Chapter 15 - Drawing with Coordinates

DRAWING LINES USING COORDINATES

KNOWLEDGE AND UNDERSTANDING
After completing this module, you will know and understand the theory regarding:
- x and y coordinates on a Cartesian Plane.
- absolute and relative coordinate entry methods for drawing straight lines

APPLICATION OF KNOWLEDGE
After completing this module, you will be able to:
- create orthographic straight line CAD graphics by using absolute coordinate entry.
- create orthographic straight line CAD graphics by using relative coordinate entry.

ASSESSMENT
After completion of this module, you will be assessed on:
- your knowledge and understanding of coordinates on a Cartesian Plane.
- your ability to create orthographic straight line CAD graphics by using absolute coordinate entry.
- your saved and printed drawing (Drawing Tutorial 10G and 10H)
- your updated portfolio. Marks will be given for neatness, completeness, correctness and presentation. (Refer to the chapter on portfolios for further details.)
**USING AUTOCAD**

**THE COORDINATE SYSTEM**

The User Coordinate System (UCS) forms the heart of all AutoCAD coordinate drawing. You can switch on the UCS icon from the View menu under the “Display” tab. The standard display for 2D drawing is the World View which can be identified with the letter “W” on the icon. The “+” on the icon identifies the origin of the X and Y axes. The arrows indicate the directions of the positive axes for X and Y.

When the drawing window is panned so that the origin is outside of the viewport, the UCS icon will jump to the bottom left of the page and the “+” will not be shown.

The actual coordinates of the cursor position can be seen at all times in the notification area at the bottom left of the screen. There are three values being displayed, separated by commas. The value of the Z-axis coordinates will stay at 0 as long as you are drawing in 2D.

**DRAWING WITH ABSOLUTE COORDINATES**

You have already used this method once when you drew the rectangle for your template. The values of the X and Y coordinates are entered on the command line, separated by a comma. The point 10,30 for example, is a point 10 mm to the right of the origin and 30 mm above it. All values are always measured from the origin.

To draw a line, click on the line icon and type the exact coordinates of the point where the line must start. Enter it. For the next point, type the exact coordinates of the next point (measured from the origin) and enter. Continue for each new point by just entering the coordinates.

The entire drawing can be completed without touching the mouse. It does require that you do some calculations though. Keep your calculator handy and write the coordinates onto the drawing in your text book before you start.

**DRAWING WITH RELATIVE COORDINATES**

Drawing with relative coordinates requires much simpler calculations. Measurement are not taken from the origin, but from the previous point. To tell AutoCAD that you want to use relative coordinates you use the @ symbol. (Press Shift 2).

If you type @10,30 on the command line, it means that you want to move the cursor 10 mm to the right of the previous point and 30 mm higher than the previous point. To draw horizontal lines, the y-value must always be 0. (For example @30,0.) To draw vertical lines, the X-value must always be 0. (For example @0,40.)

To draw a line, the first point must be located with absolute coordinates. Thereafter, relative coordinates can be used.

**USING ALUCAD**

**THE COORDINATE SYSTEM**

AllyCAD displays the coordinates of the cursor position in the notification area at the bottom right of the screen. The first number indicates the X-coordinate and the second the Y-coordinate of the point. The origin of the coordinate system is located at the centre of the drawing page. The positive x-axis is to the right of this point and the positive Y axis upwards. Move the cursor and note the changes to the coordinate display.

The position of the origin can only be changed by making use of the surveyor coordinate system. To make it easier for yourself, go to the “Settings” menu and click on “Drawing Settings”. In the dialog box, click on the “Surveyor” selection box and then on the “Surveyor Setup” button. Fill in the values exactly like those on this picture and click OK. When prompted for a value, click on the bottom left of your drawing template. This point is now your new origin.
DRAWING WITH ABSOLUTE COORDINATES

AllyCAD uses the “U” key on the keyboard to jump the cursor to a specific position relative to the origin. You have already used this method once when you drew the rectangle for your template. The values of the X and Y coordinates are entered on the command line, separated by a space. The point 10 30 for example, is a point 10 mm to the right of the origin and 30 mm above it. All values are always measured from the origin.

To draw a line, click on the line icon, hit the “U” key and type the exact coordinates of the point where the line should start. Remember to separate the X and Y values with a space each time. Enter it twice. The first enter moves the cursor and the second enter fixes the line position. For the next point, hit the “U” key again and type the exact coordinates of that point (measured from the origin) and enter twice again. Continue for each new point by hitting the “U” key and entering the coordinates.

If you forget the “U”, AllyCAD will think that the numbers you are entering are predefined views. Use “Zoom All” to see your page. You can then use the “Undo” if necessary and then snap to the last point to continue.

AllyCAD also has other snaps that can be used to simplify your drawing experience. (Refer to the chapter on object snapping.)

The entire drawing can be completed without touching the mouse. It does require that you do some calculations though. Keep your calculator handy and write the coordinates onto the drawing in your text book before you start.

DRAWING WITH RELATIVE COORDINATES

To draw with relative coordinates, you use the same technique that you used for the “Ortho” exercise. Use the arrow keys to indicate the direction in which you want to draw and type the distance that you want to move at the prompt. Enter once to move the cursor and enter a second time to fix the new line point.

To draw a diagonal line, for example, you can enter once after moving horizontally, then move the cursor vertically and enter twice. To draw a line, the first point must be located with absolute coordinates. Thereafter, relative coordinates can be used.
TIME ALLOCATION: 30 MIN

1. Start a new drawing using the template you created in 10A.
2. Name it and save it in the correct location.
3. Update your title block.
4. Choose an appropriate scale.
5. This is a no-mouse exercise. Use your keyboard only!
6. Draw the Transition Piece shown on the next page by using Absolute Coordinates.
7. Make sure that you save regularly.
8. Show all dimensions.
9. Adhere to the SANS regarding mechanical drawing.
10. Print and save the final drawing.
11. Update your portfolio.
Drawing Tutorial 10G

Absolute Coordinates

Transition Piece

Name of Learner

Name of FET Institution

Scale

Date
Drawing Tutorial 10H: Relative Coordinates – Transition Piece

**TIME ALLOCATION:** 30 MIN

1. Start a new drawing using the template you created in 10A.
2. Name it and save it in the correct location.
3. Update your title block.
4. Choose an appropriate scale.
5. This is a no-mouse exercise. Use your keyboard only!
6. Draw the Transition Piece shown on the next page by using Relative Coordinates.
7. Make sure that you save regularly.
8. Show all dimensions.
9. Adhere to the SANS regarding mechanical drawing.
10. Print and save the final drawing.
11. Update your portfolio.