Teacher's Key

- Means the answer opinion based

1. -
2. -
3. -
4. -
5. Slow Speed
6. Fast Speed
7. Excessive penetration, burn holes in material
8. Corner Joint
9. Lap Weld
10. Edge Weld
11. Fillet Weld
12. Butt Weld
13. -
14. Push
15. -
16. -
17. -
18. -
19. -
20. -
21. -
22. Speed too Slow
23. Arc Length too Long
24. Speed Too Fast
25. Current Too Low
26. Current too High

Name _____ Date __/__/__

Agriculture Mechanics

Developing Welding Technique

Part I: Establishing Welding Technique

1. Using the marker provided, draw a line in the box below that stretches from the far left side of the box to the far right side. Draw the line at a standard pace; try to keep it uniform throughout. **Only draw one line. Do not go back over it.**

Moderate Speed

2. Now, use the marker provided to draw a line at a high rate of speed across the box.

Fast Speed

3. Finally, use the marker provided to draw a line from each side at a very slow and deliberate pace.

Slow Speed

Believe it or not, you have just practiced welding technique. Welding with a stick welder is very similar to using a marker. The key difference is that when welding you should not make complete contact with the material as your marker did with the paper.

> Use your lines drawn above to answer the following questions about welding technique

4. When you were using your marker as a welding rod, did you drag or push it across the paper?

5. Of the 3 speeds above, which would produce a weld bead that is thick and short?

6. In welding, penetration is defined as how deep a weld extends into the material. For penetration to happen heat must be transferred to the metal for an extended period of time. Of these 3, which would have the *worst* penetration?

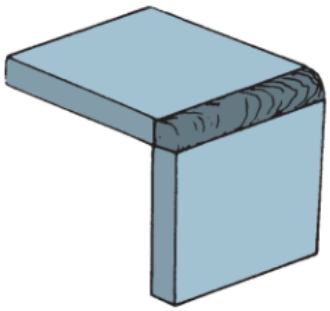
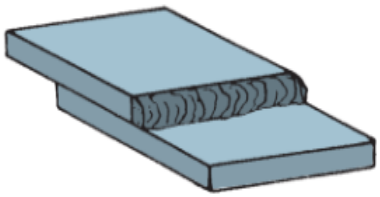
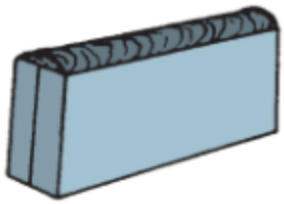
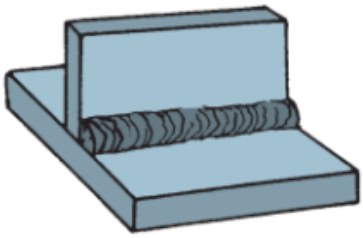
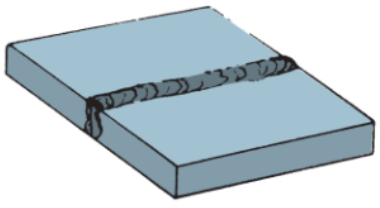
7. What could be some potential issues that could happen as a result of welding too slow and having too much penetration? *Hint: Remember it is heat that causes penetration.*

Part II: Types of Welds

> Read the definition of each weld and then match each picture to its corresponding definition.

Hint: Parallel means the pieces are side by side, perpendicular means that are going in different angles that form a 90 degree corner when connected. The face of a material is large, the edge is the small side.

