

CREATING SCALED DRAWINGS

In the lessons previous to Lesson 26 you worked only in Model space. Then in Lesson 26 you learned that AutoCAD actually has another environment called Paper Space, or Layout. In this lesson we need to learn more about why we need 2 environments and how they make it easier to display and plot your drawings.

A very important rule in CAD you must understand is:

“All objects are drawn full size”

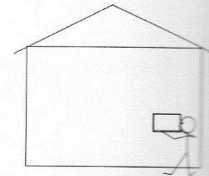
In other words, if you want to draw a line 20 feet long, you actually draw it 20 feet long. If the line is 1/8” long, you actually draw it 1/8” long.

Drawing and Plotting objects that are very large or very small.

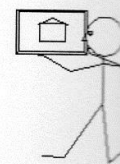
In the previous lessons you created medium sized drawings. Not too big, not too small. But what if you wanted to draw a house? Could you print it to scale on an 8-1/2 X 11 piece of paper? How about a small paper clip. Could you make it big enough to dimension? Let's start with the house.

How to print an entire house on an 8-1/2 X 11 sheet of paper.

Remember the photo and picture frame example I suggested in lesson 26? (Refer to 26-5) This time try to picture yourself standing at the front door of your house with an empty picture frame in your hands. Look at your house through the picture frame. Of course the house is way too big to fit in the frame. Or is it because you are standing too close to the house?



Now walk across the street and look through the picture frame in your hands again. Does the house appear smaller? Can you see all of it in the frame? If you could walk far enough away from the house it would eventually appear small enough to fit in the picture frame in your hands. But...the house did not actually change size, did it? It only appears smaller because you and the picture frame are farther away from it.



Adjusting the Viewport scale.

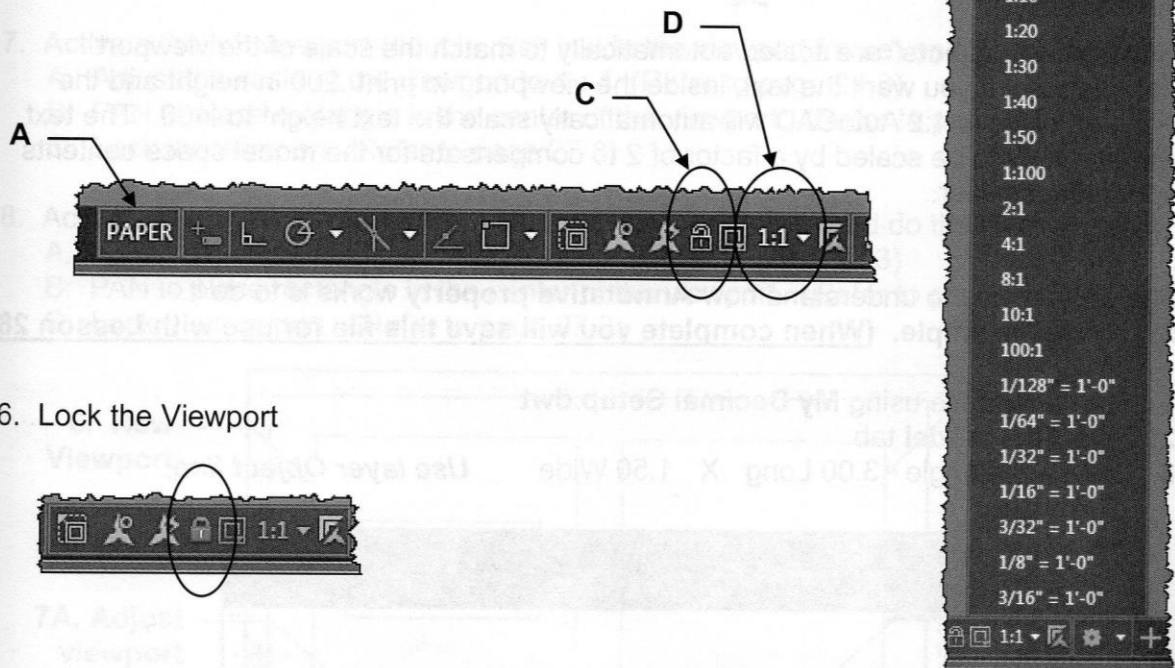
When using AutoCAD, walking across the street with the frame in your hands is called **Adjusting the Viewport scale**. You are increasing the distance between model space (your drawing) and Paper space (Layout) and that makes the drawing appear smaller. For example: A viewport scale of 1/4" = 1' would make model space appear 48 times smaller. But, when you dimension the house, the dimension values will be the actual measurement of the house. In other words, a 30 ft. line will have a dimension of 30'-0".

