

Drafting Merit Badge Requirements

You must have access to a computer aided design (CAD) program to complete this merit badge. A suggested program is Fusion 360 from AutoCAD. The process for signing up for a free student account is at the end of this document. This should be done at least 48 hours before the merit badge session.

It is strongly suggested that the “pre class” items be done before the merit badge session. The resource links (www.scouting.org/merit-badges/drafting/) and the merit badge booklet (filestore.scouting.org/filestore/Merit_Badge_RegandRes/Pamphlets/Drafting.pdf) will guide you on completing these items.

1. (pre class) Format TWO sheets of drawing paper with proper borders and title blocks - one for your manual project (see requirement 2) and one for your lettering project (see requirement 6).

Resource: [Technical Drawing - Border and Title Block \(video\)](#)

(a) Make a rough sketch for each of your project drawings to determine the correct size of paper to format.

Resource: [How to Calculate Scale, Papers Size and Maximum Drawing Size \(video\)](#)

(b) Using either single-stroke vertical or slant Gothic lettering, fill in all important information in the title block sections of the formatted paper.

Resource: [Border, Title Block and Lettering \(video\)](#)

2. (pre class) Using the formatted sheet of paper you prepared for your manual project, produce a pencil drawing as it would be used for manufacturing. Fill in all title block information. The manual drawing may be any one of the following drawing types:

(a) Architectural: Make a scale drawing of an architectural project. The architectural drawing may be a floor plan; electrical, plumbing, or mechanical service plan; elevation plan; or landscaping plan. Use an architect's scale and show dimensions to communicate the actual size of features. Include any important sectional drawings, notes, and considerations necessary for construction. Properly print a bill of materials for at least three of the raw materials or components in the project.

**** **Suggest your bedroom with furniture**

Resource: [How to Sketch a Floor Plan | COMPLETE Beginner's Guide!! Step by Step \(video\)](#)

(b) Mechanical: Make a scale drawing of some mechanical device or interesting object. The mechanical drawing may be of the orthographic (third-angle) or isometric style. Use an engineer's scale and show dimensions to communicate the actual size of features. Include any important sectional drawings, notes, and manufacturing considerations. Properly print a bill of materials for at least three of the raw materials or components in the assembly.

Resource: Isometric [Drawing Made Easy: How to Draw Isometric Views with Orthographic Projections \(video\)](#)

(c) Electrical: Draw a simple schematic of a radio or electronic circuit. Properly print a bill of materials including all of the major electrical components used in the circuit. Use standard drawing symbols to represent the electronic components.

Resource: [How to Draw an Electrical Circuit in AutoCAD \(video\)](#)

3. (pre class (sign up) + in class + post class) Produce a computer-aided design (CAD) drawing as it would be used in manufacturing. Fill in all title block information. The CAD drawing may be any one of the following drawing types:

*** **directions to Fusion web based at the end of this document**

(a) Architectural: Make a scale drawing of an architectural project. The architectural drawing may be a floor plan; electrical, plumbing, or mechanical service plan; elevation plan; or landscaping plan.

Use an architect's scale and show dimensions to communicate the actual size of features. Include any important sectional drawings, notes, and considerations necessary for construction.

Resource: [AutoCAD 2D Basics - Tutorial to Draw a Simple Floor Plan \(Fast and Effective!\) \(video\)](#)

- (b) Mechanical: Make a scale drawing of some mechanical device or interesting object. The mechanical drawing may be of the orthographic (third-angle) or isometric style. Use an engineer's scale and show dimensions to communicate the actual size of features. Include any important sectional drawings, notes, and manufacturing considerations.

**** **Suggest a simple item (bike part, car part, etc)**

Resource: [Technical Drawing Tutorial - Prepare a Perfect Mechanical Drawing for Machinists \(video\)](#)

- (c) Electrical: Draw a simple schematic of a radio or electronic circuit. Properly print a bill of materials including all of the major electrical components used in the circuit. Use standard drawing symbols to represent the electronic components.

