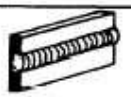
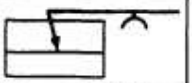
Part	No. Required	Size (TxWxL)	S.I. Conversion

Portland Community College
Welding Technology

Tolerance (Unless otherwise Specified) Dimensional ± 1/16" Angle ± 5°			WLD 111 Location of Elements of a Weld Symbol
Drawn By: John Deering	Size:	Qc No.	Rev.
Chk By: Date: 8/08/05	Approve	Date	Sheet

9/14/2011
Matt Scott


1
2
3
1/2
2-4
4
1/2
2-4
5
1/2
2-4
G
6
A-1
1/2
2-4
G
7
OAW
1/2
2-4
G
8

	APPLICATION	DESIRED WELD	SECTION OR END	ELEVATION	PLAN
SYMBOLS FOR FILLET, SQUARE GROOVE, AND BEVEL GROOVE WELDS	ARROW-SIDE FILLET WELD				
	OTHER-SIDE FILLET WELD				
	BOTH-SIDES FILLET WELD, ONE JOINT				
	BOTH-SIDES FILLET WELD, TWO JOINTS				
	ARROW-SIDE SQUARE GROOVE WELD				
	BOTH-SIDES SQUARE GROOVE WELD				
	ARROW-SIDE BEVEL GROOVE WELD				
	BOTH-SIDES BEVEL GROOVE WELD				
SYMBOLS FOR V-GROOVE, J-GROOVE AND U-GROOVE WELDS	ARROW-SIDE V-GROOVE WELD				
	BOTH-SIDES V-GROOVE WELD				
	ARROW-SIDE J-GROOVE WELD				
	BOTH-SIDES J-GROOVE WELD				
	ARROW-SIDE U-GROOVE WELD				
	BOTH-SIDES U-GROOVE WELD