Blocks: Creation

Unit: 2D Computer-Aided Design and Drafting

Problem Area: Hatching

Lesson: Blocks: Creation

Student Learning Objectives.

Instruction in this lesson should result in students achieving the following objectives:

1. **Create blocks.**
2. **Create wblocks.**

Resources.

The following resources may be useful in teaching this lesson:

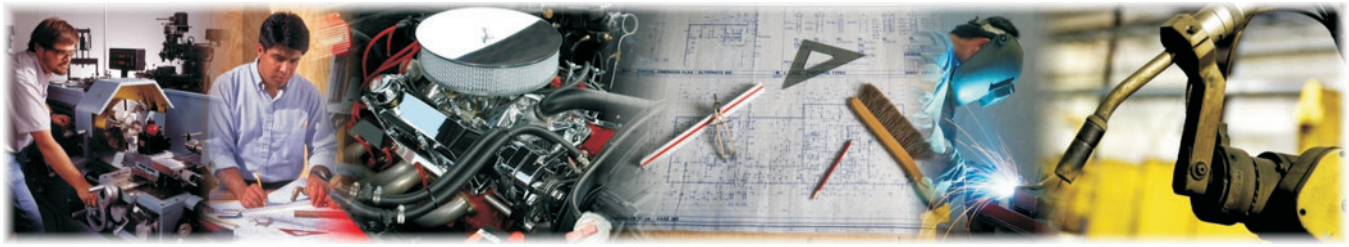
E-unit(s) corresponding to this lesson plan, CAERT, Inc. http://www.mycaert.com.

"Block Command," *Autodesk Knowldege Network,* Accessed June 12, 2019. https://knowledge.autodesk.com/support/autocad/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/AutoCAD-Core/files/GUID-B03434BE-0F68-4E31-BA8D-640EEC1D7FC9-htm.html.

"Block Definition Dialog Box," *Autodesk Knowldege Network,* Accessed June 12, 2019. https://knowledge.autodesk.com/support/autocad/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/AutoCAD-Core/files/GUID-03B61417-F040-4EB0-AFEA-B229AD303D91-htm.html.

"CAD Workstation Block Exercise," *Mark Smith YouTube Channel.* Accessed June 12, 2019. https://drive.google.com/file/d/17AiYWuQLRksmX7UIaQh_rBB7B4XJOxBJ/view?usp=sharing.

"Commands for Basic Blocks," *Autodesk Knowldege Network.* Accessed June 12, 2019. https://knowledge.autodesk.com/support/autocad/learn-explore/caas/CloudHelp/cloudhelp/2018/ENU/AutoCAD-Core/files/GUID-91EBC702-B874-4400-83E2-B134099B2974-htm.html.



"Introduction to AutoCAD Blocks and Why You Should Use Them," *TheSOURCECAD.com,* Accessed June 12, 2019. https://thesourcecad.com/free-cad-block/.

Equipment, Tools, Supplies, and Facilities

- ✓ Overhead or PowerPoint projector
- ✓ Visual(s) from accompanying master(s)
- ✓ Copies of sample test, lab sheet(s), and/or other items designed for duplication
- ✓ Materials listed on duplicated items
- ✓ Computers with printers and Internet access
- ✓ Classroom resource and reference materials
- ✓ Computer, keyboard, and mouse
- ✓ SchoolVue or comparable software that broadcasts the teacher computer to student computers

Key Terms.

The following terms are presented in this lesson (shown in bold italics):

- attribute
- base point
- block
- browse for drawing file window
- design center
- reference
- tool palette
- wblock

Interest Approach.

Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situation. A possible approach is included here.

> *AutoCAD has many types of symbols: this lesson focuses on block symbols. A block is a collection of geometric objects that are united into a single object given an arbitrary name. Blocks are the single most cost-effective tool in AutoCAD. Blocks can be realistic looking representations of objects or symbols that represent objects.*

CONTENT SUMMARY AND TEACHING STRATEGIES

Objective 1: Create blocks.

Anticipated Problem: What is a block? Where are blocks found? How are blocks created?

I. A ***block*** is a collection of geometry united into a single object and given an arbitrary name. Blocks are stored in the AutoCAD symbol table and behave as a single object. Blocks can be static or can be created with dynamic properties: attached attribute properties. A block resides within the drawing in which the CAD operator/drafter originally created it. Blocks are one of the most important entity types in AutoCAD and are used in all types of drawings. If a CAD operator/drafter is not using blocks, one of the most powerful CAD tools is left on the shelf unused. Once a block is created, it can be inserted into drawings over and over: this time and creates drawing consistency. Many organizations set up in-house proprietary blocks to save time and avoid confusion among operators/drafters. Geometry used to create a block is created on layer zero to prevent the operator/drafter from bringing in unwanted layers with the block.

A. REFERENCES: A ***reference*** is a block used in a drawing. All blocks in a drawing reference back to the original block that helps contain the size of the drawing file. When a block is modified all the references change automatically. For example, if a drafter creates a door block and, after inserting several doors in the drawing, decides to modify the door's size, referencing would automatically modify all the door blocks to the new size.

B. BLOCK DATA: The CAD operator/drafter can keep track of block data using attributes. An ***attribute*** is information created and included with a block definition such as, company name, part number, creation date, etc. and can be extracted to an Excel file or to a drawing table.

C. DESIGN CENTER: The ***design center*** is a palette (like the properties palette or the layer manager palette) in AutoCAD's small library of standard blocks that can be used in any drawing. The design center is accessed using the keyboard shortcut "CTRL + 2" or by typing 'adcenter' at the command prompt. Regardless of the method, the design center window will deploy. (See VM–A.)

D. TOOL PALETTE: The ***tool palette*** is a window that displays 10 tabs that contain different categories of blocks: tables, hatching, structures, electrical, etc. (See VM–B.) The operator/drafter can change or add tabs and control what is on each tab. The tool palette is accessed by the keyboard shortcut "CTRL + 3" and contains many simple and dynamic blocks.

E. BLOCK CREATION: To create blocks in AutoCAD, the operator/drafter can begin the process in one of two ways: type “block” at the command prompt or go to the “insert menu” in the home tab of the AutoCAD ribbon and select the “create block icon.” (See VM–C.) This action opens the ‘Block Definition Dialog Box’ that steps the drafter through the process of creating a block. (See VM–D.) Next, to create blocks an operator/drafter would:

1. First, type in the name of the block that will be created. For this exercise, the operator types in “Test.” (See VM–E.)
2. Second, determine the base point. The ***base point*** is the coordinate position or the ‘picked point’ on a geometric object determined to be the origin by the operator/drafter. Either one can be specified by selecting the ‘pick point icon’ or can be entered as an ‘X-, Y-, and Z- coordinate’ in the base point area of the ‘block definition dialog box.’ In this example, the base point is the center of the circle that has a small rectangle in the center. (See VM–F.)
3. Next, select the geometry to be contained in the block. By picking the ‘select objects icon,’ selecting the geometry on the screen, and hitting enter, the geometry is selected. (See VM–G.) [NOTE: Retain, convert to block, and delete options can be checked based on the CAD operator/drafter needs. For this example, the operator selects the default mode of ‘convert to block.’]
4. Now, the behavior category of the ‘block definition dialog box’ offers three categories: annotative, scale uniformly, or explode. In this example, the operator leaves all options unchecked except for explode. (See VM–H.) [NOTE: Leaving ‘explode’ unchecked means the block can never be exploded. The operator also ensures the ‘settings category’ is set to inches.]
5. Finally, the block requires a description that alerts the operator/drafter to the details of the block: clicking the ‘OK’ button is suggested. (See VM–I.) The AutoCAD drawing file now contains one user-defined block called ‘Test.’

