



2024 Edition

# SCOUTMASTER BUCKY

## Composite Materials Merit Badge

SCOUTS PARTICIPATING IN A SCOUTMASTER BUCKY MERIT BADGE OPPORTUNITY (ONLINE OR IN PERSON), PLEASE CONSIDER ALSO USING THE COMPOSITE MATERIALS MERIT BADGE CLASS PREPARATION PAGE FOR CLARIFICATIONS, INSIGHTS, AND EXPECTATIONS.

<https://scoutmasterbucky.com/merit-badges/composite-materials/class-prep/>

### COMPOSITE MATERIALS MERIT BADGE WORKBOOK

**REQUIREMENT 1a:** Explain to your counselor the most likely hazards you may encounter while working with composite materials and what you should do to anticipate, help prevent, mitigate, and respond to these hazards.

HAZARD #1

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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HAZARD #2

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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HAZARD #3

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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HAZARD #4

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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HAZARD #5

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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HAZARD #6

**Description:**

**Anticipate:**

**Help Prevent:**

**Mitigate:**

**Respond:**



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**REQUIREMENT 1a:** Describe the appropriate safety gear and clothing that should be used when working with composite materials.

Notes:

**REQUIREMENT 1b:** Explain the precautions that must be taken when handling, storing, and disposing of resins, reinforcements, and other materials used in composites.

Handling:

Storing:

Disposing:



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**REQUIREMENT 1b:** Include in your discussion the importance of health, safety, and environmental responsibility and awareness.

**Health:**

**Safety:**

**Environmental Responsibility and Awareness:**

**REQUIREMENT 1c:** Describe what a safety data sheet (SDS) is and tell why it is used.

**Notes:**





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**REQUIREMENT 2a:** Explain what composite materials are.

Notes:

**REQUIREMENT 2a:** Give a brief history of composites and how they have developed.

Notes:



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**REQUIREMENT 2b:** Compare the similarities and differences between composites and wood, aluminum, copper, and steel. Describe the physical, electrical, mechanical, corrosive, flammability, cost, and other such properties. For each of these raw materials, give one example of how it can be shaped and used for a specific application.

WOOD

**Similarities with Composites:**

**Physical Properties:**

**Electrical Properties:**

**Mechanical Properties:**



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**Corrosive Properties:**

**Flammability Properties:**

**Cost:**

**Other Properties:**

**Example:**



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### ALUMINUM

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:



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## Composite Materials Merit Badge

**Corrosive Properties:**

**Flammability Properties:**

**Cost:**

**Other Properties:**

**Example:**



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## Composite Materials Merit Badge

COPPER

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:



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## Composite Materials Merit Badge

**Corrosive Properties:**

**Flammability Properties:**

**Cost:**

**Other Properties:**

**Example:**



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## Composite Materials Merit Badge

STEEL

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:





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## Composite Materials Merit Badge

**Corrosive Properties:**

**Flammability Properties:**

**Cost:**

**Other Properties:**

**Example:**



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## Composite Materials Merit Badge

**REQUIREMENT 3:** Describe how composite materials are made.

Notes:

**REQUIREMENT 3a:** Discuss three different composite reinforcement materials, their positive and negative characteristics, and their uses. Obtain the SDS for each one and discuss the toxicity, disposal, and safe-handling sections for these materials.

COMPOSITE REINFORCEMENT MATERIAL #1

Name:

MSDS  obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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### COMPOSITE REINFORCEMENT MATERIAL #2

Name:

MSDS  obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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### COMPOSITE REINFORCEMENT MATERIAL #3

**Name:**

MSDS  obtained

**Positive Characteristics:**

**Negative Characteristics:**

**Uses:**

**Toxicity:**

**Disposal:**

**Safe Handling:**



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**REQUIREMENT 3b:** Discuss three different resins used in composites, their positive and negative characteristics, and their uses. Obtain the SDS for each one and discuss the toxicity, disposal, and safe-handling sections for these materials.

RESIN #1

**Name:**

MSDS  obtained

**Positive Characteristics:**

**Negative Characteristics:**

**Uses:**

**Toxicity:**

**Disposal:**

**Safe Handling:**



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RESIN #2

Name:

MSDS  obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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RESIN #3

Name:

MSDS  obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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**REQUIREMENT 3b:** Include thermoset resins and thermoplastic resins in your discussion.

