Scout Name: _____ Unit #: _____ Date: _____

MODEL DESIGN AND BUILDING

Merit Badge Requirements

1) Study and understand the requirements for personal safety when using such modelmaker hand tools as: knives handsaws, vices, files, hammers, screwdrivers, hand drills and drill bits, pliers, and portable power tools, and when to use protective equipment such as goggles when grinding and drilling. Know what precautions to take when using flammable or hazardous products such as: glue, epoxy, paint, thinners. Discuss these with your counselor before you begin your model-making project and tell why they are important.

2) Explain the uses for each of the following types of models: architectural, structural, process, mechanical, and industrial. Do research into the different types of materials that could be used in making these models.

3) With your counselor's advice, select a subject from requirement 4 for your model project (no kits). Prepare the necessary plans to the proper scale, a list of materials to be used, and a list of the required tools. This model should be your own original work. Tell why you selected this subject.

4) Do ONE of the following:

A) Make an architectural model. Build a model of a house to a scale of ¼"=1'0" (50: 1 Metric). Discuss with your counselor the materials you intend to use, the amount of detail required, outside treatment (finish, shrubbery, walks, etc.) and color selections. After completion of the model, present it to your counselor for approval.

B) Build a structural model. Construct a model showing corner construction of a wood frame building to a scale of 1 1/2"=1'0" (8:1 Metric). All structures shown must be to scale. Cardboard or flat sheet wood stock may be used for sheeting or flooring on the model. Review with your counselor the problems you encountered in gathering the materials and supporting the structure. Be able to name the parts of the floor and wall frames, such as intermediate girder, joist, bridging, subfloor, sill, sole plate, stud and rafter.

C) Make a process model. Build a model showing the plumbing system in your house. Show hot and cold water supply, all waste returns, and venting to a scale of 3/4"=1'0" (15:1 Metric). Talk to your counselor about how to begin this model, and present the scale and the materials you will use. After completion, present the model to your counselor and be prepared to discuss any problems you had building this model.

D) Complete a mechanical model. Build a model of a mechanical device that uses at least two of the six simple machines. After completing the model, present it to your counselor. Be prepared to discuss materials used, the machine's function and use, and any particular difficulty you may have encountered.

E) Make an industrial model. Build a model of an actual passenger-carrying vehicle to a scale of 1"=1'0" or 1/2"=1'0" (10:1 or 25:1 Metric). Take the dimensions of the vehicle, and record the important dimensions. Draw the top, front, rear, and sides of the vehicle to scale. From your plans, build a model of the vehicle to scale. From your plans, build a model of the vehicle and finish in a craftsman like manner. Discuss with your counselor the most difficult part of completing this model.

5) Build a special-effects model of a fantasy spacecraft that might appear in a Hollywood science-fiction movie. Determine an appropriate scale for your design – one that makes practical sense. Include a cockpit or control area, living space, storage unit, engineering spaces, and propulsion systems. As you plan and build your model, do the following:

A) Study aircraft, submarines, and naval ships for design ideas.
B) Arrange and assemble the parts.
C) Sketch your completed model
D) Write a short essay in which you discuss your design, scale, and materials choices. Describe how you engineered your model and discuss any difficulties you encountered and what you learned.

6) List at least six occupations in which modelmaking is used and discuss with your counselor some career opportunities in this field.

Worksheet Created by: Rob Greenland – robgreenland@juno.com

Scout Name: _____ Unit #: _____ Date: _____

Requirement 1

Study and understand the requirements for personal safety when using such modelmaker hand tools as: knives, handsaws, vices, files, hammers, screwdrivers, hand drills and drill bits, and portable power tools. Give a brief summary of your knowledge and explain some of the safety requirements when using these tools: _____

Know what precautions to take when using flammable or hazardous products such as: glue, epoxy, paint, and thinners. Give a brief summary of the precautions to take when using these products: _____

Discuss these safety requirements and features with your counselor and tell why they are important before you begin your model-making project: _____

Requirement 2

Explain the uses for each of the following types of models. Also, do some research into the different types of materials that could be used in making these models.

Architectural: _____

Materials Used: _____

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Structural: _____

Materials Used: _____

Process: _____

Materials Used: _____

Mechanical: _____

Materials Used: _____

Industrial: _____

Materials Used: _____

Requirement 3

With your counselor's advice, select a subject from requirement 4 for your model project (no kits).