Teaching Strategy: *Many techniques can be used to help students master this objective. Lead a discussion about blocks in AutoCAD. Provide examples of what industry acceptable blocks look like. Use VM–A through VM–I to reinforce creating blocks. Show and demonstrate creating blocks using SchoolVue or a comparable software. [NOTE: The base method is to use a program like SchoolVue to broadcast from the teacher’s computer out to the student computers. This allows you to demonstrate directly to each student’s computer. This lesson was prepared assuming the use of the Autodesk product AutoCAD.]*

Objective 2: Create wblocks.

Anticipated Problem: What is a wblock? Where are wblocks found? How are wblocks created?

II. A ***wblock*** (short for 'write block') is a collection of geometric objects that are united into a single object, given an arbitrary name, and saved outside the current drawing file. Wblocks can be static or can be created with dynamic properties: wblocks with dynamic properties are called 'dynamic blocks.' Again, a wblock resides outside the drawing the CAD operator/drafter used to create the block. Geometry that will be used to create a wblock should be created on layer zero that prevents the operator/drafter from bringing in unwanted layers with the wblock. Once a wblock is created, it can be inserted into a drawing over and over to save time and help with drawing consistency. Many organizations set up in-house, proprietary wblocks to avoid confusion among drafters. The difference between a block and a wblock is that a block is saved inside the drawing file in which it was created and a wblock is saved outside of the drawing file in which it was created.

A. REFERENCE: A reference is a wblock used in a drawing. All wblocks used in a drawing reference back to the original wblock that helps contain the size of the drawing file. This helps the drawing file size stay smaller. If you modify a wblock all the references change automatically. An example of referencing would be a wblock of a door, after inserting all of the door wblocks you decide to modify the size of the door. In this case you would modify the door wblock; then all of its references (inserted door wblocks) automatically update or change to match the modified door wblock.

B. WBLOCK DATA: The operator/drafter can keep track of wblock data using attributes: information such as company name, part number, creation date, etc. associated with a wblock. This data can be extracted to an Excel file or to a drawing table.

C. WBLOCK CREATION: To create AutoCAD wblocks, the operator/drafter can begin the process in one of two ways: type wblock at the command prompt or go to the 'insert menu' in the home tab of the AutoCAD ribbon and select the 'create block down arrow icon' and then select the 'wblock icon.' (See VM–J.) The steps to create a wblock are the same as the steps to create a block, with these exceptions:

1. The destination category of the 'write block dialog box' asks the operator/drafter to determine where the wblock will be saved. By clicking on the displays, a 'standard file selection dialog box icon' opens. (See VM–K.) The source area should include the objects option selected.
2. Once the icon is selected, it opens the 'browse for drawing file window.' (See VM–L.) AutoCAD's ***browse for drawing file window*** is the place the operator selects the desired location to save the wblock. [NOTE: This location is typically a predetermined location where all company/organization wblocks are saved.] The operator/drafter gives the wblock a name, and then clicks 'save.' Now, the

'write block dialog box' reappears. The operator clicks on the 'insert units down arrow' and selects the appropriate units (in this case inches) and then clicks 'OK." [NOTE: In the top left area of the screen as the 'OK' button is clicked, the operator notices a brief display of a small window showing the wblock being created.]

Teaching Strategy: *Many techniques can be used to help students master this objective. Use VM–J, VM–K, and VM–L to illustrate wblock creation. You could walk around the room and interact with the students as they create blocks and wblocks. Assign LS–A.*

- **Review/Summary.** Use the student learning objectives to summarize the lesson. Have students explain the content associated with each objective. Student responses can be used in determining which objectives need to be reviewed or taught from a different angle. Questions at the ends of chapters in the textbook may also be used in the review/summary.

- **Application.** Use the included visual masters and lab sheet to apply the information presented in the lesson.

- **Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is provided.

- **Answers to Sample Test:**

Part One: Matching

1. a
2. d
3. b
4. e
5. c
6. f

Part Two: Completion

1. drawing
2. entity
3. outside
4. zero
5. single
6. attribute

Part Three: Short Answer

A block is saved inside of the drawing file it was created in. A wblock is saved outside of the drawing file it was created in.

Sample Test

Name _____

Blocks: Creation

Part One: Matching

Instructions: **Match the term with the correct definition.**

a. reference
b. tool palette
c. attributes
d. block
e. design center
f. reference

_____1. What a block called once inserted into a drawing

_____2. Helps the drawing file size stay smaller

_____3. Window that displays 10 tabs and contains

_____4. AutoCAD contains a small library that stores blocks

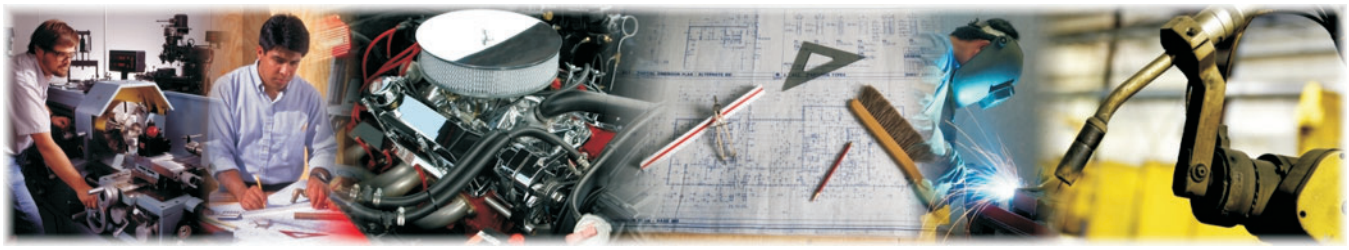
_____5. Information that is attached to a block

_____6. What a wblock used in a drawing is called

Part Two: Completion

Instructions: **Provide the word or words to complete the following statements.**

1. Once a block is created, it can be inserted into a _____ over and over.
2. Blocks are AutoCAD's most important _____ types.
3. A wblock is saved _____ the current drawing file.
4. Geometry used to create a block is created on layer _____ to prevent the operator/drafter from bringing in unwanted layers with the block.