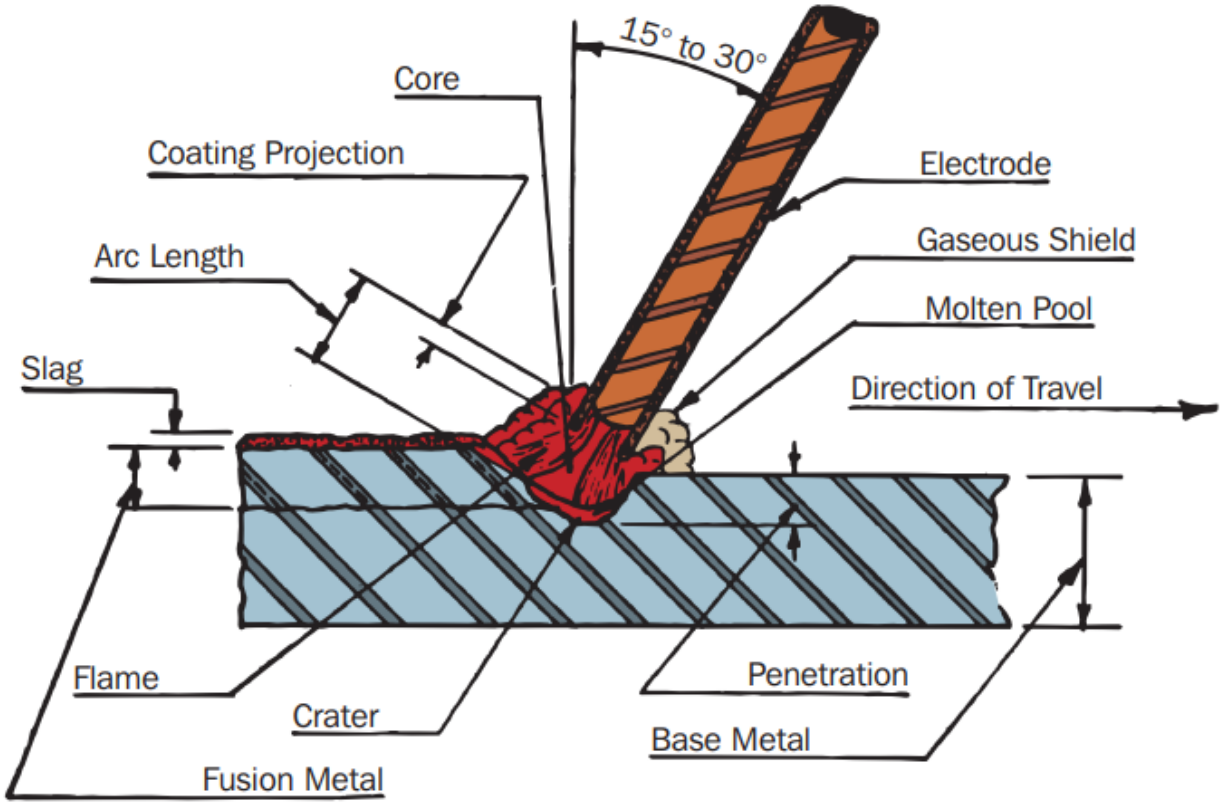
- ❏ Butt Weld- Weld where 2 pieces of material are parallel and touching and then welded where the faces connect.
- ❏ Corner Joint- Weld where 2 pieces of material are perpendicular but not touching and are welded on their edge
- ❏ Edge Joint- Weld where 2 pieces of material are parallel and touching and then welded where the edges connect.
- ❏ Fillet Weld- Weld where a standing piece is held perpendicular on top of a base piece in the shape of an upside down T
- ❏ Lap Joint- Weld where a piece of material overlaps another and is then welded on the edge of one material and face of another

		
8. _____	9. _____	10. _____
		
11. _____	12. _____	

Part III: SMAW & GMAW Welding Techniques

> Read the excerpt below then use the information to draw each requested weld.

An old saying among welders is “If it slags it drags.” Slag is a material left on top of welds when performing SMAW (Shielded Metal Arc Welding). Slag is a byproduct of flux. Flux is a mixture of metals found on the outside of welding rods (stick welding) and the inside of flux core wires (MIG welding). Slag should be knocked off with a hammer/chisel after the weld has cooled. The saying, “If it slags it drags,” means that when using the SMAW welding process, you should drag the welding rod or MIG gun from the 1st point to the 2nd point as opposed to pushing. See the diagram below for reference on this technique.



13. Using the technique highlighted in the picture above and referenced in the text, weld a line with your marker in the box below. Attempt to make your weld as uniform as possible. This will be simulating an SMAW weld, so remember “If it slags is drags.”

