

# Technology Education Grades 9-12

## Drafting I



# Technology Education, Grades 9 - 12

## Drafting I

**Grade Level:** 9, 10, 11, 12

**Prerequisite:** None

Drafting I is an elective course which provides students the opportunity to become familiar with the fundamentals of drafting and the significance it has in our present way of life. This course allows the student to explore the major areas of machine and architectural drafting. Areas to be covered include sketching, lettering, mechanical drawing, pictorials, and views of objects, and dimensioning. Drawings will be assigned with emphasis on accuracy, proper line technique, and neatness. Mechanical drawing and/or CAD will be utilized to complete drawings.

### Core Conceptual Objectives

- I. The student will construct freehand sketches. (SM 2.5)
- II. The student will effectively use drafting hardware by demonstrating accuracy, proper technique, neatness, and speed. (SM 2.5, 2.7)
- III. The student will letter according to lettering principles and techniques. (SM 2.5, 2.7)
- IV. The student will construct accurate geometric constructions on drafting problems. (SM 2.5, 2.7, 3.2)
- V. The student will construct three-dimensionally shaped objects. (SM 2.5, 2.7)
- VI. The student will apply dimensions to drafting problems according to dimensioning standards. (SM 2.5, 2.7, 3.2)
- VII. The student will plan and draw architectural drawings. (SM 2.5, 2.7)
- VIII. The student will construct pictorial drawings from orthographic views and dimensions. (SM 2.5, 2.7)
- IX. The student will utilize and analyze complete microcomputer systems and CAD software to construct graphic representations that demonstrate basic principles of drafting. (SM 1.4, 2.5)

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## Drafting I (cont.)

### I. Core Conceptual Objective:

The student will construct freehand sketches.  
(SM 2.5)

#### A. Content and Skills:

The students will learn:

1. Sketching
2. Object shapes
3. Object surfaces

#### B. Facilitating Activities:

The student may:

1. construct sketching drawings containing horizontal, vertical, inclined, and circular lines. (2) (T)
2. center and proportion a given sketching problem in the workspace. (2) (T)

#### C. Application Level Assessment:

The student will construct accurate examples of technical sketches using skills of sketching to organize assigned drawings.

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### Drafting I (cont.)

#### II. Core Conceptual Objective:

The student will effectively use drafting hardware by demonstrating accuracy, proper technique, neatness and speed.  
(SM 2.5, 2.7)

#### A. Content and Skills:

The students will learn:

1. Measuring
2. Instrument usage
3. Line quality
4. Drafting Tools

#### B. Facilitating Activities:

The student may:

1. demonstrate T-square, triangle, compass, and scale usage. (1) (T)
2. demonstrate computer software usage. (1) (T)
3. construct horizontal lines, vertical lines, and parallel lines using drafting equipment. (2) (T)
4. lay out and construct circles and arcs. (2) (T)
5. draw to scale accurately. (2) (T)
6. construct mechanical drawings using the appropriate lines and proper techniques. (2) (T)
7. create or plot a mechanical drawing. (2) (T)

#### C. Application Level Assessment:

The student will produce effective mechanical drawings, using drafting software.

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## Drafting I (cont.)

### III. Core Conceptual Objective:

The student will letter according to lettering principles and techniques.  
(SM 2.5, 2.7)

#### A. Content and Skills:

The students will learn:

1. Lettering technique
2. Lettering principles

#### B. Facilitating Activities:

The student may:

1. demonstrate lettering technique for mechanical drawings using proper formation. (2) (T)
2. produce lettering on mechanical drawings. (2) (T)

#### C. Application Level Assessment:

The student will produce lettering information on a drawing.

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## Drafting I (cont.)

### IV. Core Conceptual Objective:

The student will construct accurate geometric constructions on drafting problems.  
(SM 2.5, 2.7, 3.2)

#### A. Content and Skills:

The students will learn:

1. Geometric shapes
2. Construction Methods
3. Measurement techniques
4. Mathematical reasoning

#### B. Facilitating Activities:

The student may:

1. identify given parts and shapes of circles, angles, and plane figures. (1)
2. construct basic geometric shapes on mechanical drawings. (2) (T)
3. construct lines, arcs, and circles on mechanical drawings. (2) (T)

#### C. Application Level Assessment:

The student will create drawings, utilizing accurate geometric construction techniques.

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## Drafting I (cont.)

### V. Core Conceptual Objective:

The student will construct three-dimensionally shaped objects.  
(SM 2.5, 2.7)

#### A. Content and Skills:

The students will learn:

1. Measurement
2. Line quality
3. Orthographic projection
4. Normal surfaces
5. Line, arc, circle construction methods

#### B. Facilitating Activities:

The student may:

1. properly organize multi-view drawings in the drawing space. (2) (T)
2. sketch multi-view drawings from pictorial problems. (1) (T)
3. explain components of computer-aided drafting (CAD) software. (1) (T)
4. utilize CAD software to draw various views. (2) (T)
5. draw multi-view drawings using orthographic projection. (2) (T)
6. draw multi-view drawings with normal lines and planes. (2) (T)
7. draw multi-view drawings with inclined lines and planes. (2) (T)
8. draw multi-view drawings with oblique lines and planes. (2) (T)
9. draw multi-view drawings with arcs and circles. (2) (T)

#### C. Application Level Assessment:

The student will construct multi-view drawings using orthographic projection.

