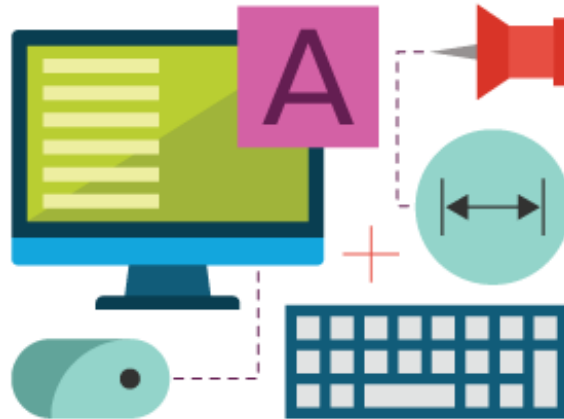# Text and Dimension Fundamentals

AutoCAD Blocks and Layers : Text and Dimension Fundamentals

Lesson 1 Overview

More often than not, a drawing will require more than just objects to fully describe all of the information that the drawing is meant to convey. Text is used to add labels, notes, numbering, dimensions, and tables to drawings to communicate their intent fully. In this lesson, you'll learn how to add single lines of text to drawings using the TEXT command, add multiple lines of text using the MTEXT command, manipulate text styles and fonts, and change the properties of text in your drawings. Then you'll learn how to create and work with tables in AutoCAD, and how to use an AutoCAD template to both simplify and standardize your layouts.

The second half of this lesson focuses on how to add dimensions to objects in AutoCAD. You'll learn how to draw single linear dimensions

using the DIMLINEAR command, as well as how to automate the drawing of multiple linear dimensions at once utilizing the QDIM command. You'll also gain an understanding of how to add dimensions to nonlinear objects such as angles, arcs, and circles. The concept of *ordinate dimensions* is also introduced as a method to further enhance the range of options for dimensioning your drawings.

1.1 Explain how to change text fonts, styles, and properties in AutoCAD

Text Properties

READING ASSIGNMENT

Read this assignment. Then, read Chapter 7 of your textbook.

This section introduces you to some basic methods to add annotations to your drawings. *Annotations* are basically textual descriptions that are added to a drawing to identify things like the type, size, and location of objects, or to add additional information that may be required to relay information on design or construction and manufacturing requirements. The most common types of annotations that you'll create in AutoCAD are *text, dimensions,* and *hatching.* **Hatch** is technically a Draw command as opposed to an Annotation command, so replace with leaders and tables.

Multiple annotation styles may be used in a single drawing to make it easier for the viewer to identify separate elements and save different text settings for use in your drawings, such as font, size, type, orientation, justification, and more. For example, you could define a style called "General Notes," which uses a ⅛-inch text height in the *Arial*

regular font; you could define a different style called "Title Text," which uses a ½-inch text height in the *Arial bold* font. You can also define special characters that aren't found on your keyboard but are commonly used in drawings (such as the degree symbol).

There are two basic ways in which text can be placed into a drawing: *single-line* and *multiline.* As its name implies, single-line text results in one continuous line of text characters, with numerous options for placing the text and multiple fonts and styles to choose from. *Multiline* text uses a special text editor to create and place multiple lines of text within a drawing. This option allows you to choose a window on the screen into which the text will be placed. The size and shape of the box will determine the number of lines of text that will be created, depending on the font size and space available. Typically, multiline text is used more frequently than single-line.

Once the text is drawn, it's sometimes necessary to make changes or edits to the text. The **TEXTEDIT** command allows you to change the wording and context of your annotations, and also provides a means to modify text properties using *height, justification,* and *character* options. AutoCAD even has a spelling checker, which is very similar to those used in word processing programs.

Another way to modify objects including text is to utilize the **MATCHPROP** command, which can be used to match the properties of one object to another. For example, once you've annotated a drawing, you may decide that you want to make a uniform text style to describe

objects that share similar properties. Use **MATCHPROP** to do this: First, select a source object with the properties you wish to transfer, then select the destination object(s). You can also use the Property Settings dialog box to pick the specific properties you wish to match. This is done by selecting Settings from the command line while in the **MATCHPROP** command.

