2026 Merit Badge Challenge
Model Design and Building

Counselors: **Mr. Brugger (John)** **741-0678**
e-mail: jbrugge@fuse.net
Mr. Baldwin (Jack) **777-4246**
e-mail: jackb1951@gmail.com

Schedule

Week 1	**Overview types of models**	
Jan. 17	**Discuss scale**	
	Discuss materials	
	Discuss tools	
	Discuss fasteners and adhesives	
	Materials	
	Finishes	
Week 2	**Turn in safety worksheet**	**Requirement 1**
Feb. 21	**Turn in types of models essay**	**Requirement 2**
	Show finished model and project sheet	**Requirements 3 & 4**
	Show space/sci-fi model and project sheet	**Requirement 5**
	Turn in model building career worksheet	**Requirement 6**
	Fun with simple machines	**Time permitting**

Please e-mail one of the counselors if you need help with your model building project, need to discuss plans, need advice on materials, tools and techniques and guidance in preparation of the Project Sheets.
In keeping with Scouting America Youth Protection policies please copy a parent or guardian on your e-mails.

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Requirement 6 Worksheet

Scout Name: _____ **MBC Session:** C (12:30) D (2:15)

Date: _____

Research one career utilizing model building and find the following:

Business or Career

_____

Training or education required

_____

Training or education costs

_____

Job prospects and salary

_____

Job content or duties

_____

To help you, here are some businesses that use models and a list of purposes for which models may be used

Business
Aeronautics (Aviation)
Amusement Parks
Architecture and Building
Automotive
Chemical & Petroleum
Energy
Environmental and civil engineering
Law
Machinery and Manufacturing
Medicine and Science
Movies (film) and theater
Museums and historic parks
Office Equipment
Sales
Toy Industry
Undersea and Naval

	Model Uses
1	Court room models
2	Wind resistance studies
3	Human factors study
4	Safety study
5	Product design development
6	Piping layouts
7	Ship design
8	Materials or fuel handling
9	Concept studies
10	Stage sets
11	Special effects
12	Robots
13	Make-up
14	Motion study
15	Force study
16	Internal and 3-D strain studies
17	Building and house appearance
18	Office layout
19	Site study
20	City Planning
21	Topographic studies
22	River flow study
23	Dams and spillway studies
24	Pollution studies

25 Sales conventions
26 Showroom displays
27 Dioramas
28 Physics demonstrations
29 Display of artifacts
30 Historical sites
31 Planetariums
32 Plant layouts
33 Structural testing
34 Harbor and dock studies
35 Human and animal anatomy
36 Molecular structure demonstration

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Reqmt. 5 Project Summary Sheet

Scout Name: _____

MBC Session: _____ **C** _____ **D**

Complete this sheet and turn it in when you present your finished model:

Type of spacecraft built: _____

Draw a sketch of model on back of this sheet

Design features checklist:

Cockpit or control space	☐	Crew living space	☐
Supply storage space(s)	☐	Propulsion system	☐
Engineering space(s)	☐	Fuel spaces	☐

Scale used: _____

Materials:
(What you used, what you used it for)

Adhesives & Fasteners:
(What you used, what you used it for and why)

Finishes:
(What you used, what you used it for and why)

What was the biggest problem or challenge you had in building your model? What did you

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Reqmt. 3 & 4 Project Summary Sheet

Scout Name: _____

MBC Session: _____ **C** _____ **D**

Complete this sheet and turn it in when you present your finished model:

Type of model built: architectural structural process mechanical industrial

Subject (what you made): _____

Scale used: _____

Materials:
(What you used, what you used it for) _____

Adhesives & Fasteners:
(What you used, what you used it for and why) _____

Finishes:
(What you used, what you used it for and why) _____

What was the biggest problem you had in building your model? How did you solve it? What did you learn? _____

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Requirement 2

Name: _____

2. Explain use of the following types of models and research materials that could be used to make these models:

a. Architectural

b. Structural

c. Process

d. Mechanical

e. Industrial

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Requirement 1 Worksheet

Name: _____ **MBC Session:** C (12:30) D (2:15)
Date: _____

Mark T (True) or F (False) each of the following statements
There are 42 statements. You must get at least 33 correct to pass this test.