5. Blocks are stored in the AutoCAD symbol table and behave as a _____ object.

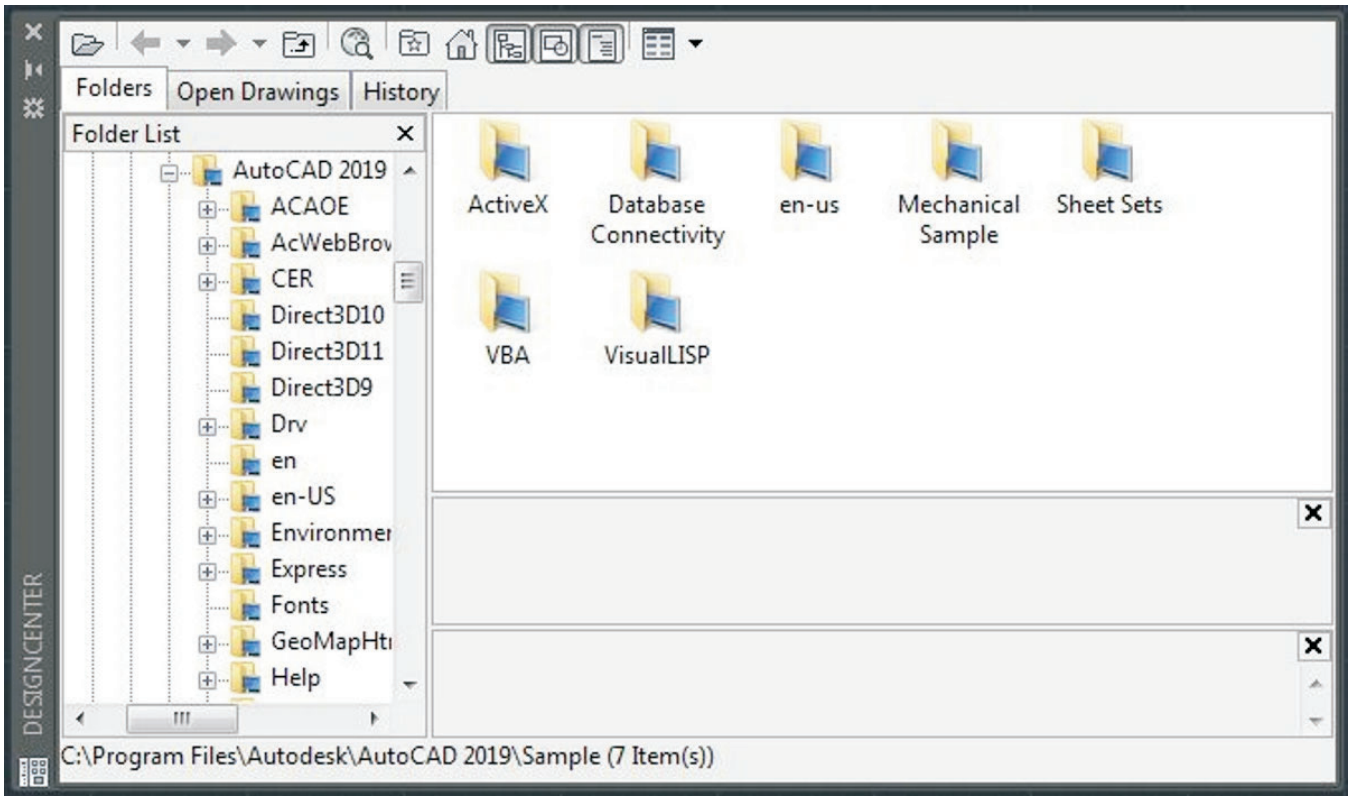
6. Information such as company name, part number, and creation date is called a/an _____.

Part Three: Short Answer

Instructions: **Complete the following.**

Differentiate between a block and a wblock.

AUTOCAD'S DESIGN CENTER WINDOW



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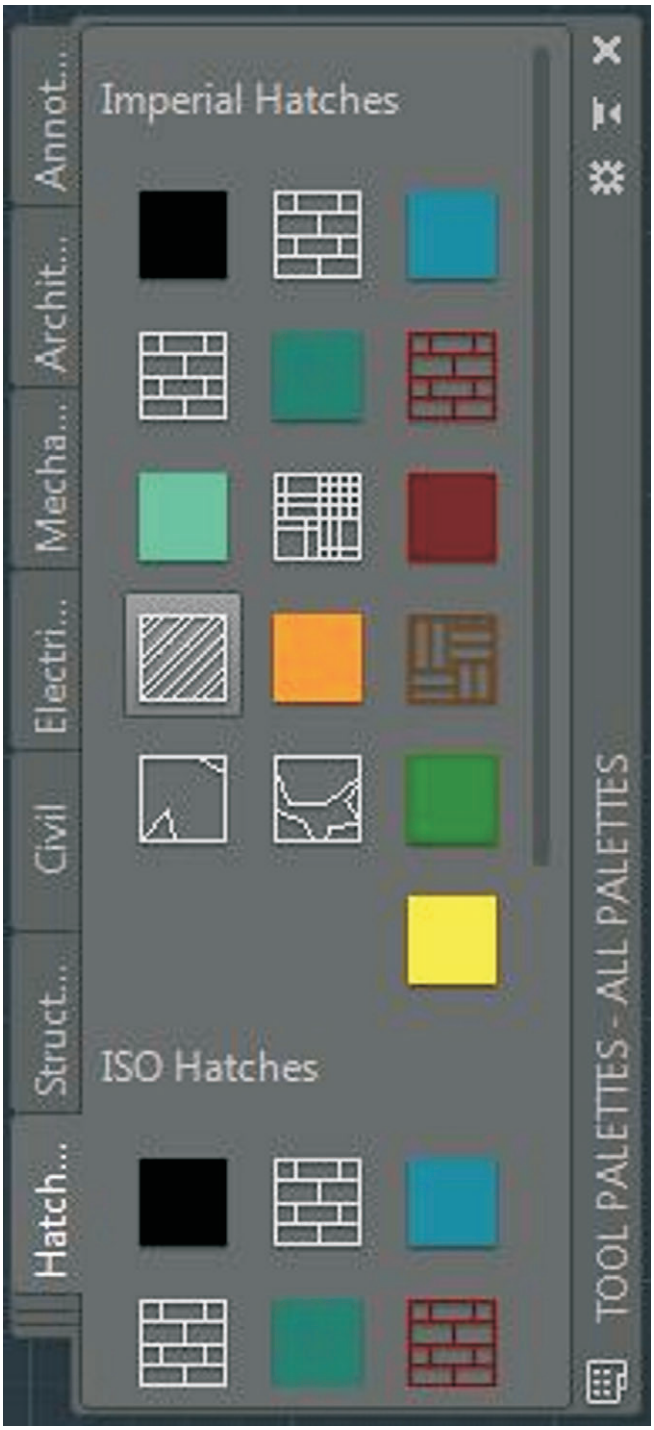
AUTOCAD'S TOOL PALETTE



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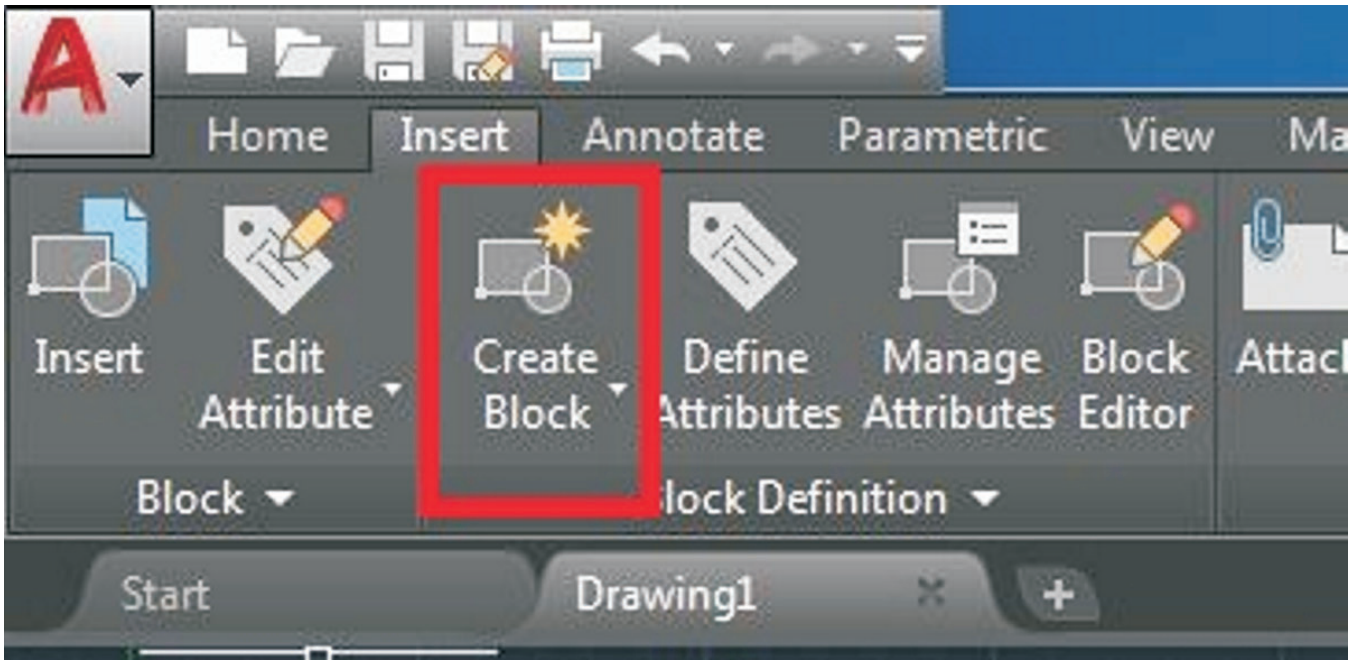
AUTOCAD'S CREATE BLOCK ICON