As with other objects, you can modify the scale of the text if you wish. This is done using the **SCALE** command. The amount you scale objects up or down is driven by the scale factor you choose. Scale factors are based on a unit of 1, so choosing 0.5 will reduce the scale by half, whereas a scale factor of 2 will make objects twice as large. You can also scale by Reference, which saves you time by having AutoCAD do the math to figure out scale factors. You can also scale by highlighting an object, picking a grip, right-clicking, and selecting **Scale** from the shortcut menu.

Tables are used in drawings at times to add text for things such as parts lists, bills of materials, and revision history. AutoCAD provides multiple options for creating and managing tables and the data they contain. Table styles can be created and saved. You can format table cells with text, numerical data, formulas, and with fields that can be set up to update automatically. Data can even be extracted from a drawing and linked to an external spreadsheet.

Now that you have an understanding of both creating text and utilizing paper space layouts, you can utilize AutoCAD templates to create

predrawn borders and title blocks. A drawing title block typically includes a border that represents the sheet size as well as textual information such as name, address, drawing title, revision history, general notes, tolerance information, and more.

Key Points and Links

READING ASSIGNMENT

Key Points

- The TEXT command is used for entering single lines of text, while the MTEXT command is used for entering multiple lines of text within a specialized text editor.
- The TEXTEDIT command can be used to edit text created with either the TEXT command or the MTEXT command.
- All objects have characteristics called properties. Standard properties include color, layer, linetype, lineweight, and length.
- The AutoCAD SPELL command can be used to check the spelling of text within your drawing.
- The MATCHPROP command can be used to match all or some of the properties of one object to another.

Exercise: AutoCAD: Annotations

Answer the "Chapter Test Questions" at the end of chapter 7 of your textbook. This includes the "Multiple Choice," "Matching," "True or False," and "Questions." You may also want to try the

"Drawing Problems" on your own.

Exercise Answer Key:

Exercise: AutoCAD: Annotations

Multiple Choice

1. a
2. b
3. c
4. d
5. b

Matching

a. %%d
b. %%c
c. Contextual tab
d. A.M.
e. Grip Edit mode

True or False

1. True
2. False
3. True
4. False
5. False

Questions

1. Center-justified text is centered on the midpoint of an underline of the text. Middle-justified text is centered on the midpoint of a line running through the middle of the text.

2. The symbol %% identifies that the character that follows is to be translated by its character code.

3. A font is a named set of characters, having common design characteristics. A style, in AutoCAD, is a named set of text settings, beginning with a font but also including other characteristics such as height, width, direction, slanting, and so on.

4. Enter **SCALE**, select the line, pick a base point, specify the Reference option, type **3 Enter**, and then type **2.75 Enter**.

5. Pick the **New** tool to create a new drawing; then select an AutoCAD template with a border and title block from the template list.

1.2 Describe the methods of linear dimensioning

Dimensioning

READING ASSIGNMENT

Read the assignment. Then, read pages 307–325 of Chapter 8 in your textbook.

In the previous section, you learned how to add annotations to a drawing; in this section, you'll discover how to *dimension* a drawing. AutoCAD allows you to create numerous dimension styles with various

types and sizes of leaders, arrows, and texts. It also lets you control different variables such as units, precision, tolerances, and more. All of these options are accessed through the **Dimension Style Manager** dialog box, which allows you to create and modify existing styles and even temporarily override some style features when necessary. Whether you're creating a new text style or modifying an existing one, the dialog box will contain tabs for the various options, including **Lines, Symbols and Arrows, Text, Fit, Primary Units, Alternate Units,** and **Tolerances.** As you can see, defining dimension styles allows you to maintain the consistency of the appearance of dimensions. By defining styles in a template drawing, all drawings made from that template can have a similar appearance.