When plotting something smaller, like a paperclip, you have to move the picture frame closer to model space to make it appear larger. For example: 8 = 1

ADJUSTING THE VIEWPORT SCALE

The following will take you through the process of adjusting the scale within a viewport.

1. **Open** a drawing.
2. Select a **Layout** tab. (paper space)
3. Create a new **Page Setup**
4. Cut a new Viewport or unlock an existing Viewport.
5. Adjust the scale
 - A. You must be in Paper Space. (See below)
 - B. Select the Viewport Frame.
 - C. Unlock Viewport, if locked.
 - D. Select the Viewport Scale down arrow.
 - E. Select the scale from the list of scales.

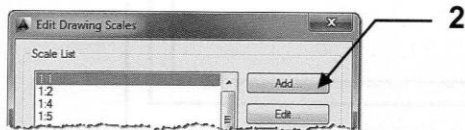


6. Lock the Viewport

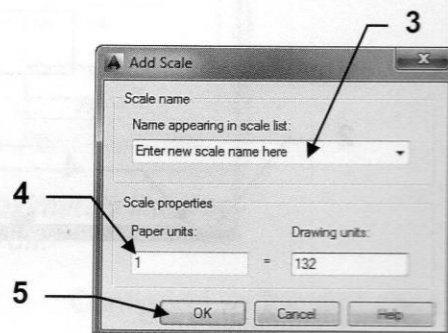


Note: If you would like to add a scale that is not on the list:

1. Type **Scaledit**
2. Select **Add** button.

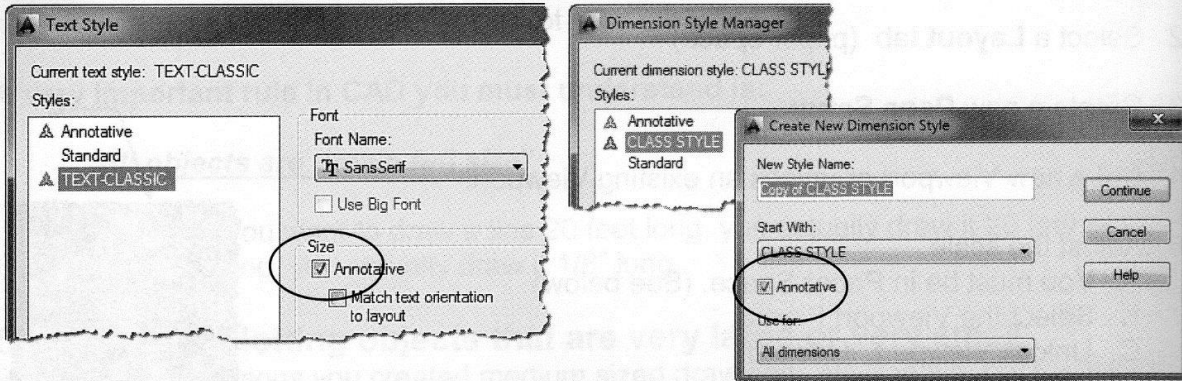



3. Enter Scale name to display in scale list.
4. Enter Paper and drawing units.
5. Select the **OK** button.



ANNOTATIVE OBJECTS

In lesson 26 you created a new text style and dimension style. You also added the “**Annotative**” property to both simply by placing a check mark in the Annotative box.