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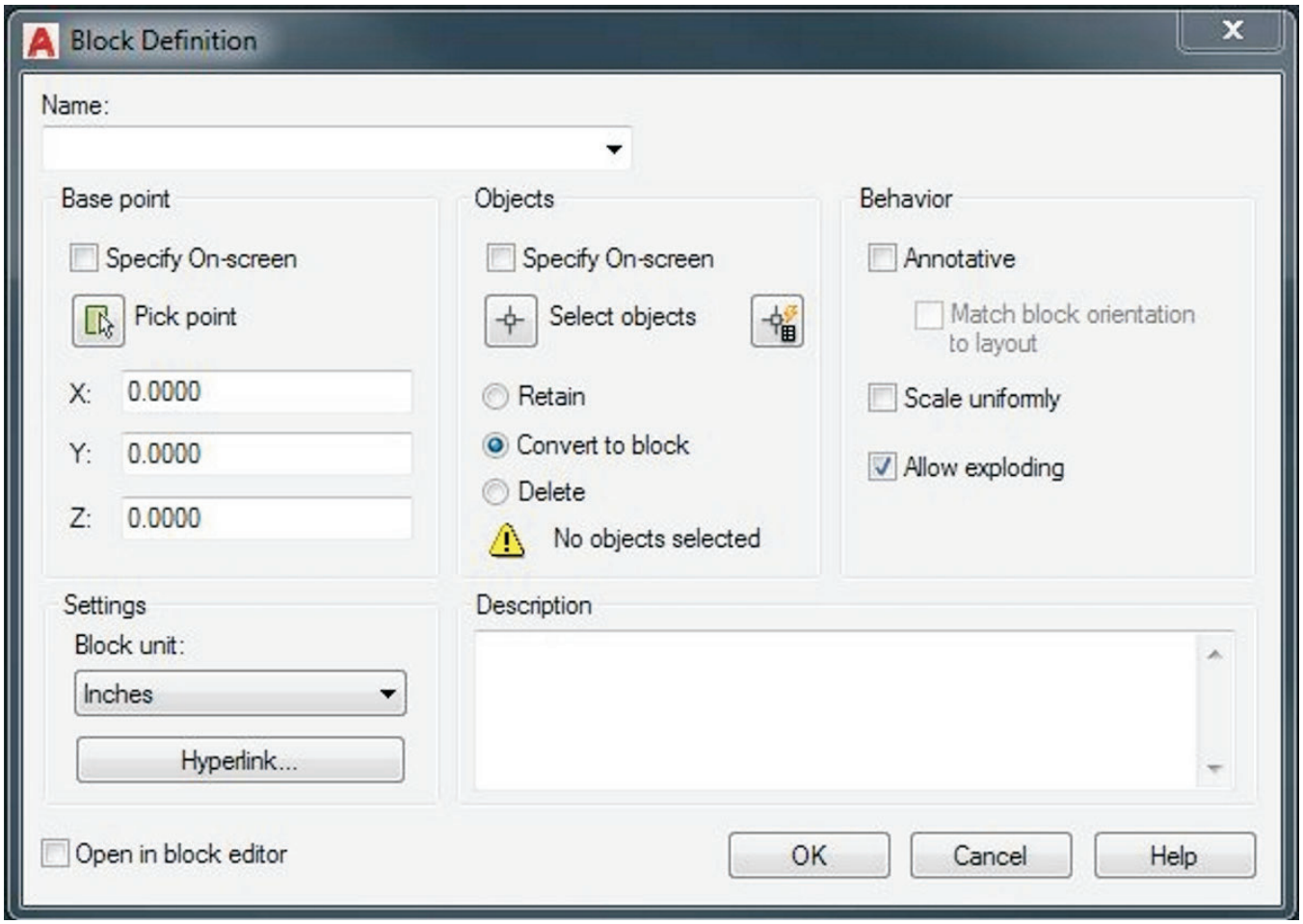
AUTOCAD'S BLOCK DEFINITION WINDOW



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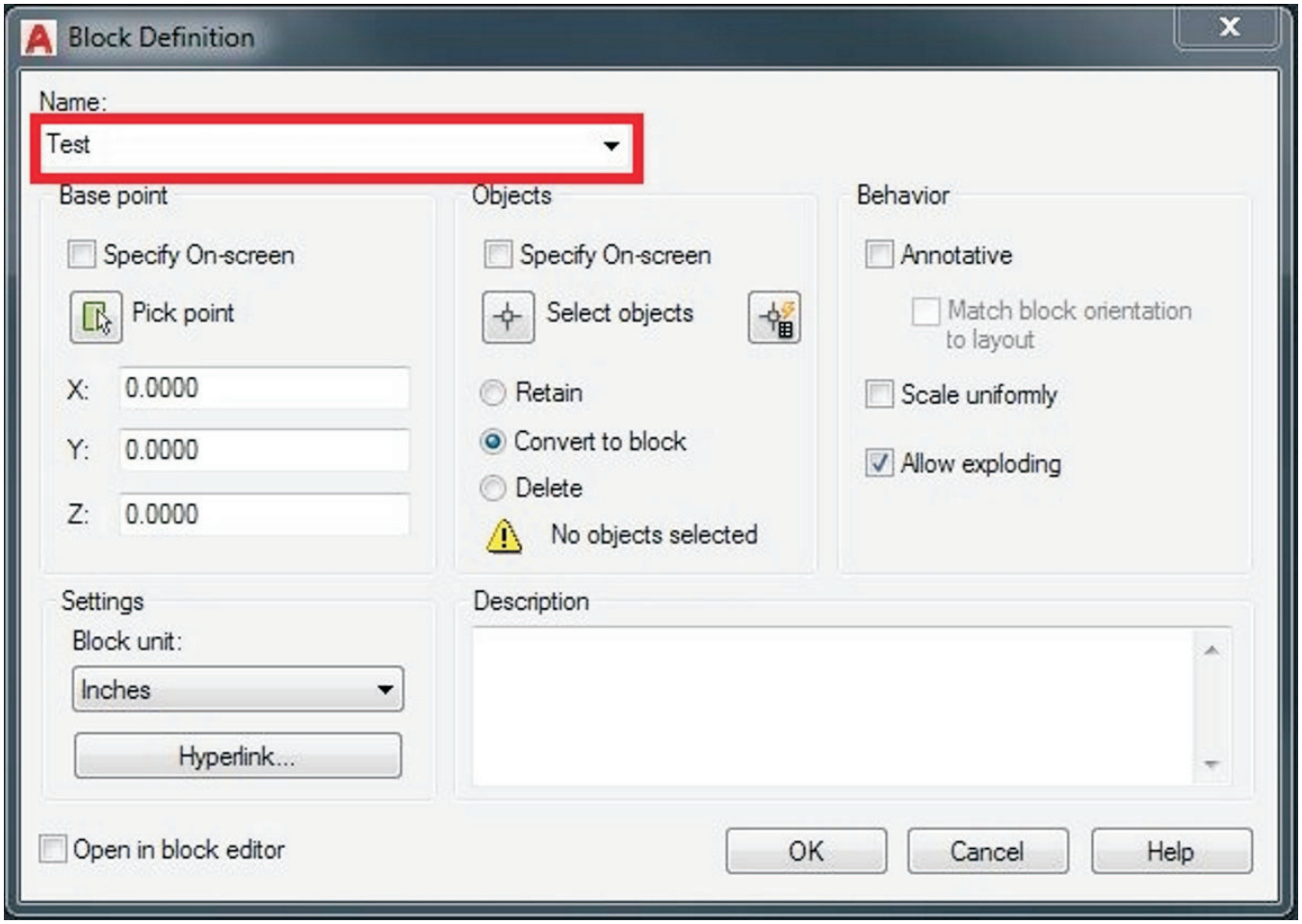
AUTOCAD'S BLOCK DEFINITION WINDOW WITH THE BLOCK'S NAME