AutoCAD provides tools to create linear dimensions, which can be horizontal, vertical, or aligned with an object, as well as tools to create dimensions for angles, arcs, and circles. Another very useful tool is the **Quick Dimension** option that helps to automate the creation of multiple dimensions. For instances when it's better to dimension features of an object relative to a fixed point rather than point to point, the **Ordinate Dimension** feature is available.

Key Points and Links
READING ASSIGNMENT

Key Points

- Dimension styles that control the text and geometry of different types of dimensions can be created and saved.

- The QDIM command automates the creation of certain types of multiple dimensions.
- Ordinate dimensions are relative to a fixed point of origin rather than point to point.

Exercise: AutoCAD: Dimensioning Drawings

In the "Chapter Test Questions" at the end of chapter 8 of your textbook, complete "Multiple Choice" question 1, "Matching" questions a–d, "True or False" question 2, and "Questions" questions 1 and 3. You may also want to try the "Drawing Problems" on your own.

Exercise Answer Key:
Exercise: AutoCAD: Dimensioning Drawings

Multiple Choice

1. c

Matching

a. Baseline
b. **QDIM**
c. **DIMORDINATE**
d. **DIMANGULAR**

True or False

2. False

Questions

1. Dimensions have their own style, including unit type. To specify architectural dimensions, you must create a dimension style with this type of dimension.

3. Ordinate dimensions are measured relative to a point of origin. By moving the origin of the coordinate system to a point in the drawing, you can create ordinate dimensions relative to that point. In **QDIM**, you do this by selecting the datum point option and then picking a point.

Lesson 1 Review

Self-Check

1. What is the command that allows you to type multiple lines of text in a special text editor and positions them in a windowed area in your drawing?

    a. TEXT
    b. MTEXT
    c. TEXTEDIT
    d. TEXT2MTEXT

2. Where are the text entry and editing tools located in the AutoCAD user interface?

a. In the Tools menu

b. Under the Insert dropdown

c. The Properties palette

d. In the Annotation panel on the ribbon

3. What is the difference between center-justified and middle-justified text?

a. Center-justified text is placed equidistantly between two specified points, while middle-justified text is justified from the middle of the text both horizontally and retains its vertical height.

b. Center-justified text is justified from the from the middle of the text both horizontally and vertically, while middle text is justified from the bottom center of the text block.

c. Center-justified text retains its vertical height while being justified from the center of the text block, while middle-justified text is placed between two specified points.

d. Center-justified text is justified from the bottom center of the text block, while middle text is justified from the middle of the text both horizontally and vertically, rather than from the bottom center of the text block.

4. What is the difference between aligned and fit text justification?

a. Aligned text is justified from the bottom center of the text block, while fit text is justified from the middle of the text both horizontally and vertically, rather than from the bottom center of the text block.

b. Aligned text is placed between two specified points and retains its height relative to the distance between these two points, while fit text proportions its height relative to the distance between the two points.

c. Aligned text is justified from the from the middle of the text both horizontally and vertically, while fit text is justified from the bottom center of the text block

d. Aligned text is placed between two specified points and proportions its height relative to the distance between these two points, while fit text retains its original height when placed between two specified points.

5. What is the procedure for entering angled text in AutoCAD?

a. Activate the TEXT or MTEXT command, pick a starting point, enter text size, enter angle, enter text.

b. Activate the TEXT or MTEXT command, enter angle, pick a starting point, enter text, enter text size.

c. Activate the TEXT or MTEXT command, pick a starting point, enter text, highlight entry, enter text size, enter angle.

d. Activate the TEXT or MTEXT command, pick starting point, enter text size, enter angle, enter text.

6. What does %%P stand for?

a. Percent

b. Point

c. Plus/Minus

d. Parallel

7. How is the MTEXT default formatting different from the Fit justification format?

a. Both options allow for a body of text to be located within a specified constraint field and are more or less redundant.

b. AutoCAD formats and justifies MTEXT entries according to the specified field constraints but leaves Fit entries as simple text.

c. MTEXT doesn't attempt to place the complete text width within a specific window; it's concerned with the text height only. Fit also addresses the width of the text block.

d. While Fit adjusts text height to allow the entire body of text to fit within specified constraints, MTEXT doesn't attempt to place the complete text inside the window, but only within its width.