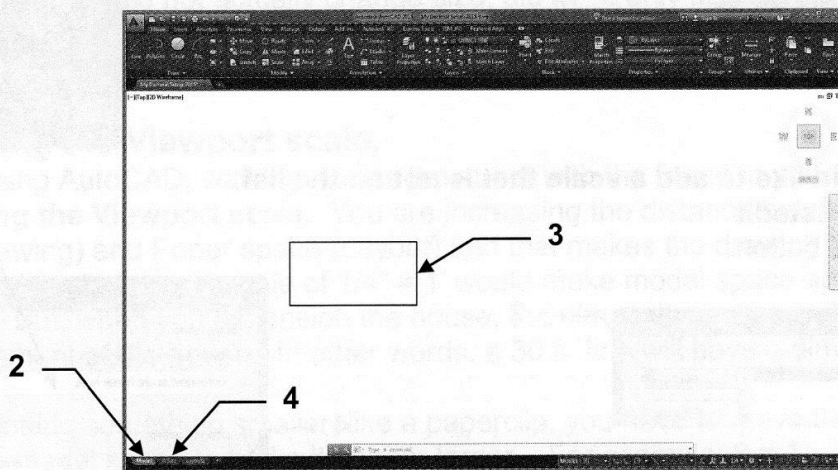


The Text style and Dimension Style shown above are now **Annotative**. Notice the Annotative symbol  beside the Style Name. (No symbol by “Standard”.)

“**Annotative objects**” are scaled automatically to match the scale of the viewport. For example, if you want the text, inside the viewport, to print .200 in height and the viewport scale is 1:2 AutoCAD will automatically scale the text height to .400. The text height needs to be scaled by a factor of 2 to compensate for the model space contents appearing smaller.

The easiest way to understand how **Annotative property** works is to do it. **So try this example. (When complete you will save this file for use with Lesson 28.)**

1. Start a New file using **My Decimal Setup.dwt**
2. Select the **Model** tab.
3. Draw a rectangle 3.00 Long X 1.50 Wide **Use layer Object line.**

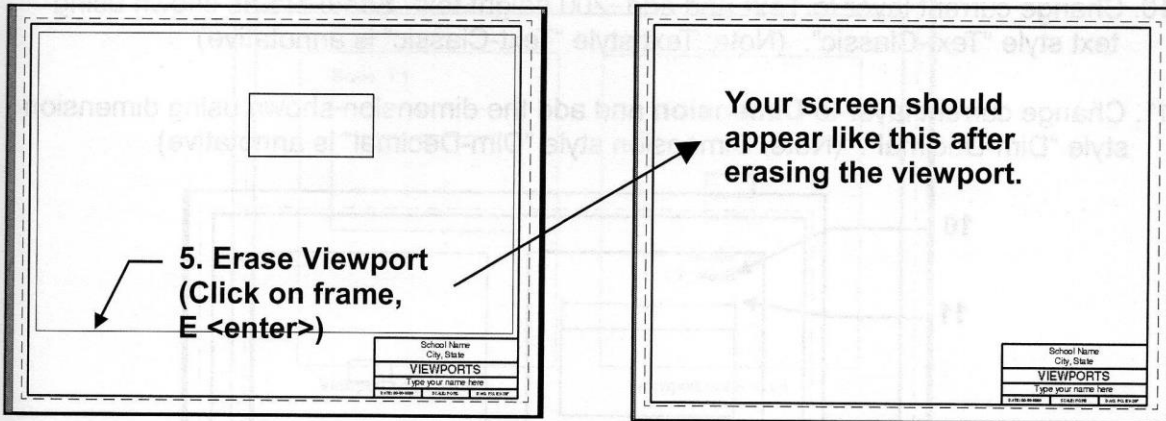


4. Select the **A Size** tab.

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ANNOTATIVE OBJECTS....continued

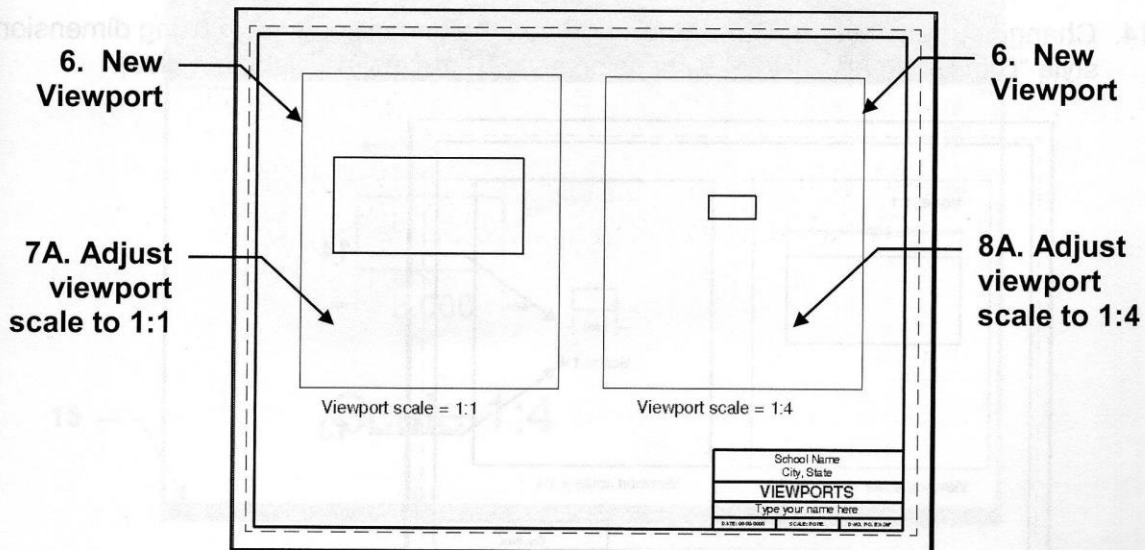
5. Erase the existing single viewport frame.