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## Drafting I (cont.)

### VI. Core Conceptual Objective:

The student will apply dimensions to drafting problems according to dimensioning standards.

(SM 2.5, 2.7, 3.2)

#### A. Content and Skills:

The students will learn:

1. Dimension terms
2. Dimension standards
3. Measurement
4. Drawing technique

#### B. Facilitating Activities:

The student may:

1. identify and draw lines used in dimensioning. (2) (T)
2. apply dimensions to mechanical drawings. (2) (T)
3. discuss dimensioning standards. (1)
4. utilize computer-aided drafting (CAD) software to dimension drawings. (2) (T)

#### C. Application Level Assessment:

The student will apply dimensions to drawings according to acceptable dimensioning standards.

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### **Drafting I (cont.)**

#### **VII. Core Conceptual Objective:**

The student will plan and draw architectural drawings.  
(SM 2.5, 2.7)

#### **A. Content and Skills:**

The students will learn:

1. Floor plan symbols
2. Floor plan requirements
3. Size requirements

#### **B. Facilitating Activities:**

The student may:

1. discuss basic floor plan layout. (1)
2. demonstrate floor plan symbol construction. (2)
3. review floor plan layout to identify symbols and critique quality of plan. (4)
4. utilize computer-aided drafting (CAD) software to draw floor plans. (2)  
(T)

#### **C. Application Level Assessment:**

The student will draw an architectural floor plan.

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## Drafting I (cont.)

### VIII. Core Conceptual Objective:

The student will construct pictorial drawings from orthographic views and dimensions. (SM 2.5, 2.7)

#### A. Content and Skills:

The students will learn:

1. Isometric views
2. Isometric plans
3. Linear measurement

#### B. Facilitating Activities:

The student may:

1. define an isometric view. (1)
2. identify procedures for drawing an isometric view. (1) (T)
3. construct Isometric drawings. (2) (T)
4. critique procedures for drawing various perspectives. (4)
5. construct perspective drawings. (2) (T)
6. utilize computer-aided drafting (CAD) software to construct pictorial drawings. (2) (T)

#### C. Application Level Assessment:

The student will draw isometric, cabinet, and oblique pictorial drawings.

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## Drafting I (cont.)

### IX. Core Conceptual Objective:

The student will utilize and analyze complete microcomputer systems and CAD software to construct graphic representations that demonstrate basic principles of drafting.

(SM 1.4, 2.5)

#### A. Content and Skills:

The students will learn:

1. Historical development of computer technology.
2. Components of a micro-computer and peripheral equipment
3. CAD applications

#### B. Facilitating Activities:

The student may:

1. discuss and analyze the historical developments of computer technology. (4)
2. identify and describe various microcomputer hardware and software components and how they impact the entire system. (3) (T)
3. investigate and utilize a microcomputer system employing CAD software, such as AutoCAD. (2) (W, R, T)

#### C. Application Level Assessment:

The student will create and produce assigned graphic representations, utilizing a microcomputer system and CAD software.

## Technology Education, 9-12 Drafting I (CCO #I-IX) SCORING GUIDE

Use of American National Standards Institute (hereafter abbreviated ANSI) guidelines throughout course.

Criteria	Level IV	Level III	Level II	Level I
<b>View Construction</b>	Demonstrates proper line quality and line usage with few or no errors.	Demonstrates proper line quality and line usage with minimal errors.	Demonstrates proper line quality and line usage, but with many errors and/or several re-works.	Demonstrates inappropriate line quality and line usage with several errors despite assistance.
<b>View Layout</b>	Demonstrates proper alignment, location and spacing with few or no errors.	Demonstrates proper alignment, location and spacing with minimal errors.	Demonstrates proper alignment, location and spacing, but with many errors and/or several re-works.	Demonstrates inappropriate alignment, location and spacing with several errors despite assistance.
<b>Dimensioning and Lettering</b>	Applies ANSI drafting standards precisely. Correctly places text & dimensions with few or no errors.	Applies ANSI drafting standards. Correctly places text & dimensions with minimal errors.	Applies ANSI drafting standards. Places text & dimensions, but with many errors and/or several re-works.	Inappropriately applies ANSI drafting standards. Places text & dimensions inappropriately with several errors despite assistance.
<b>Knowledge and Use of Content</b>	Follows instructions without assistance. Proposes more efficient processes. Maximizes use of previous knowledge.	Follows instructions with minimal assistance. Proposes more efficient processes. Uses previous knowledge.	Follows instructions with major reliance on instructor or peers. Demonstrates limited use of previous knowledge.	Does not follow instructions. Relies heavily on teacher or peer assistance to complete operations. Gives no evidence of previous knowledge.
<b>CADD usage and Spatial Visualization Skills</b>	Demonstrates high degree of spatial visualization skills & speed. Prioritizes command utilization. Creates & modifies objects.	Demonstrates acceptable spatial visualization skills & speed. Correctly employs command utilization.	Demonstrates marginal spatial visualization skills & speed. Needs assistance to use commands in proper order.	Demonstrates substandard spatial visualization skills & speed. Does not use commands without direct assistance.