8. Selecting text and clicking **Edit** in the right-click dropdown accomplishes the same task as _____ the text.

    a. double-clicking

    b. regenerating

    c. reloading

    d. re-entering

9. Most object modification options can be accessed through the

    a. Annotation palette.

    b. Dynamic Input palette.

    c. Gizmo palette.

    d. Quick Properties palette.

10. What command-line entry activates the SPELL command?

    a. S

    b. SP

    c. SCHK

    d. SPCHK

11. How do you change the appearance of a body of text to run vertically?

    a. Use the Effects panel in the Text Style dialog box.

    b. Use the ROTATE command to rotate the text 90 degrees.

c. Resize the text window so that only one letter fits within it at a time.

d. Create a series of single-letter TEXT entities and align them one under another using the SNAP command.

12. You've realized you've just spent three hours drawing cabinetry elevations on the wrong layer and using incorrect lineweights/types. What is the *most* efficient way to correct this mistake?

a. Go through the elevations and select the appropriate objects as a set, then change their layer and linetypes manually in the Quick Properties palette to the desired ones.

b. Select each object type set in its turn, hit **Ctrl + X** to cut it from your drawing, navigate to the appropriate layer in your Layer Manager panel, and paste the object set back into the drawing. Repeat as necessary.

c. Select each object independently in succession, and change the properties in the Properties Manager one by one.

d. Use the MATCHPROP (MA) command to select the objects with desired properties and then match the appropriate object types in your cabinetry elevations to the source object.

13. MA, select source object, S accomplishes what command functionality?

a. Activates the Property Settings dialog box within the Match Properties command

b. Activates the Object Snap function within the Match Properties command

c. Activates the Save Property Presets function within the Match Properties command

d. Activates the Setup function within the Match Properties command

14. You've downloaded a series of CAD objects from a manufacturer's website, only to realize that they were drawn in millimeters, while your drawing is in inches. What is the *best* way to remedy the situation?

a. Import the CAD objects into your drawing and use the Scale By Reference option to size them to the required dimensions.

b. Contact the manuacturer's Support department and ask for Imperial CAD blocks instead.

c. Scale the drawings up and down by percentages until you get to a Good Enough, visually viable scale that matches your needs.

d. Look up "mm to in conversion tables" on the internet and scale the drawings up or down accordingly.

15. Your boss wants you to include door and window schedules on the layouts for a multifamily apartment project. What is the *best* way to handle organizing the different types, dimensions, model numbers, and finishes of these items?

a. Lay out the schedule in Excel and import a PDF print to AutoCAD.

b. Draw a table by offsetting a series of lines or copying a series of boxes in AutoCAD to simulate a spreadsheet.

c. Insert a series of spec sheets for each window into AutoCAD layouts and tag each layout with a key on the main floorplan.

d. Draw a table with the appropriate number of rows and columns.

16. When you need to reverse direction while moving sequentially through a table, what keys should you press?

a. Shift and Tab

b. Ctrl and Enter

c. Alt and Tab

d. Space bar and Enter

17. PlotScale, Date, PageSetupName, Project, and Title are all types of

a. functions.

b. smart elements.

c. dynamic variables.

d. fields.

18. How do you set automatic field updates for your drawing?

a. **Insert > Data > Update Fields**

b. **Pick Object > Right-click > Update Field**

c. Right-click on empty space **> Options > User Preferences >**

Fields > Field Update Settings

d. **Regen > Right-click > Update Field**

19. What is the primary purpose of a title block?

a. Provide a border that represents the sheet size as well as textual information such as drawing title, revision history, and so on

b. To enhance the graphic appeal of the drawing set

c. To provide a frame for viewports to reside in

d. To organize filing and revision information for municipal authorities

20. You have a last-minute project with an End of Day issuance. What is the *most* efficient way to set up a title block?

a. Draw one from scratch. Title Blocks are unique to each project.

b. Download one from the internet.

c. Open and modify an existing AutoCAD template to tailor it to your needs.

d. Just use a text field instead.