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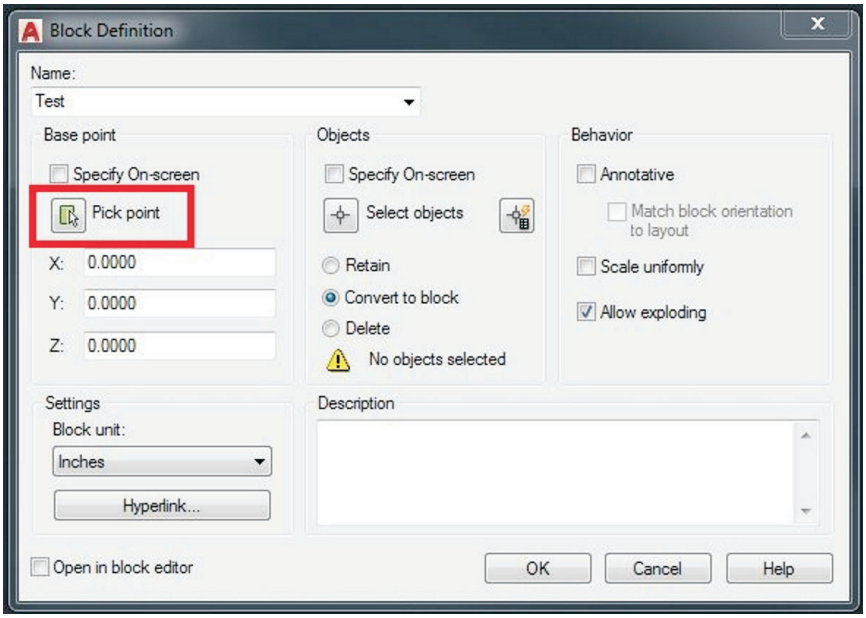
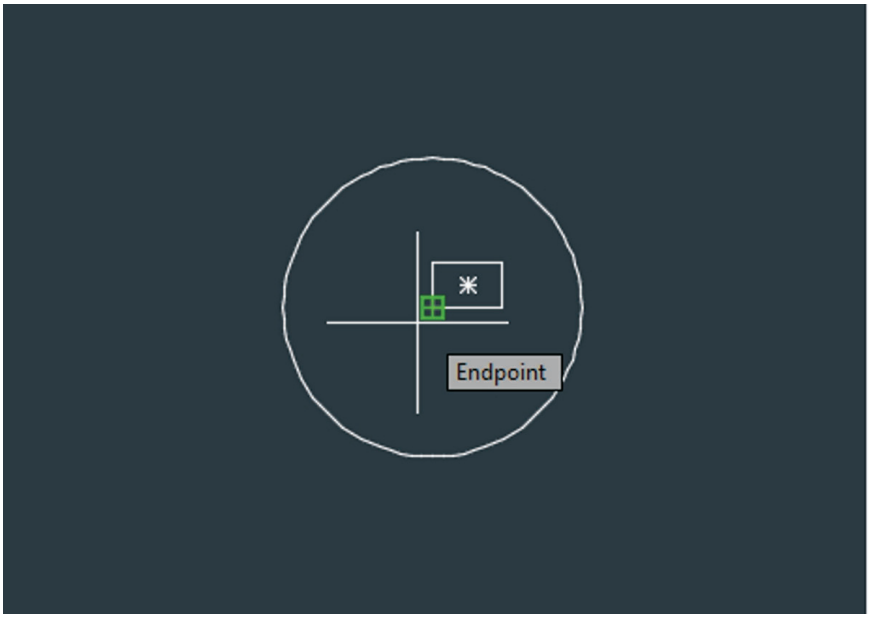
AUTOCAD'S PICK POINT AND CENTER OF CIRCLE IN THE BLOCK DEFINITION DIALOG BOX





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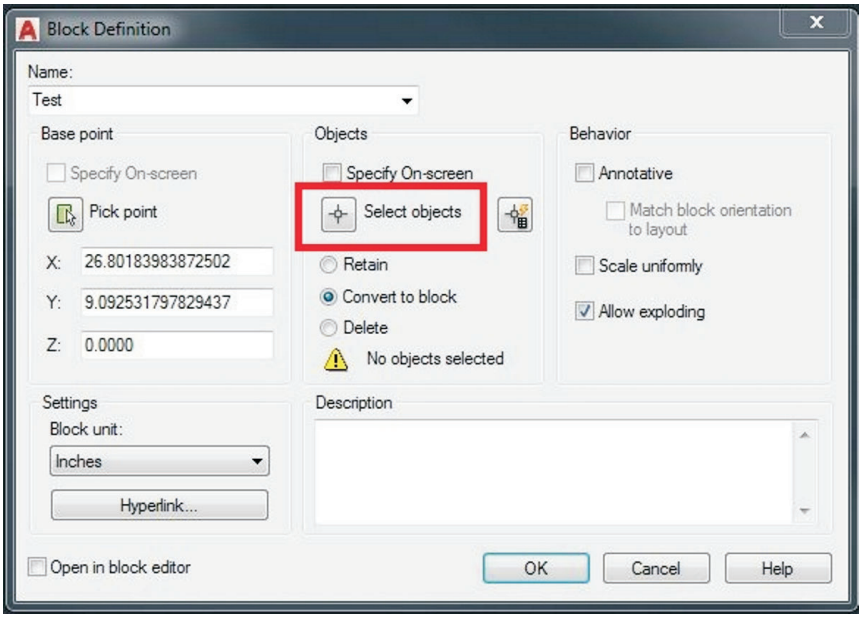
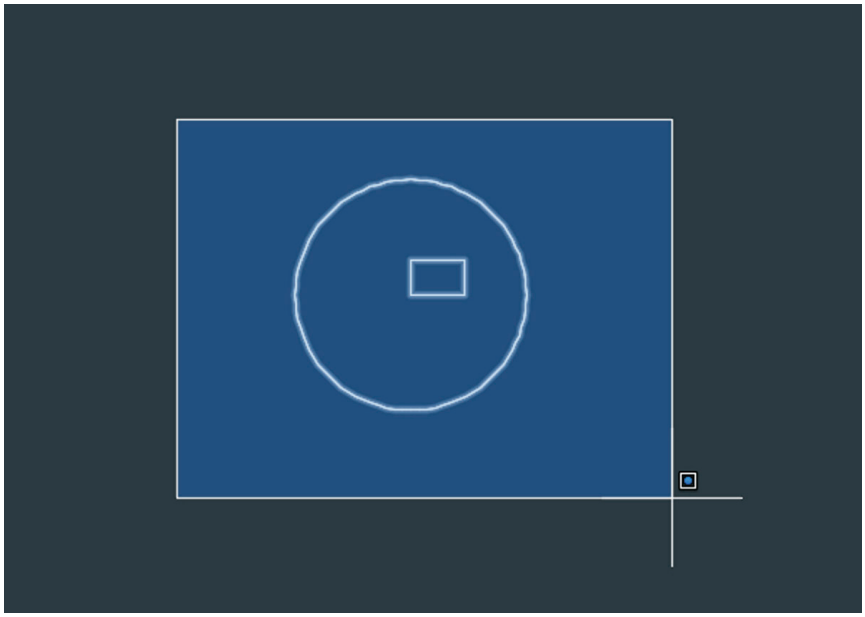
AUTOCAD'S BLOCK DEFINITION DIALOG BOX WITH SELECTING ON-SCREEN GEOMETRY