Line	T/F	
1	_____	Never work alone when using power tools
2	_____	Always use a tool only for its designed purpose
3	_____	Make sure the tools you use are in good condition
4	_____	Always wear safety goggles or a face shield when cutting, drilling or sawing.
5	_____	Keep safety goggles and face shields clean and scratch free.
6	_____	Only use the face of a hammer to strike an object.
7	_____	Always swing a hammer as hard as you can.
8	_____	When using a hand saw, hold the object you are cutting with your hand.
9	_____	When sawing, make sure there is clearance so the saw won't hit anything.
10	_____	When sawing, push and pull smoothly and evenly, don't force.
11	_____	When a saw cut is almost through, twist the saw blade to break the pieces apart.
12	_____	Keep the handle of a screwdriver directly over the screw head.
13	_____	Apply steady pressure toward the screw when using a screwdriver.
14	_____	A screwdriver makes a good substitute for a chisel.
15	_____	Always tighten C-clamps as tight as you can.
16	_____	When drilling or sawing, make sure clamps are clear of the drill or saw.
17	_____	Attach a bench vise to a sturdy workbench or table.
18	_____	Never use a file without a handle.
19	_____	Avoid striking files with any hard object.
20	_____	Store files in a dry place.
21	_____	When using a chisel on soft wood, it is okay to hold the work piece with your hand.
22	_____	Wear safety goggles when using a chisel.
23	_____	Use a metal hammer to hit the chisel handle for extra cutting power.
24	_____	Cover chisel blades when not in use.
25	_____	Always use the correct size wrench on nuts and bolts.
26	_____	If a bolt is really tight, use a piece of pipe for an extension bar to get more force.
27	_____	When cutting wire or metal rods with pliers, cover the cut end so it won't fly out.
28	_____	Securely tighten twist drills in the drill chuck.
29	_____	If you can't find the drill chuck key, use pliers.
30	_____	Always run the drill at the fastest speed setting.
31	_____	Never use your fingers to clear chips from a drill.
32	_____	Always use sharp drills.
33	_____	Always clamp work to a bench or in a vise when drilling.
34	_____	When cutting with a knife, always cut away from your body.
35	_____	Have experienced adult supervision when using power tools
36	_____	Keep power tool cords and extension cords away from the work being done
37	_____	Always unplug power tools by grasping the plug head and pulling straight out.
38	_____	Don't carry power tools by the cord.
39	_____	Work in a well ventilated area when using volatile adhesives, paints and thinners
40	_____	Wear non-latex protective gloves when handling solvents, epoxy and CA adhesives
41	_____	Carefully follow instructions and have qualified supervision when using a 3-D printer
42	_____	Follow Scouting America guidelines when using on-line sources for research

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~ VERY IMPORTANT ~

ALLOWABLE MODEL BUILDING MATERIALS

Models built with Legos or other building block or construction sets will NOT be accepted for Requirements 4 or 5. You may use Lego people or other figures as passengers or crew in model vehicles or in architectural models and you may use Lego or other trees or bushes as landscaping for models, but the model itself may not be made of Legos or other construction kits. You may use toy vehicles as scenery or to demonstrate a structural model such as a bridge.

You may use commercial model building parts or kit pieces (kit bashing) to build your model. However, you **MUST** review your planned model building project with one of the counselors before you build the model to assure there is enough original work in the project.

COMPUTER GRAPHICS MODELS

The Model Design and Building Merit Badge Requirements 4 and 5 require you to build physical, three-dimensional models. A computer graphics model does not fulfill the merit badge requirements and cannot be accepted. However computer design software may be used and models made by 3-D Printing are acceptable provided they are your own original work.

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Model Design and Building Requirements

1. **Understand personal safety using model building tools, precautions using flammable and hazardous materials , use of personal protective equipment and safety and best practices using digital design software.**

2. **Explain use of the following types of models and research materials that could be used to make these models:**
   a. **Architectural**
   b. **Structural**
   c. **Process**
   d. **Mechanical**
   e. **Industrial**

3. **Select a modeling subject, prepare plans, list required materials and required tools.**

4. **Build a model in one of these categories:**
   a. **Architectural (House or similar size building; 1/4" = 1' scale or 1/50 metric)**
   b. **Structural (Corner construction of wood frame building ; 1 1/2" = 1' scale or 1/8 metric)**
   c. **Process (Plumbing system of a house; 3/4" = 1' scale or 1/15 metric)**
   d. **Mechanical (Mechanical device using as least 2 of 6 simple machines)**
   e. **Industrial (Passenger carrying vehicle; 1" = 1" or 1/2" = 1' scale, 1/12 to 1/25 metric)**

5. **Build a special effects model of a fantasy spacecraft or a hand-held prop that might appear in a science fiction movie. Determine the scale of the model and include (in a spacecraft) a cockpit or control area, living space, storage space, engineering space and propulsion system. The model does not have to show all of these areas (cut-away not required) but a sketch plan should be made to show these spaces.**

6. **Research one career using model making and discuss training, education and career opportunities in this field**