14. The process of GMAW (Gas Metal Arc Welding) does not create slag. GMAW is what is performed when using Argon gas on a MIG welder with copper wire. With this in mind, since it does not slag should you drag or push the MIG gun in GMAW?

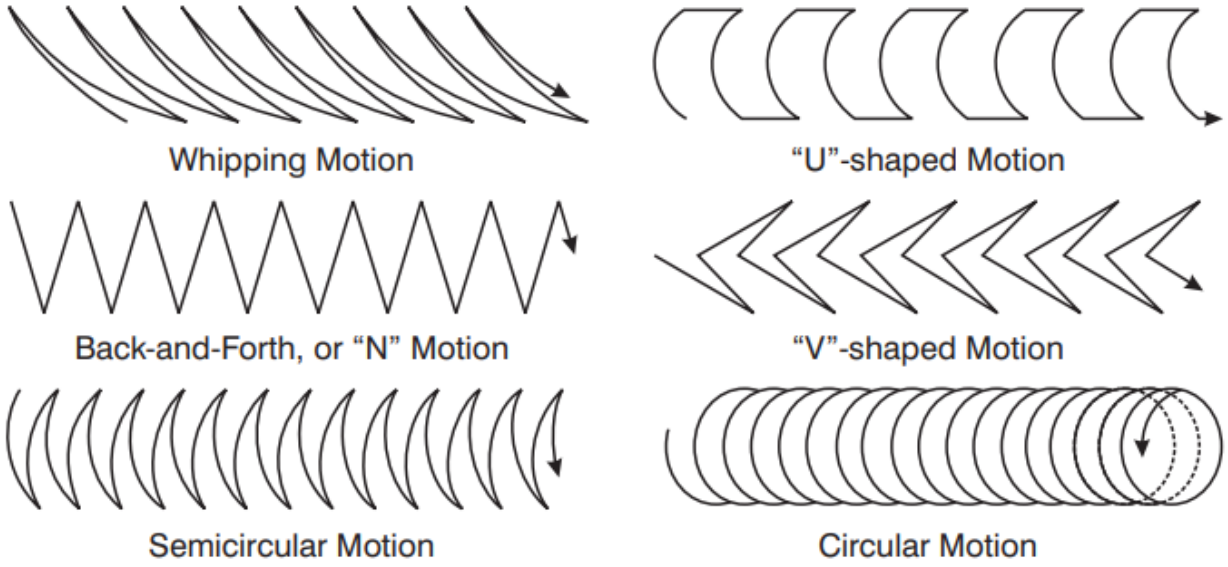
15. Using your marker, practice using the proper technique for GMAW

16. Which method do you think created the most uniform weld? Dragging SMAW or pushing GMAW?

Part IV: Developing Advanced Welding Techniques

> Read the excerpt below then use the information to draw each requested weld.

Welding is very much a personal skill. What works for one welder may not work for another. Thus, it is important to practice multiple styles and find which one allows the welder to function with the best comfort. One of the most developed techniques is movement styles. For welders who struggle with creating uniform beads, they may try more intricate movement styles in order to force themselves to slow down or develop rhythm. There are pictures of 6 common movement styles practiced below.



> Choose 4 of the 6 movement styles from the previous page and practice them in the boxes below with your marker. Challenge yourself to maintain uniform thickness with the line you are drawing.