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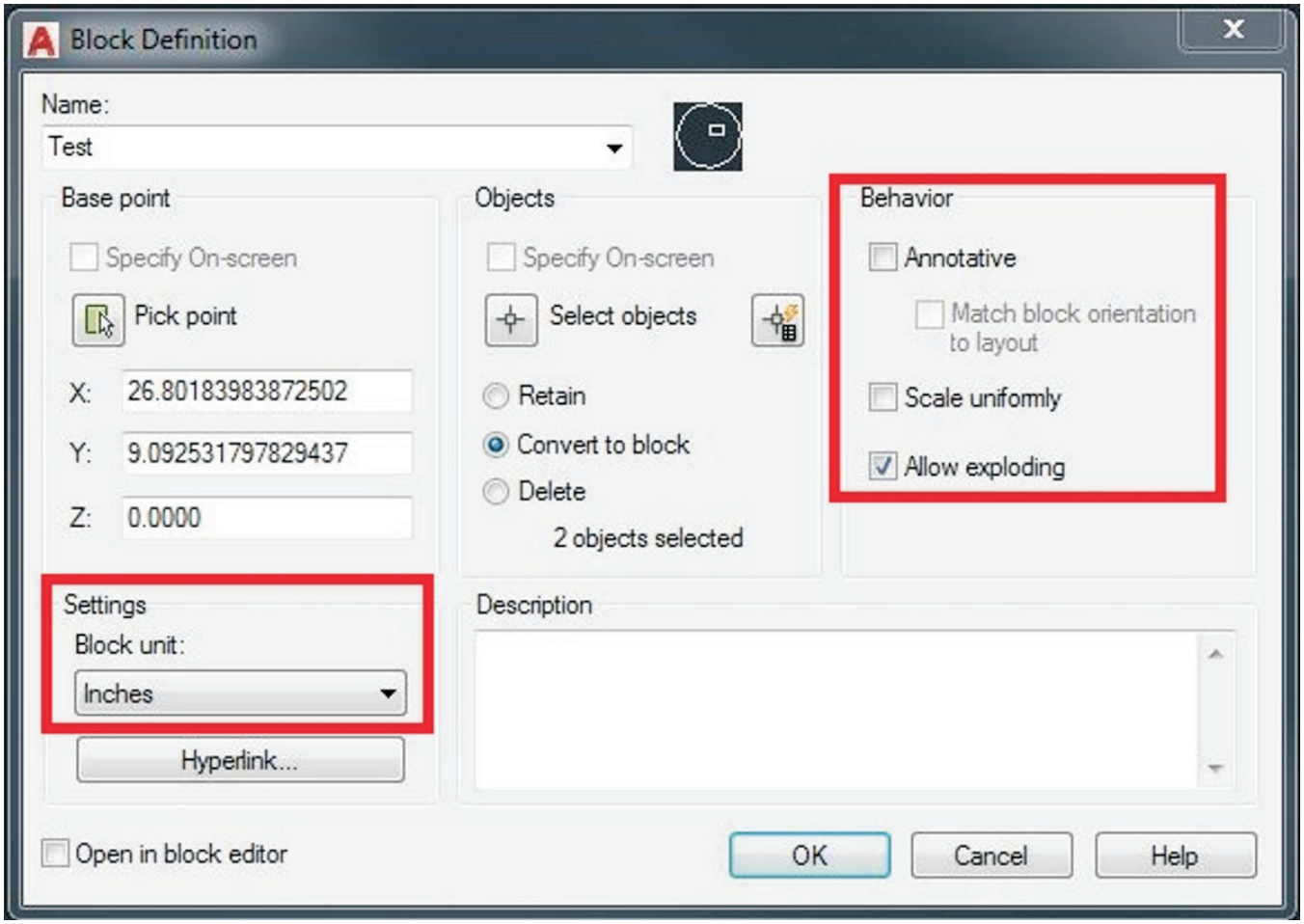
AUTOCAD'S BEHAVIOR OPTIONS IN THE BLOCK DEFINITION DIALOG BOX