6. Change current layer to Viewport and cut 2 new viewports as shown below.(See 26-7)

7. Activate the left viewport (double click inside the viewport frame) and do the following:
 A. Adjust the scale of the viewport to **1 : 1** (Refer to page 27-3)
 B. PAN to place rectangle in the center of the viewport. (Refer to page 26-10)
 C. Lock the viewport (Refer to page 27-3)

8. Activate the right viewport (click inside the viewport frame) and do the following:
 A. Adjust the scale of the viewport to **1 : 4** (Refer to page 27-3)
 B. PAN to place rectangle in the center of the viewport. (Refer to page 26-10)
 C. Lock the viewport (Refer to page 27-3)

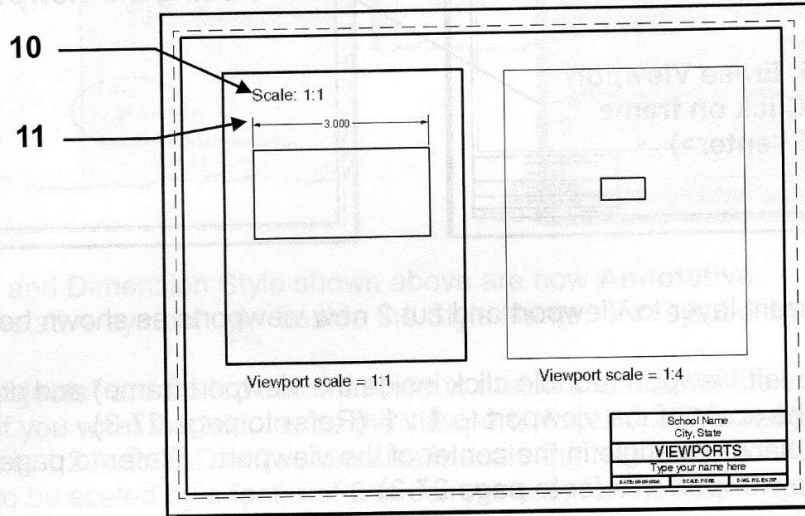


Your screen should appear approximately like this.
 Note: My grids are off.

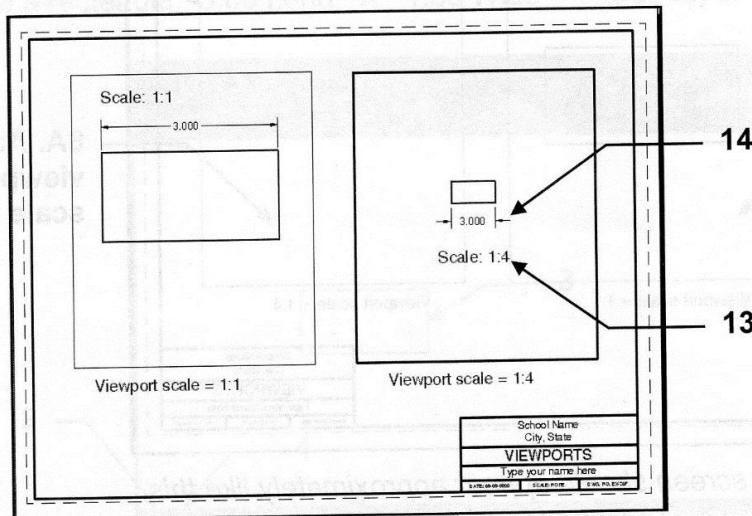
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ANNOTATIVE OBJECTS....continued