What type of model have you selected? _____

Give a brief description of the model you plan to build: _____

Why did you select this subject? _____

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__ On separate pieces of paper prepare the necessary plans to the proper scale for your project. Attach your plans to this worksheet when completed. Show your plans to your counselor.

Use the space below or a separate piece of paper to make a list of materials to be used to build your model:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Use the space below or a separate piece of paper to make a list of the tools required to build your model:

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Requirement 4

For this requirement you have been asked to build a model. You have been given five options for the type of model you will build. Select a type of model then complete the requirements for the specific type of model you have chosen.

If you selected ***Option A****:* Make an architectural model

__ Build a scale model of a house you select to a scale of ¼”=1’0” (50:1 Metric).

Give a brief description of the house: _____
_____
_____
_____
_____
_____

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In requirement 3 you listed the types of material do you intend to use for the building of your model. Describe the amount of detail you will include: _____
_____
_____
_____
_____

Tell about the outside treatment that was, or will be used: _____
_____
_____
_____
_____

Tell about the colors you have selected for your model: _____
_____
_____
_____
_____

__ After completion of the model, present it to your counselor for approval.

If you selected ***Option B****:* Build a structural model

Build a model showing corner construction of a wood frame building to a scale of 1 1/2"=1'0" (8:1 Metric). All structure shown must be to scale. Cardboard of flat sheet wood stock may be used for sheeting or flooring on the model.

Tell about the problems you encountered in gathering the materials and supporting the structure: _____
_____
_____
_____
_____

__ Be able to name the parts of the floor and wall frames. Point them out and name them for your counselor when you show them your completed model.

___ Intermediate Girder ___ Joist ___ Bridging ___ Subfloor ___ Sill ___ Sole Plate ___ Stud ___ Rafter

If you selected ***Option C****:* Make A Process Model

Build a model showing the plumbing system in your house. Show hot and cold water supply, all waste returns, and venting to a scale of 3/4"=1'0" (15:1 Metric).

Talk to your counselor about how to begin this model. What did you discuss? _____
_____
_____
_____
_____
_____
_____
_____
_____

__ Present the scale and the materials you will use.

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__ After completion, present the model to your counselor.

Briefly describe any problems you had building this model: _____
_____
_____
_____
_____

If you selected ***Option D****:* Build Mechanical Model

Build a model of a mechanical device that uses at least two of the six simple machines. Give a brief description of the model you intend to build: _____
_____
_____
_____
_____

What materials do you plan to use for your model?

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Describe the function and use of the model you built: _____
_____
_____
_____
_____

Tell about any problems or difficulty you may have encountered: _____
_____
_____
_____
_____

__ Present your model to your counselor for approval.

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If you selected ***Option E:*** Make an Industrial Model

Build a model of an actual passenger-carrying vehicle to a scale of 1”=1’0” or 1/2”=1’0” (10:1 or 25:1 Metric).

Take the dimensions of the vehicle and record them in the space below:

__ On a separate piece of paper, draw the top, front, rear and sides of the vehicle to scale. When finished with your project, attach your plans to this worksheet.

__ From your plans, build a model of the vehicle and finish in a craftsman like manner. Show it to your counselor when completed.

Tell about the most difficult part of completing this model: _____
_____
_____
_____
_____

Requirement 5

Build a special-effects model of a fantasy spacecraft that might appear in a Hollywood science-fiction movie. Determine an appropriate scale for your design – one that makes practical sense.

What will be the scale of your model? _____

Include a cockpit or control area, living space, storage unit, engineering spaces, and propulsion systems.

Study aircraft, submarines, and naval ships for design ideas. What did you learn? _____
_____
_____
_____

_____ Arrange and assemble the parts.

_____On a separate piece of paper, sketch your completed model. Show this sketch to your counselor.

_____ Write a short essay in which you discuss your design, scale, and materials choices. Describe how you engineered your model and discuss any difficulties you encountered and what you learned. Attach your essay to this worksheet and show it to your counselor when finished.

Scout Name: _____ Unit #: _____ Date: _____

Requirement 5

List at least six occupations in which model making is used:

_____ _____ _____

_____ _____ _____

Discuss with your counselor some career opportunities in this field. Tell what you discussed: _____
_____
_____
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