Resource: [How to Draw an Electrical Circuit in AutoCAD \(video\)](#)

4. (in class + post class) Do the following:

- (a) Present a copy of your drawings from Requirements 2 and 3, either in paper or digital format to your counselor. Your counselor will return a redlined version of your drawings indicating to add/remove/change a feature, material, BOM QTY, etc.
- (b) Make the correction from the redline, identify it on the drawings with a revision marker, and add a revision block.

Resource: [AutoCAD II 25-19 Revision History Blocks \(video\)](#)

5. (in class + post class) Discuss with your counselor how fulfilling requirements 2, 3 and 4 differed from each other. Tell about the benefits derived from using CAD for requirements 3 and 4. Include in your discussion the software you used as well as other software options that are available.

6. (in class + post class) Using single-stroke slant or vertical Gothic lettering (without the aid of a template or lettering guide), write a brief explanation of what you consider to be the most important benefit in using CAD in a particular industry (aerospace, electronics, manufacturing, architectural, or other). Use the experience gained in fulfilling requirements 2 through 5 to support your opinion. Use the formatted sheet of paper you prepared in requirement 1 for your lettering project.

7. Do ONE of the following:

- (a) Visit a facility or industry workplace where drafting is part of the business. Ask to see an example of the work that is done there, the different drafting facilities, and the tools used.

Resource: [Benefits of AutoCAD to Manufacturing Design Workflow \(video\)](#)

- (1) Find out how much of the drafting done there is manual and how much is done using CAD. If CAD is used, find out what software is used and how and why it was chosen.
- (2) Ask about the drafting services provided. Ask who uses the designs produced in the drafting area and how those designs are used. Discuss how the professionals who perform drafting cooperate with other individuals in the drafting area and other areas of the business.
- (3) Ask how important the role of drafting is to producing the end product or service that this business supplies. Find out how drafting contributes to the company's end product or service.
- (b) **(pre class + in class + post class)** Using resources you find on your own such as at the library and on the internet (with your parent or guardian's permission), learn more about the drafting trade and discuss the following with your counselor.

**** **Suggest this item ... if not arrange your own visit (a) with a parent/guardian**

Resources: [Tracing the Evolution of Technical Drawings: From Da Vinci to CAD \(URL with video\)](#)
[The Evolution of Drafting \(video\)](#)
[A Walk Through the History of CAD \(video\)](#)

- (1) The drafting tools used in the past - why and how they were used. Explain which tools are still used today and how their use has changed with the advent of new tools. Discuss which tools are being made obsolete by newer tools in the industry.
- (2) Tell what media types were used in the past and how drawings were used, stored, and reproduced. Tell how the advent of CAD has changed the media used, and discuss how these changes affect the storage or reproduction of drawings.
- (3) Discuss whether the types of media have changed such that there are new uses the drawings, or other outputs, produced by designers. Briefly discuss how new media types are used in the industry today.

8. (pre class + in class + post class) Identify three career opportunities that would use skills and knowledge in Drafting. Pick one and research the training, education, certification requirements, experience, and expenses associated with entering the field. Research the prospects for employment, starting salary, advancement opportunities and career goals associated with this career. Discuss what you learned with your counselor and whether you might be interested in this career.

Resources: [Drafter | Careers That Work \(video\)](#)

[23 Different Types of Drafting Jobs \(Plus Salary Information\) \(website\)](#)

Access to an online version of Fusion 360 through your web browser.

Go to fusion.online.autodesk.com and create an account, use your school email. If you do not have a school email have a parent contact the MB counselor.

At the next page "Autodesk Education or Commercial Account Required" click on "this page" (in the text "sign up for an Autodesk Education account on this page")

On the next page select Fusion

On the next page select Student

Fill in the information. When you enter your school name it should appear in a pull down, choose that school. It is suggested to send an image of your school id to validate the registration. This will link your name to the school name you entered.

scouting.org/.../drafting/