9. Activate the left hand viewport. (Double click inside left hand viewport)
10. Change current layer to **Text** and add .200 height text **Scale 1:1** as shown using text style "Text-Classic". (Note: Text style "Text-Classic" is annotative)
11. Change current layer to **Dimension** and add the dimension shown using dimension style "Dim-Decimal". (Note: Dimension style "Dim-Decimal" is annotative)



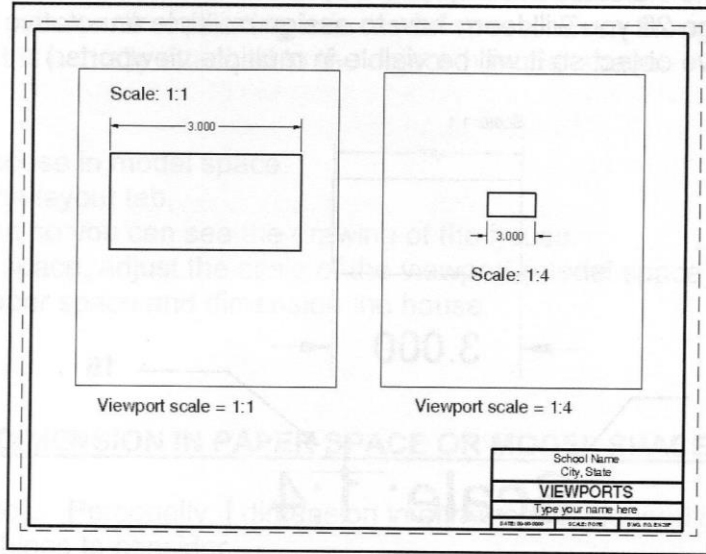
12. Activate the right hand viewport. (Click inside right hand viewport)
13. Change current layer to **Text** and add .200 height text **Scale 1:4** as shown using text style "Text-Classic". (Note: Text style "Text-Classic" is annotative)
14. Change current layer to **Dimension** and add the dimension shown using dimension style "Dim-Decimal". (Note: Dimension style "Dim-Decimal" is annotative)



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ANNOTATIVE OBJECTS....continued

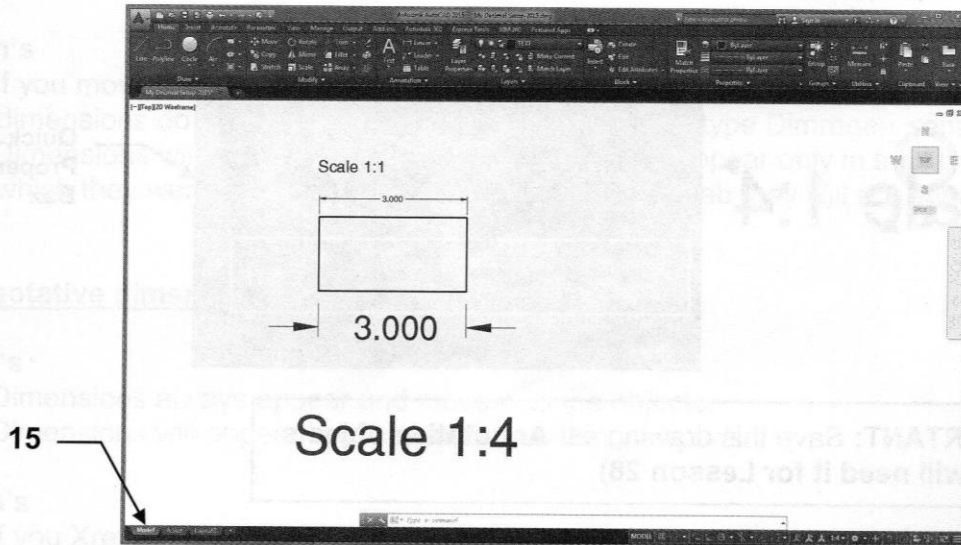
Notice that the text and dimensions appear the same size in both viewports.



15. Now select the **Model** tab.

Notice there are 2 sets of text and dimensions.


- One set has the annotative scale of 1:1 and will be visible only in a 1:1 viewport.
- One set has the annotative scale of 1:4 and will be visible only in a 1:4 viewport.
- But you see both sets when you select the model tab.