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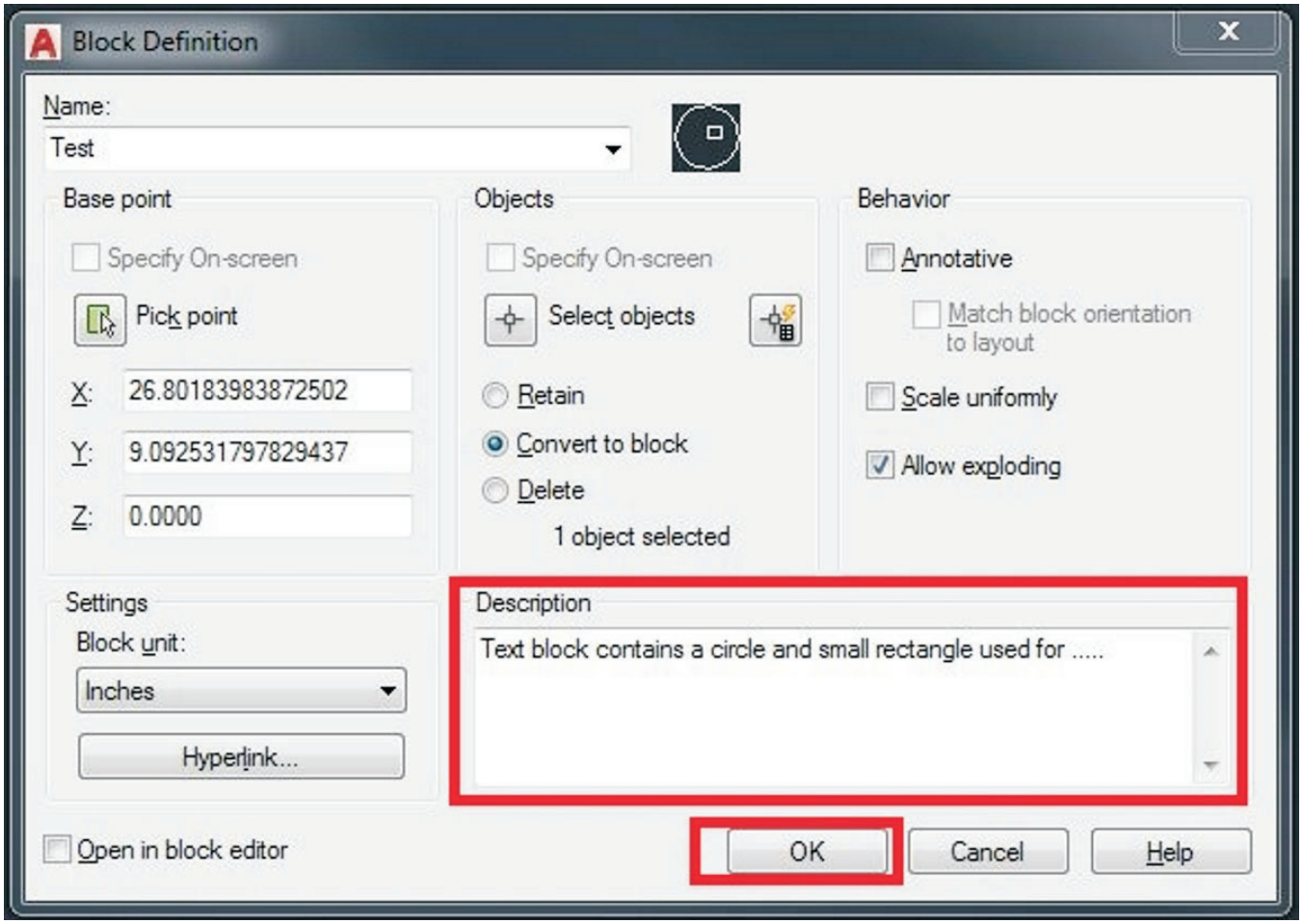
AUTOCAD'S DESCRIPTION AREA IN THE BLOCK DEFINITION DIALOG BOX



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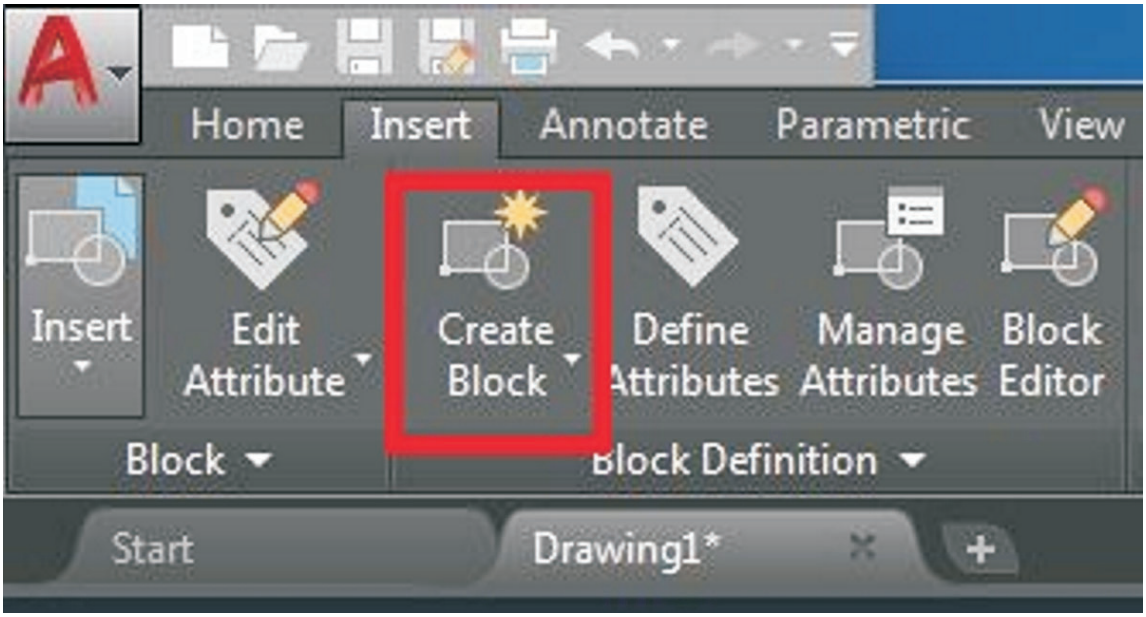
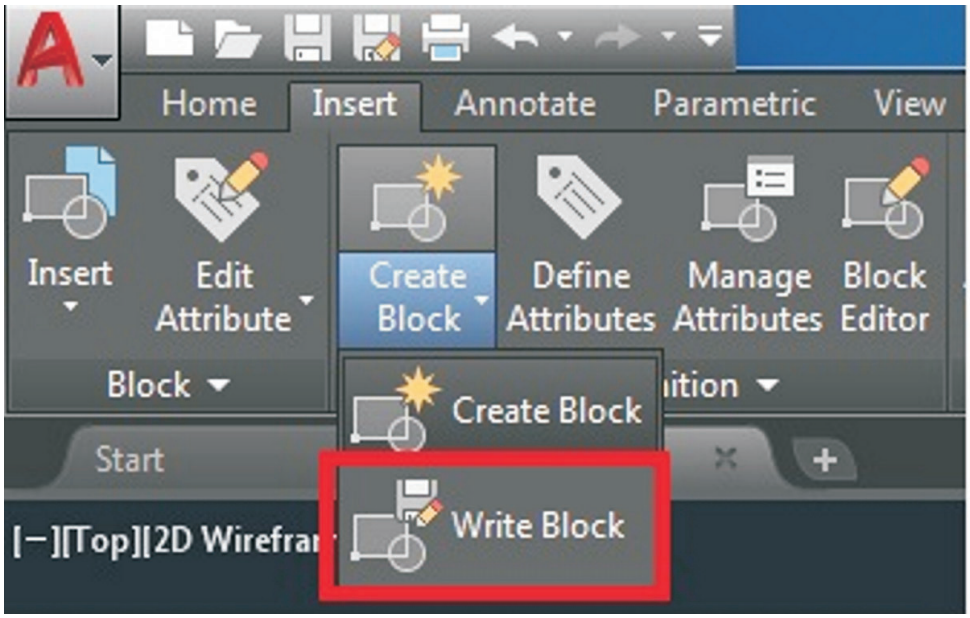
AUTOCAD'S CREATE BLOCK DOWN ARROW AND WRITE BLOCK ICONS





