Objective

■ Have a working knowledge of coordinate system

■ Understand quadrants of coordinate system

■ Gain a working knowledge of machine geometry and axis orientation
Real Number System

- Uses numbers 0 to 9
- Can be in any combinations
  - 2 or +2
  - -3
  - 1/8, 1-3/16
  - .185, 3.5
- All real numbers can be placed on a number line
Rectangular Coordinate System

- Cartesian Coordinate System
- A given point can be defined on a plane with two coordinate values
- A given point can be defined in space with three coordinate values
- When two number scales intersect at right angles it creates a rectangular coordinate system which makes three important terms
  1. Axes and Planes
  2. Origin
  3. Quadrants
  4. Right hand coordinate system
1. Axis and Planes

- Each major line of the number scale is an axis
- It could be in vertical or horizontal
- Axis is a reference for numbers in given direction

- Plane is a 2D entity
- It is the right angle view of two number scales
- It may vary between CAD/CAM and CNC programs
2. Origin

- An origin is the point where zero coordinates in each axis intersect

- X0Y0 on a plane - X0Y0Z0 in space

- NOTE: in CNC programming the origin is called the program reference point
  
  This may also differ from the CAD origin
3. Quadrants

- Quadrants are the four parts of a plane formed by a system of rectangular coordinates.
- Quadrants are defined by roman numerals.

![Graph showing the four quadrants with their respective signs and origin at (0, 0).]
4. Right Hand Coordinate System

- Based on the fact that all numbers to the right and up are positive and the opposite direction are always negative.
- CNC machines are normally programmed using absolute coordinate methods.
- This follows that the origin in X0Y0Z0.
- All movements will follow this rectangular coordinate systems.
Machine Geometry

- Machines use the coordinate system
- The basic axis for machines are X, Y, and Z
- Typically the Z axis is the axis that could make a hole with a simple point tool
Mill Axes
Lathe Axes
Homework
Alpena Community College TAACCCT Grant

- “Lesson 2” by Andrew Paad, Building Career Pathways in the STEM Cluster: Closing the Skill Gaps in Northeast Michigan, Alpena Community College is licensed under CC BY 4.0. To view a copy of this license, visit https://creativecommons.org/licenses/by/4.0/.

- ACC is sponsored by a $2.5 million grant from the U.S. Department of Labor, Employment & Training Administration TAACCCT Grant #TC-26458-14-60-A-26. It is the policy of Alpena Community College (ACC) to comply with Section 504 of the Rehabilitation Act of 1973, as amended, and with the Americans with Disabilities Act of 1990 (ADA). These acts provide for equal opportunity for students with disabilities in educational activities, programs, and facilities. ACC is committed to affording equal opportunity to persons with disabilities by providing access to its programs, activities, and services.

- This workforce product was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.