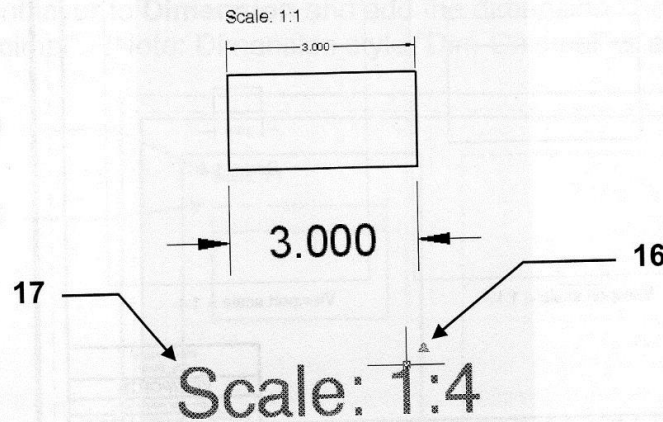


(In Lesson 28 you will learn how to assign multiple annotative scales to one set of text or dimensions so you will not have duplicate sets in the model tab.)

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ANNOTATIVE OBJECTS....continued

16. Place your cursor on any of the text or dimensions. An "Annotative symbol"  will appear. This indicates this object is annotative and it has only one annotative scale. (In lesson 28 you will learn how to assign multiple annotative scales to a single annotative object so it will be visible in multiple viewports.)



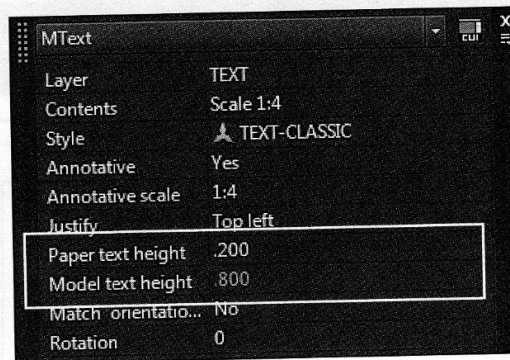
17. Click once on the **Scale: 1:4** text. The Quick properties box should appear. (Quick Properties button on the status bar must ON.)

Notice the text height is listed twice.

Paper text height = .200 This is the height that you selected when placing the text. When the drawing is printed the text will print .200.

Model text height = .800 This is the desired height of the text (.200) factored by the viewport scale (1:4). The viewport scale is a factor of 4. ($4 \times .200 = .800$)

Scale 1:4



Quick Properties Box

18. **IMPORTANT:** Save this drawing as: **Annotative objects**
(You will need it for Lesson 28)

Summary:

If an object is annotative AutoCAD automatically adjusts the scale of the object to the viewport scale. The most commonly used Annotative Objects are: Dimensions, Text, Hatch and Multileaders. Refer to the Help menu for more. (In lesson 28 you will learn how to assign multiple annotative scales to a single annotative object.)

PAPER SPACE DIMENSIONING

Some people prefer to dimension in paper space. Paper space dimensions are Trans-spatial. Trans-spatial means that you may place the dimension in paper space while the object you are dimensioning is in model space. Even though the dimension is in paper space it is actually attached to the object in model space.

For example,

1. You draw a house in model space.
2. Now select the layout tab.
3. Cut a viewport so you can see the drawing of the house.
4. Go to model space, adjust the scale of the viewport (model space) and lock it.
5. Now go to paper space and dimension the house.

SHOULD YOU DIMENSION IN PAPER SPACE OR MODEL SPACE?

This is your choice. Personally, I dimension in either space depending on the situation. Here are some things to consider.

Paper Space dimensioning

Pro's

1. You never have to worry about the viewport scale.
2. All dimensions will have the same appearance in all viewports.
3. If you Xref the drawing the dimensions do not come with it.
(Xref is not discussed in this workbook)

Con's

1. If you move the objects in model space, or adjust the viewport scale, sometimes the dimensions do not move with them. (If this happens type Dimregen <enter>)
3. Dimensions will not appear in the Model tab. They appear only in the layout tab in which they were placed. If you go to another layout tab they will not appear.

Annotative dimensioning in Model Space

Pro's

1. Dimensions always appear and move with the objects.
2. Dimensions will appear in all layout tabs within viewports.

Con's

1. If you Xref the drawing the dimensions come also.