Self-Check Answer Key

1. MTEXT

   Explanation: MTEXT allows you to type multiple lines of text in a special text editor and positions them in a windowed area in your drawing, similar to text editing options of MS Word or Apple's Pages. It's a more robust tool than the simple TEXT command, which only allows you to enter one line of text at a time.
   Reference: Section 1.1

2. In the Annotation panel on the ribbon

   Explanation: All text entry and related options are found in the Annotation panel of the ribbon.
   Reference: Section 1.1

3. Center-justified text is justified from the bottom center of the text block, while middle text is justified from the middle of the text both horizontally and vertically, rather than from the bottom center of the text block.

   Explanation: Center-justified and middle-justified justification options differ subtly but have important effects on the layout and overall look of your finished prints. Center-justified text is justified from the bottom center of the text block, while middle-justified text is justified from the middle of the text both horizontally and vertically, rather than from the bottom center of the text block.
   Reference: Section 1.1

4. Aligned text is placed between two specified points and proportions its height relative to the distance between these two points, while fit text retains its original height when placed between two specified points.

   Explanation: Aligned text is placed between two specified points and proportions its height relative to the distance between these two points, while fit text retains its original height when placed between two specified points.

   Reference: Section 1.1

5. Activate the TEXT or MTEXT command, pick starting point, enter text size, enter angle, enter text.

   Explanation: Activate the TEXT or MTEXT command, pick starting point, enter text size, enter angle, enter text, press Enter to close out the command. It is also best to get into a habit of hitting Save often, especially after completing some labor-intensive commands like text entry, arrays, or hatching, which tie up a lot of AutoCAD resources and sometimes force the system to crash. Saving often after these commands will prevent data loss throughout your process.

   Reference: Section 1.1

6. Plus/Minus

   Explanation: AutoCAD has a robust library of control codes and special characters at your disposal. %%p triggers a code command

to display the Plus/Minus sign, ±. It's an important code you'll use often when noting tolerances.
Reference: Section 1.1

7. While Fit adjusts text height to allow the entire body of text to fit within specified constraints, MTEXT doesn't attempt to place the complete text inside the window, but only within its width.
Explanation: While Fit adjusts text height to allow the entire body of text to fit within specified constraints, MTEXT doesn't attempt to place the complete text inside the window, but only within its width. As a result, you'll often need to backtrack and check whether your text is fully displayed within your model or layout constraints. Leftover text is signaled by a red icon locked into the right bottom corner of your text column/field.
Reference: Section 1.1

8. double-clicking
Explanation: Many of the same functionalities available in the right-click dropdown can be accessed by simply double-clicking the object in place. In this case, the TEXTEDIT command is activated with greater efficiency than if you were using the dropdown method.
Reference: Section 1.1

9. Quick Properties palette.
Explanation: The Quick Properties palette is a universal tool available for all AutoCAD object types, not solely text entities. It

contains the properties listing and options for any selected object, based on its type and its inherent characteristics. With text and multiline text entities, the palette contains properties such as justification, size, font, rotation angle, and any special formatting effects such as strikethrough or superscript performed on the given text block.

Reference: Section 1.1

10. SP

Explanation: The SPELL command allows you to check spelling on a body of text from within AutoCAD itself. The command-line entry SP will save you significant time compared with navigating to it through the menus.

Reference: Section 1.1

11. Use the Effects panel in the Text Style dialog box.

Explanation: The Effects panel in the Text Style dialog box provides a number of alterations you can perform to reformat existing bodies of text. The Vertical option is one of the alterations, and is the correct way to achieve the desired effect, while resizing text windows and breaking up the text into a series of single letters is a rookie workaround that creates a lot of extra labor. Rotating the text will change its orientation but not its run direction.

Reference: Section 1.1

12. Use the MATCHPROP (MA) command to select the objects with

desired properties and then match the appropriate object types in your cabinetry elevations to the source object.