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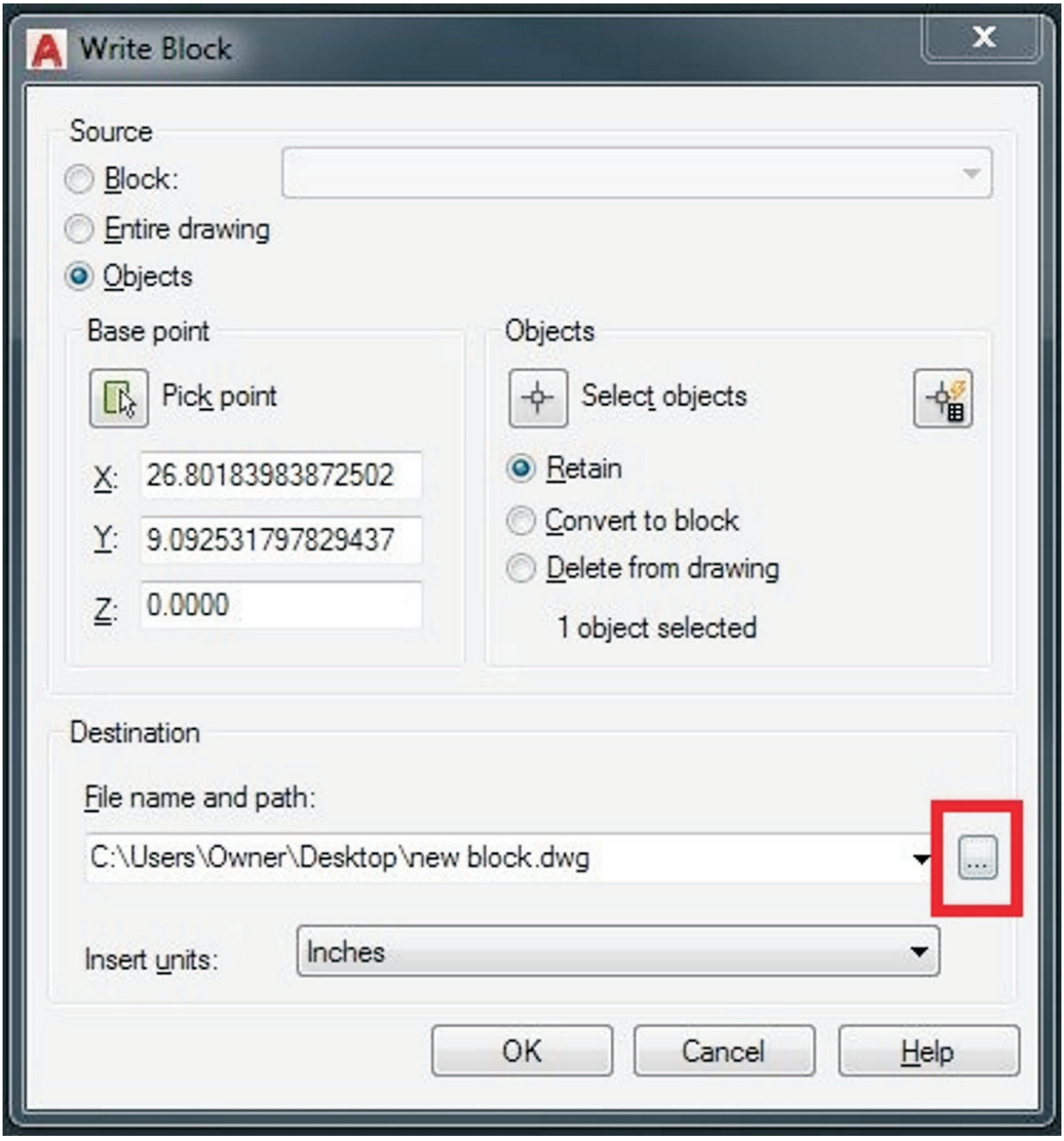
AUTOCAD'S STANDARD FILE SELECTION DIALOG BOX ICON



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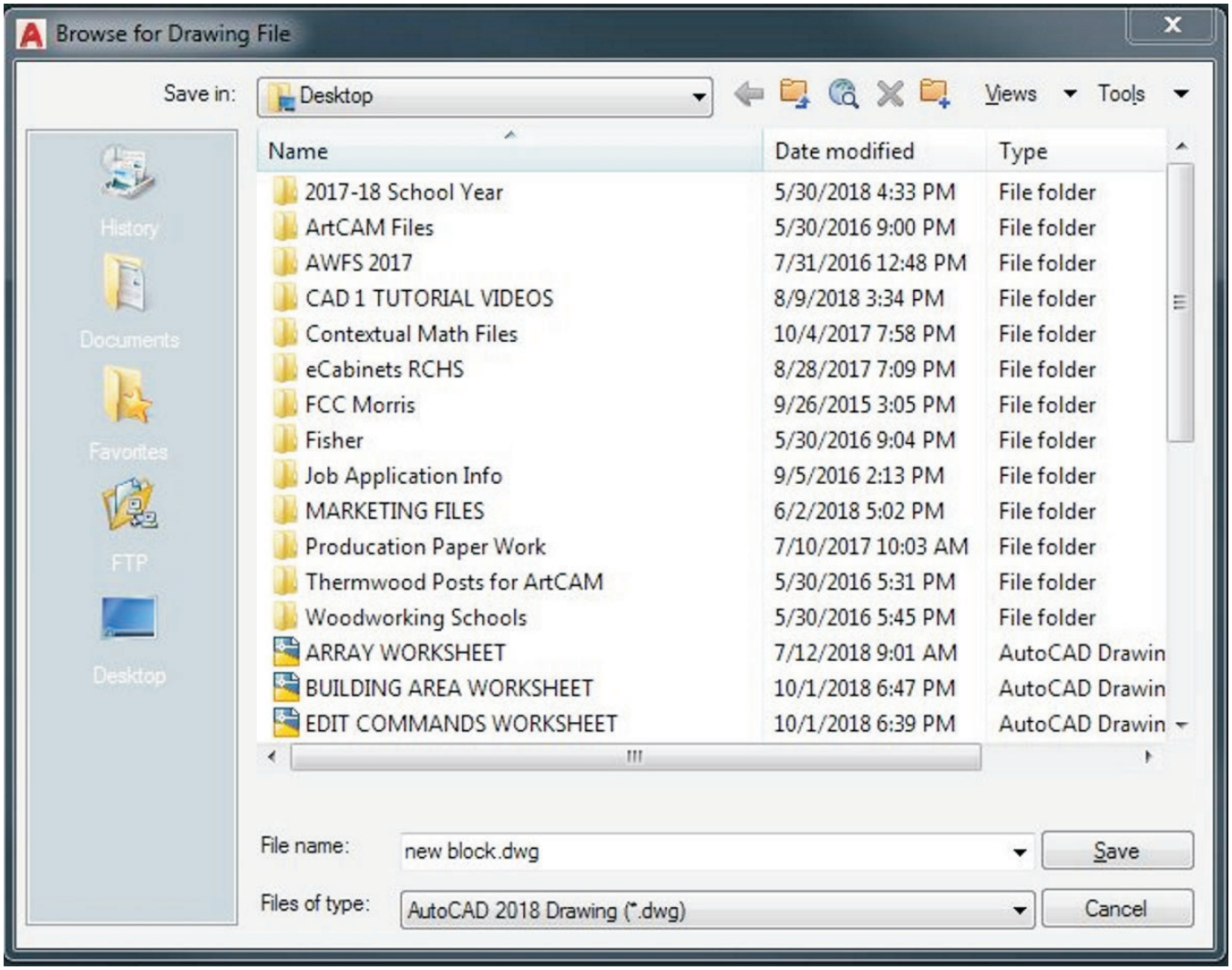
AUTOCAD'S BROWSE FOR FILE WINDOW



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LS–A

Name _____

Create Blocks and Wblocks

Purpose:

The purpose of this lab activity is to create blocks and wblocks.

Materials:

- lab sheet
- computer with Internet access and AutoCAD program

Objective:

Create blocks and wblocks.

Procedure:

1. Download the "CAD Workstation Block Exercise" at https://drive.google.com/file/d/17AiYWuQLRksmX7UIaQh_rBB7B4XJOxBJ/view?usp=sharing.
2. Complete the 'Block Exercise' by using your class notes to set up blocks and wblocks in a drawing template.
3. Turn your completed drawing template, with blocks and wblocks, in to your instructor via the class method of submission.