17. Movement Style = _____

18. Movement Style = _____

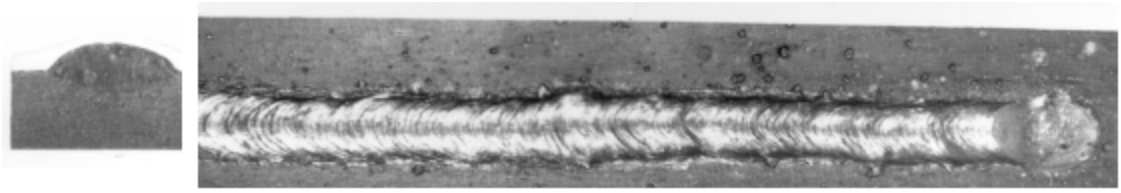
19. Movement Style = _____

20. Movement Style = _____

21. Which movement style do you think allowed you to create the most uniform weld?

Part V: Evaluating Welds

>Here is a weld with proper settings and speed

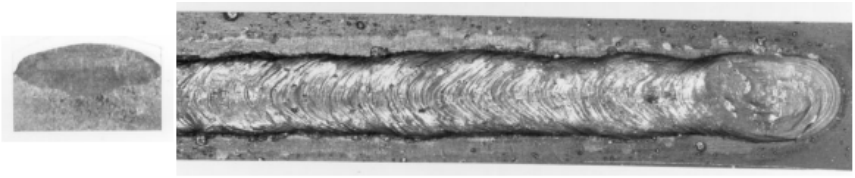


> Read the definition of each weld defect and then match each picture to its corresponding defect.

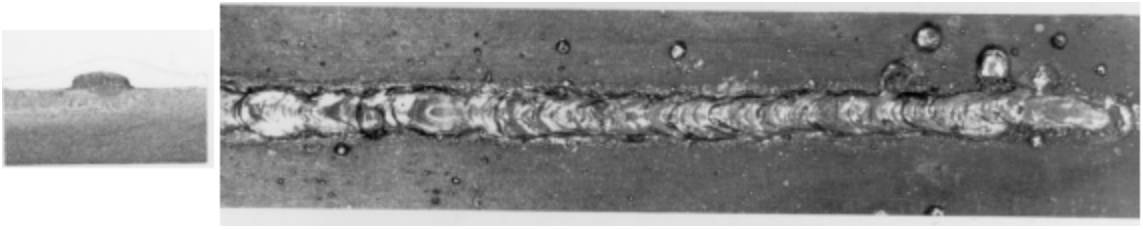
Hint: Spatter are dried drops of molten metal that appear to the side of the weld

- ❏ Arc Length Too Long- Creates a short and skinny weld with moderate amounts of spatter
- ❏ Current Too High- Creates a short and fat weld with excess penetration, lots of spatter
- ❏ Current Too Low- Creates a tall and skinny weld with poor penetration that sets on top of the material piece, no spatter
- ❏ Welding Speed Too Fast- Creates a skinny weld that is not uniform in penetration and and spatter
- ❏ Welding Speed Too Slow- Creates a short and very fat weld with excessive penetration, no spatter

22. _____



23. _____



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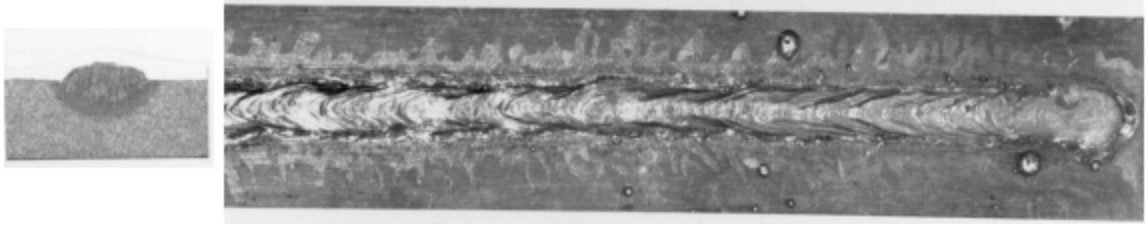

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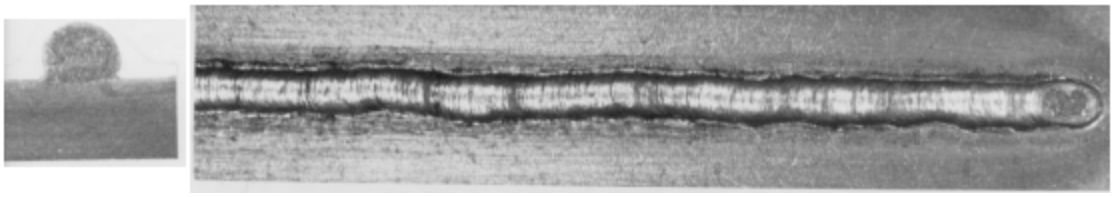

26. _____