**Thermoset Resins:**

**Thermoplastic Resins:**

**REQUIREMENT 3c:** For each of the three resins you chose for requirement 3b, think of a new application that might be worth developing.

RESIN #1

**Name:**

**New Application Idea:**

RESIN #2

**Name:**

**New Application Idea:**

RESIN #3

**Name:**

**New Application Idea:**





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**DO ONE OF THE FOLLOWING (4A or 4B) FOR REQUIREMENT 4**

**REQUIREMENT 4a:** With your parent's permission and your counselor's approval, visit a company that manufactures or repairs products made with composites. Discuss what you learn with your counselor

**Company:**

**Date and Location of visit:**

\_\_\_\_\_  
Parent's Name

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Parent's Signature

\_\_\_\_\_  
Date

*permission*

**COUNSELOR APPROVAL:** PERHAPS IMPLIED, THIS REQUIREMENT DOES NOT STATE THAT YOU NEED THE COUNSELOR'S APPROVAL AHEAD OF TIME TO VISIT A COMPOSITES COMPANY. PLEASE NOTE, AS WITH ANY REQUIREMENT, ACCEPTANCE IS AT THE DISCRETION AND SATISFACTION OF THE MERIT BADGE COUNSELOR.

\_\_\_\_\_  
Counselor's Name

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Counselor's Signature

\_\_\_\_\_  
Date

*approved*

**Notes:**



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**REQUIREMENT 4b:** With your parent's permission and your counselor's approval, find three composites-related websites. Share and discuss what you learn with your counselor.

Parent's Name \_\_\_\_\_

Phone \_\_\_\_\_

Parent's Signature \_\_\_\_\_

Date \_\_\_\_\_

permission

**COUNSELOR APPROVAL:** PERHAPS IMPLIED, THIS REQUIREMENT DOES NOT STATE THAT YOU NEED THE COUNSELOR'S APPROVAL AHEAD OF TIME TO IDENTIFY the WEBSITES. PLEASE NOTE, AS WITH ANY REQUIREMENT, ACCEPTANCE IS AT THE DISCRETION AND SATISFACTION OF THE MERIT BADGE COUNSELOR.

Counselor's Name \_\_\_\_\_

Phone \_\_\_\_\_

Counselor's Signature \_\_\_\_\_

Date \_\_\_\_\_

approved

**Composites Website #1:**

**Composites Website #2:**

**Composites Website #3:**

**Notes:**



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**REQUIREMENT 5a:** Use composite materials to complete two projects, at least one of which must come from the Composite Materials merit badge pamphlet. The second project may come from the pamphlet OR may be one you select on your own that has been approved by your counselor in advance.

This requirement must be reviewed with your merit badge counselor.

### PROJECT #1

**Selected Project from Composite Materials Merit Badge Pamphlet:**

\_\_\_\_\_  
Counselor's Name

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Counselor's Signature

\_\_\_\_\_  
Date

approved

### PROJECT #2

**Selected Project:**

\_\_\_\_\_  
Counselor's Name

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Counselor's Signature

\_\_\_\_\_  
Date

approved

**REQUIREMENT 5b:** With your counselor's assistance, find an appropriate site where the projects can be safely completed under your counselor's supervision and/or the supervision of an adult approved by your counselor who is knowledgeable about composites.

This requirement must be reviewed with your merit badge counselor.



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**REQUIREMENT 5c:** With your counselor, determine how the finished projects will be evaluated. Using those guidelines, evaluate the completed projects with your counselor.

This requirement must be reviewed with your merit badge counselor.

Evaluation Criteria:

\_\_\_\_\_

Counselor's Name

\_\_\_\_\_

Phone

\_\_\_\_\_

Counselor's Signature

\_\_\_\_\_

Date

approved



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**REQUIREMENT 6:** Find out about three career opportunities in composite materials.

Career Opportunity #1:

Career Opportunity #2:

Career Opportunity #3:

**REQUIREMENT 6:** Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor., and explain why this profession might interest you.

Selected Career Opportunity:

Educational Requirements:

Training Requirements:

Experience Requirements:

**REQUIREMENT 6:** Explain why this profession might interest you .

Notes: