

Lesson 1.4 Teacher Notes

Activity 1.4.2 Sketching Techniques

For middle school we will stress these line types: object or visible, construction, hidden, and center. Point out centerline bisector and center points in a hole during the presentation. Require students to use a pencil for all sketching.

Demonstrate on the board how to construct a straight line without having a straight edge. Also go over how to sketch a circle and triangle.

Explain why sketches are necessary (universal language)

Drill proper line techniques and types

Activity 1.4.3 Sketching Practice

Provide two simple objects for students to practice sketching in question 2 – these might be blocks, a paper clip, pencil eraser, etc. Students will follow the presentation as they complete this activity. Continually remind students that they will get better if they practice, practice, and practice some more.

No perspective drawings, spend 2 classes on isometric

Stress that height width and depth are all shown in an isometric drawing

Drawn back at 30 degree angles

For the first practice problem give an example to the class and go through it step by step

Since we're not doing perspective, students will go around to the room and sketch in isometric, the figure given at each of the 5 stations. This will be what we do the 2nd day

Activity 1.4.4 Orthographic Sketching

Activity 2 will use linking cubes or sugar cubes, Activity 3 will use wooden blocks created by the teacher, and Activity 4 can use either set of blocks.

Orthographic drawings and sketches are always completed the same way. A standard approach is established so that whoever looks at your drawing will understand immediately what is being communicated. The front view is placed in the lower left corner of the paper, the top view directly above the front, and the right side

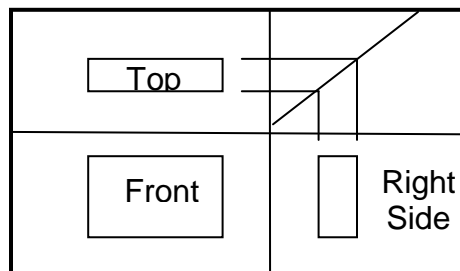
view to the right of the front view (see diagram below). It is very important that students understand this concept by the end of this activity.

Go over how to project the depth from the top to right side or vice versa using the 45 degree line.

Go over the matching as a class and have the students answer, and the first diagram in activity 2.

Students will draw each of the 5 figures on isometric graph paper as well as doing the orthographic projection.

Any cylinders, triangles, or half circles will be cubes in the building activity.



Crafting Block Directions

For Activity 2, make or purchase one set of blocks for every two students. The following are drawings and diagrams that you may use to craft blocks out of wood or other materials. Students will use these blocks to create different structures while learning about orthographic and isometric drawings.

Equipment and Materials:

You will need the following materials in order to make 12 block sets. You may want to make as many as 15 sets for a class of 30 students for the orthographic projection activity.

To make one set of 12 blocks, you will need:

- One foot of 1 in. square wood stock
- One three in. length of 1 in. diameter dowel stock
- Drill with ¼ in. bit
- Hand saw or table saw
- Wood vise to hold pieces
- Tape measure
- Pencil

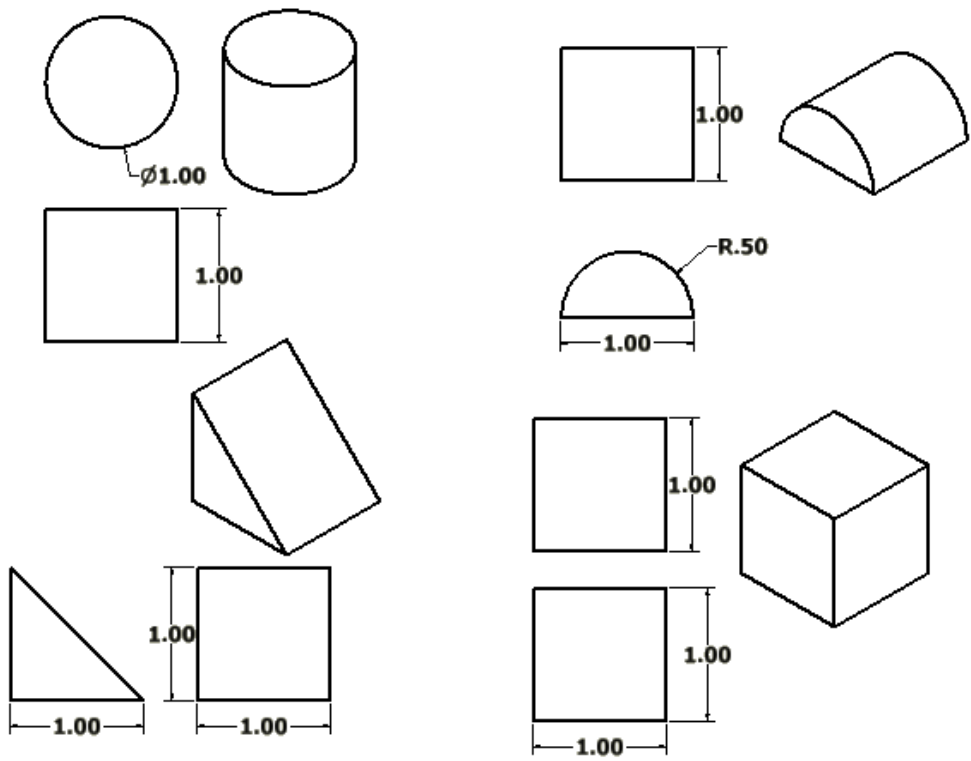


Procedure:

Using the working drawings below as a guide, lay out the wooden blocks as follows:

- 1 ½ cylinder
- 1 cylinder
- 2 right triangular prisms

- 7 cubes
- 1 cube with $\frac{1}{4}$ in. through hole



Activity 1.4.5 Dimensioning

Give students time to dimension sketches before advancing presentation slide to show answers. Students should evaluate and correct their work.

Stress the 8 dimensioning rules

Go over first part of #8 with the class

Keep enforcing that dimensions show the height, width, depth, and location of features.

Dimensioning Guidelines Presentation

Eight guidelines are featured here, but feel free to include other dimensioning rules that you think are necessary and that your students will be able to use. The following is the list of guidelines from the IED curriculum.

General Rules for Dimensioning

1. Dimensions should NOT be duplicated, nor should the same information be given in two different ways.
2. No unnecessary dimensions should be used – only those needed to produce or inspect the part.
3. Dimensions should be placed at finished surfaces or important center lines.
4. Dimensions should be placed so that it is not necessary for the observer to calculate, scale, or assume any measurement.
5. Dimensions should be attached to the view that best shows the shape of the feature to be dimensioned.
6. Dimensioning to hidden lines should be avoided.
7. Dimensions should not be placed on the object unless that is the only clear option.
8. Overall dimensions should be placed the greatest distance away from the object so that intermediate dimensions can nest closer to the object to avoid crossing extension lines.
9. A dimension should be attached to only one view (i.e., extension lines should not connect two views).
10. Dimension lines should never be crossed.
11. A center line may be extended and used as an extension line.
12. Leaders should slope at a 30, 45, or 60 degree angle.
13. Dimension numbers should be centered between arrowheads, except when using stacked dimensions where the numbers should be staggered.
14. In general, a circle is dimensioned by its diameter; an arc by its radius.
15. Holes should be located by their center lines.
16. Holes should be located in the view that shows the feature as a circle.
17. Extension lines start approximately 1/16 in. from the object and extend 1/8 in. past the last dimension.
18. The first dimension is approximately 3/8 in. from the object, and each associated dimension is spaced uniformly approximately 1/4 in. apart.
19. Dimensions should reflect the actual size of the object, not the scaled size.