Explanation: Using the MATCHPROP command by typing **MA** or selecting the **Match Properties** icon from the Properties panel on the ribbon is an efficient and sure-fire way to correct your course of action, provided there are existing objects in the drawing with the settings you desire.

Reference: Section 1.1

13. Activates the Property Settings dialog box within the Match Properties command

    Explanation: The command sequence **MA, select source object, S** activates the Property Settings dialog box within the Match Properties command to allow you to specify the particular properties you want to match between the objects, while omitting ones you need to keep separate.

    Reference: Section 1.1

14. Import the CAD objects into your drawing and use the Scale By Reference option to size them to the required dimensions.

    Explanation: Drawing unit coordination can be eliminated through the use of the Scale By Reference function of the SCALE (SC) command. If you need a CAD object to be of a certain height or width, simply draw a line with the desired dimension, align one of its vertices with the part of the object you need to match in size, and execute the following command sequence: SC, select object,

specify base point r, pick the original object's start and end points, then pick the new dimension endpoint on the line you've drawn earlier.
Reference: Section 1.1

15. Draw a table with the appropriate number of rows and columns.
Explanation: While the solution to lay out the schedule information in a spreadsheet and then insert a PDF of that spreadsheet into your layout may seem second nature, image files are much heavier than AutoCAD vector objects and will balloon the size of your files, reducing loading speed and maneuverability extensively. The fastest and most effective solution is to draw a table directly within AutoCAD and populate it accordingly. Drawing and offsetting lines and boxes one by one not only delays the execution of the project, but offers limited and cumbersome editability if anything changes later on in the project.
Reference: Section 1.1

16. Shift and Tab
Explanation: When entering data in table cells, you can move sequantially through cells using the Tab key. To reverse direction and move backward, hold down the Shift key while pressing Tab.
Reference: Section 1.1

17. fields.
Explanation: PlotScale, Date, PageSetupName, Project and Title

are just some of the field types available in the Field dialog box.
Reference: Section 1.1

18. Right-click on empty space **> Options > User Preferences > Fields > Field Update Settings**

    Explanation: Automating repetitive tasks in AutoCAD is critical to an efficient drafting workflow. Updating fields automatically removes an extra level of coordination pressure from your daily drawing schedule and saves time. To set your fields to update automatically during specific conditions (printing a drawing, opening a drawing, saving a drawing, etc), right-click on empty space, then click **Options > User Preferences > Fields > Field Update Settings**.
    Reference: Section 1.1

19. Provide a border that represents the sheet size as well as textual information such as drawing title, revision history, and so on
    Explanation: A title block typically includes a border that represents the sheet size as well as textual information such as name, address, drawing title, revision history, general notes, tolerance information, and more.
    Reference: Section 1.1

20. Open and modify an existing AutoCAD template to tailor it to your needs.
    Explanation: In a tight-deadline situation, it's always best to load the already-available templates from AutoCAD's DWT library and

modify them to your needs.

Reference: Section 1.1

Flash Cards

1. Term: TEXT

Definition: Command that allows you to type single lines of text and displays them as you type

2. Term: MTEXT

Definition: Command that allows you to type multiple lines of text in a special text editor and positions them in a windowed area in your drawing

3. Term: Aligned Text

Definition: Text justification option that proportions text height relative to the distance between the two points between which it's placed

4. Term: %%C

Definition: The control code for the Diameter symbol

5. Term: Multiline Text Editor

Definition: The panel type that gives you the ability to change text styles, fonts, and other text features

6. Term: Properties

Definition: Characteristics of an object that determine how and where an object is shown in a drawing; some are object-specific while others are universally common

7. Term: Annotative

Definition: The property of being automatically scalable to match the varying scales of viewports in a drawing layout; typically refers to text and dimensions

8. Term: Text Styles

Definition: Variations in size, orientation, and spacing of characters within given fonts

9. Term: MATCHPROP (MA)

Definition: Command that increases drafting efficiency by letting you match all or some of the properties of an object to those of another

10. Term: Basepoint Scaling

Definition: The concept that allows you to specify whether, and which, sides of a previously-drawn object will expand/shrink equally, and in relation to which geographical location