**Metal Stock Identification**

**Description**

Metal is produced in many different types, shapes, and forms. This activity plan provides examples of stock forms that might be found in a metal shop. Many of these shapes are common to all shops, while others are less frequently available. Almost all of the stock forms used in a metal shop are available in steel, and most are also available in other non-

ferrous metals. Students will gain experience identifying different stocks and classifying them appropriately.

## Lesson Objectives

The student will be able to:

* Identify stock types visually
* Use the proper names for stock types
* Properly identify stock by shape and dimensions
* Categorize the stock by metal type

## Assumptions

The teacher should:

* Have experience differentiating stock types by shape, size, and type of metal
* Ensure that the metal shop is supplied with many types of stock for this activity The student should:
* Have experience determining metal type
* Have a basic understanding that material comes in different shapes and sizes
* Have the ability to measure and determine dimensions of materials

## Terminology

**Dimensions**: measurements of width, depth, length, thickness, or wall thickness.

**DOM**: structural tubing that is different from pipe.

**Ferrous**: a metal that contains iron and is often magnetic.

**Galvanized**: steel that is coated, usually in zinc, to prevent oxidation/rust.

**Gauge**: thickness measurement of sheet stock.

**Grade**: a term for the quality of the material. Often refers to hardness or strength.



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**Metal**: a solid material that is hard, fusible, and workable and usually conducts heat and electricity.

**Metal stock**: material in the specific shape, size, and length in which it comes from the supplier.

**Non-ferrous**: a metal that doesn’t contain iron and is not magnetic.

**Schedule 40/80**: pipe wall thickness.

**Web**: thickness of angle/I beam.

## Estimated Time

1–1.5 hours

## Recommended Number of Students

20, based on the *BC Technology Educators’ Best Practices Guide*

## Facilities

Secondary school metal shop or equivalently equipped technology education shop

## Tools

* + Whiteboard
  + Overhead or data projector
  + Computer
  + Micrometer
  + Vernier caliper
  + Sheet metal gauge
  + Scale

## Materials

* + Worksheets
  + Samples of stock types to identify
  + Writing implement

## Resources

Metal Supermarkets website: <http://metalsupermarkets.com/>

*Modern Metalworking*, textbook by John R. Walker

**Teacher-led Activity**

1. Describe and define metal stock.
2. Explain that stock comes in many different shapes, sizes, and metal types.
3. Outline the main characteristics by which metal stock is categorized:
   1. Metal type – the type of metal (e.g., aluminum, stainless steel, brass)
   2. Material shape – the shape that the metal is formed in (e.g., tubing, pipe, sheet); also considering whether the material is solid or hollow. Explain the difference between tube, pipe, hollow bar, and between drill rod, shafting and round bar.
   3. Grade – the quality of the material; most school shops use the lowest grade for their supply.
   4. Dimensional size – the size of the material; sometimes multiple dimensions, including width, thickness, wall thickness, and length
4. Get students started on the stock type identification activity.

## Student Activity

1. Students will move from station to station with a worksheet to identify material stock based on their characteristics.
2. Stations will be set up with many of the common stock types from the shop, including samples that are:
   1. Multiple different metal types
   2. Hollow, solid, and sheet
   3. Various shapes and sizes
   4. Common and rare
   5. Different grade levels
3. Students will fill out the worksheet based on their observations of the five characteristics above.

## Assessment

Consider co-creating the assessment criteria with your students at the beginning of the activity/ project. You may want to include the following:

* Worksheet completion: worksheet is complete and neatly filled out.
* Observations: all tests were completed accurately and data was noted.
* Summary: information was accurate and complete.

## Student Metal Stock Information Sheet

Use the following information to complete the Identifying Metal Stock activity.

### Metal Types

1. Hot rolled steel
2. Cold rolled steel
3. Tool steel
4. Alloy steel
5. Stainless steel
6. Aluminium
7. Copper
8. Brass
9. Bronze
10. Galvanized (usually sheet stock)

### Stock Shapes

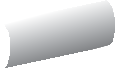
Consider if the stock is hollow, solid, or sheet (Figure 1).

### Grade

Most school shops use utility grade for all material, except when building specialty projects requiring specific steel alloys, tool steel, or aluminum alloys.

### Dimensions

Stock may be measured in a variety of dimensions, including width, thickness, wall thickness, and length. Pipe is measured by the inside diameter. Sometimes there will be two different widths (one could be called depth), as in the case of tubing, angle iron, and channel. Weight is important as it helps identify and price most metals, particularly precious metals. Web thickness is important in angle, channel and I-beam. There are also some very specific dimensions that are used with some sheet materials, like expanded metal or tread plate, which you will have to ask your teacher to help you with.



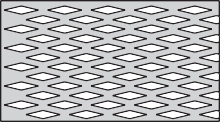
Round bar

Rectangular bar

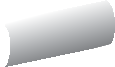
Square bar Hexagonal bar



Channel

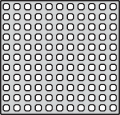


Expanded metal



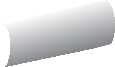
Pipe

I-beam Angle iron Sheet

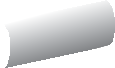
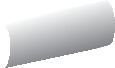
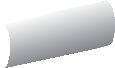




Perforated sheet Plate Tread plate



Round tube Square tube Rectangular tube



Hollow bar Shafting Drill rod

Mesh sheet

Precision ground stock

**Figure 1—**Stock Shapes

Metal Stock Identification

Metal Work-Introduction to Metal Work

**Student Activity:**

**Identifying Metal Stock Name(s):**

**Instructions**

You and your partner(s) must move from station to station and identify the stock form characteristics of the metal sample at each station based on the categories in the Student Metal Stock Information Sheet.

After completing your observations, summarize your data gathered on each sample. Please ensure that you are summarizing in full sentences.

### Station ID # Observations (What can you see?)

|  |  |
| --- | --- |
| **Common Characteristics** | |
| Metal type |  |
| Hollow/solid/sheet |  |
| Stock shape |  |
| Grade |  |
| Dimensions |  |

**Summary (What metal is it and why?)**

**Metal Stock Identification Metal Work – Introduction to Metal Work**

**Station ID # Observations (What can you see?)**

|  |  |
| --- | --- |
| **Common Characteristics** | |
| Metal type |  |
| Hollow/solid/sheet |  |
| Stock shape |  |
| Grade |  |
| Dimensions |  |

**Summary (What metal is it and why?)**

**Station ID # Observations (What can you see?)**

|  |  |
| --- | --- |
| **Common Characteristics** | |
| Metal type |  |
| Hollow/solid/sheet |  |
| Stock shape |  |
| Grade |  |
| Dimensions |  |

**Summary (What metal is it and why?)**