



Composite Materials Merit Badge Workbook

SCOUTMASTER BUCKY

Scouts participating in a Scoutmaster Bucky merit badge opportunity, whether online or in person, should consider using the Composite Materials merit badge pamphlet for discovery and knowledge, along with the class preparation pages for clarifications, insights, and expectations.

<https://scoutmasterbucky.com/merit-badges/composite-materials/composite-materials-pamphlet.pdf>

<https://scoutmasterbucky.com/merit-badges/composite-materials/composite-materials-cpp.pdf>

REQUIREMENTS 4 and 5a REQUIRE COUNSELOR APPROVAL.

REQUIREMENT 4 REQUIRES PARENT / GUARDIAN PERMISSION.

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, mitigate, and prevent, 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: Explain the importance of health, safety, and environmental responsibility and awareness.

Health:

Safety:

Environmental Responsibility and Awareness:



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

Notes:

REQUIREMENT 2a: Explain what composite materials are.

Notes:

REQUIREMENT 2a: Explain 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:

Flammable Properties:

Cost(s):

Other Properties:



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ALUMINUM:

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:



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Corrosive Properties:

Flammable Properties:

Cost(s):

Other Properties:



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COPPER:

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:



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Corrosive Properties:

Flammable Properties:

Cost(s):

Other Properties:



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STEEL:

Similarities with Composites:

Physical Properties:

Electrical Properties:

Mechanical Properties:



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Corrosive Properties:

Flammable Properties:

Cost(s):

Other Properties:



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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:

SDS ☐ obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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COMPOSITE REINFORCEMENT MATERIAL #2:

Name:

SDS ☐ obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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COMPOSITE REINFORCEMENT MATERIAL #3:

Name:

SDS ☐ 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:

SDS ☐ obtained

Positive Characteristics:

Negative Characteristics:

Uses:

Toxicity:

Disposal:

Safe Handling:



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RESIN #2:	
Name:	
SDS <input type="checkbox"/> obtained	
Positive Characteristics:	Negative Characteristics:
Uses:	
Toxicity:	
Disposal:	
Safe Handling:	



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RESIN #3:	
Name:	
SDS <input type="checkbox"/> obtained	
Positive Characteristics:	Negative Characteristics:
Uses:	
Toxicity:	
Disposal:	
Safe Handling:	



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REQUIREMENT 3b: Discuss thermoset resins.

Notes:

REQUIREMENT 3b: Discuss thermoplastic resins.

Notes:

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

RESIN #1:

Name:

New Application Idea:



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RESIN #2:

Name:

New Application Idea:

RESIN #3:

Name:

New Application Idea:

WITH YOUR PARENT OR GUARDIAN'S PERMISSION AND YOUR COUNSELOR'S APPROVAL DO ONE OF THE FOLLOWING ONE (4A or 4B) FOR REQUIREMENT 4

PARENT/GUARDIAN PERMISSION: IS REQUIRED.

Parent's / Guardian's Name

Phone or Email

Parent's / Guardian's Signature

Date ☐ *permission*

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date ☐ *approved*



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REQUIREMENT 4a: Visit a company that manufactures or repairs products made with composites. Discuss what you learn with your counselor.

Company:

Date and Location of Visit:

Notes:



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REQUIREMENT 4b: Find three composites-related websites. Share and discuss what you learn with your counselor.

Composites-Related Website #1:

Composites-Related Website #2:

Composites-Related 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 Material 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.

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.

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

You will need to use the [Composite Materials Merit Badge Pamphlet](#) for this requirement

This requirement must be reviewed with your merit badge counselor.

BE PREPARED!

Project #1 (selected from the Composite Materials Merit Badge Pamphlet:

Project #2 (must be approved by the merit badge counselor):

COUNSELOR APPROVAL: IS REQUIRED.

Counselor's Name

Phone or Email

Counselor's Signature

Date

☐

approved

Notes:



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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.

Selected Career Opportunity:

Education Requirements:

Training Requirements:

Experience Requirements:

REQUIREMENT 6: Explain why this profession might interest you.

Notes: