



# Engineering

## Merit Badge Workbook

### Modified For Bechtel Engineering Day

**Scouts are required to complete Pre-work items 1, 3, 6 (one item) and 9 prior to attending Bechtel Engineering Merit Badge Workshop Class. Pre-work not submitted prior to the due date will result not obtaining full credit earn for the Engineering merit badge.**

**Bechtel will provide full credit to registered scouts attending the Bechtel Engineering Merit Badge Workshop Class for items 2, 4, 5b, 6d, 7 and 8.**

This workbook can help you but you still need to read the merit badge pamphlet (book). No one can add or subtract from the Boy Scout Requirements #33215. Merit Badge Workbooks and much more are below: [Online Resources](#).  
Workbook developer: [craig@craiglincoln.com](mailto:craig@craiglincoln.com). Requirements revised: 2008, Workbook updated: November 2008.

Scout's Name: \_\_\_\_\_ Unit: \_\_\_\_\_

Counselor's Name: \_\_\_\_\_ Counselor's Ph #: \_\_\_\_\_

**1. Pre-work:** Select a manufactured item in your home (such as a toy or an appliance) and, \_\_\_\_\_  
under adult supervision and with the approval of your counselor, investigate how and why it works as it does. \_\_\_\_\_

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Find out what sort of engineering activities were needed to create it. \_\_\_\_\_

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Discuss with your counselor what you learned and how you got the information. \_\_\_\_\_

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**2. Select an engineering achievement that has had a major impact on society. Bechtel will discuss during workshop meeting and provide credit to registered Scouts.** \_\_\_\_\_

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Using resources such as the Internet (with your parent's permission), books, and magazines, find out about the engineers who made this engineering feat possible, \_\_\_\_\_

the special obstacles they had to overcome, \_\_\_\_\_

and how this achievement has influenced the world today. Tell your counselor what you have learned. \_\_\_\_\_

**3. Explain the work of six types of engineers. Pre-work**

Pick two of the six and explain how their work is related.

**4. Visit with an engineer (who may be your counselor or parent) and do the following: Bechtel will discuss during workshop meeting and provide credit to registered Scouts.**

a. Discuss the work this engineer does \_\_\_\_\_

and the tools the engineer uses. \_\_\_\_\_

b. Discuss with the engineer a current project \_\_\_\_\_

and the engineer's particular role in it. \_\_\_\_\_

c. Find out how the engineer's work is done and how results are achieved. \_\_\_\_\_

d. Ask to see the reports that the engineer writes concerning the project. \_\_\_\_\_

e. Discuss with your counselor what you learned about engineering from this visit. \_\_\_\_\_

5. Do ONE of the following:

a. Use the systems engineering approach to make step-by-step plans for your next campout. \_\_\_\_\_

List alternative ideas for such items as program schedule, \_\_\_\_\_

campsites, \_\_\_\_\_

transportation, \_\_\_\_\_

and costs. \_\_\_\_\_

Tell why you made the choices you did \_\_\_\_\_

and what improvements were made. \_\_\_\_\_

b. Make an original design for a piece of patrol equipment. Bechtel will discuss during workshop meeting and provide credit to registered Scouts.

Use the systems engineering approach to help you decide how it should work and look. \_\_\_\_\_

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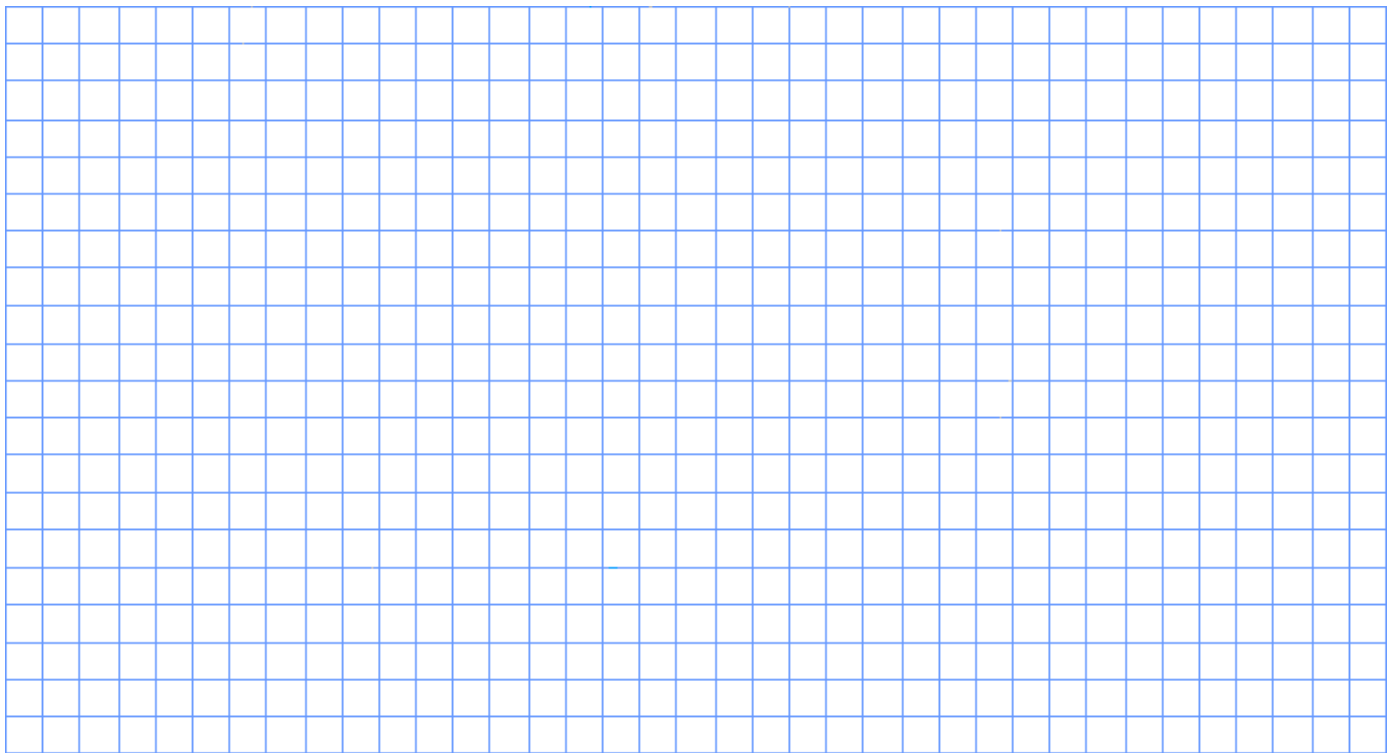
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Draw plans for it.



Show the plans to your counselor, explain why you designed it the way you did, \_\_\_\_\_

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and explain how you would make it. \_\_\_\_\_

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7. Explain what it means to be a registered Professional Engineer (P.E.). **Bechtel will discuss during workshop meeting and provide credit to registered Scouts.** \_\_\_\_\_

Name the types of engineering work is registration most important. \_\_\_\_\_

8. Study the Engineer's Code of Ethics. Explain how this is like the Scout Oath and Scout Law. **Bechtel will discuss during workshop meeting and provide credit to registered Scouts.** \_\_\_\_\_

9. Find out about three career opportunities in engineering. **Pre-work** \_\_\_\_\_

Pick one \_\_\_\_\_

and research the education, training, and experience required for this profession. \_\_\_\_\_

Discuss this with your counselor, and explain why this profession might interest you. \_\_\_\_\_

**Online Resources** *(Use any Internet resource with caution and only with your parent's or guardian's permission.)*

**Boy Scouts of America:** ► [scouting.org](http://scouting.org) ► [Guide to Safe Scouting](#) ► [Age-Appropriate Guidelines](#) ► [Safe Swim Defense](#)  
► [Scout](#) ► [Tenderfoot](#) ► [Second Class](#) ► [First Class](#) ► [Rank Videos](#) ► [Safety Afloat](#)

**Boy Scout Merit Badge Workbooks:** [usscouts.org](http://usscouts.org) -or- [meritbadge.org](http://meritbadge.org) **Merit Badge Books:** [www.scoutstuff.org](http://www.scoutstuff.org)

**Requirement Resources**

1: How Things Work: <http://www.howstuffworks.com/>

2: Achievements: <http://www.greatachievements.org/> [http://en.wikipedia.org/wiki/Greatest\\_Engineering\\_Achievements](http://en.wikipedia.org/wiki/Greatest_Engineering_Achievements)

3: Fields (Type) of Engineering: [http://en.wikipedia.org/wiki/Fields\\_of\\_engineering](http://en.wikipedia.org/wiki/Fields_of_engineering)

4: Systems Approach: <http://www.creatingtechnology.org/sysapp.htm>

6b: Appliance Energy Usage: <http://www.otpc.com/SaveEnergyMoney/applianceEnergyUsage.asp>

6f: Science Fair Projects: <http://www.sciencefair-projects.org/> <http://www.all-science-fair-projects.com/>

7: Best Engineering Programs: <http://colleges.usnews.rankingsandreviews.com/college/spec-doct-engineering>

Recommended High School Courses for Engineering Colleges:

Berkley: <http://www.coe.berkeley.edu/students/prospective-students/admissions/freshman-faq.html>

Iowa State: <http://www.public.iastate.edu/~catalog/2005-07/curric/engineering.html>

MIT: [http://www.mitadmissions.org/topics/before/recommended\\_high\\_school\\_preparation/index.shtml](http://www.mitadmissions.org/topics/before/recommended_high_school_preparation/index.shtml)

Purdue: <https://engineering.purdue.edu/Engr/Academics/Admissions>

Stanford: <http://www.stanford.edu/dept/uga/basics/selection/prepare.html>

University of Illinois: [http://www.oar.uiuc.edu/future/apply/requirements\\_freshman.html](http://www.oar.uiuc.edu/future/apply/requirements_freshman.html)

8: Professional Engineer: <http://www.nspe.org/> [http://en.wikipedia.org/wiki/Professional\\_Engineer](http://en.wikipedia.org/wiki/Professional_Engineer)

9: Engineer's Code of Ethics: <http://www.nspe.org/Ethics/CodeofEthics/index.html>

**General Resources**

Amer. Institute of Chemical Eng.: <http://www.aiche.org>

ASME (Amer. Soc. of Mechanical Eng.): <http://www.asme.org>

Jet Propulsion Laboratory: <http://www.jpl.nasa.gov>

Kennedy Space Center: <http://www.ksc.nasa.gov>

National Aeronautics and Space Administration: <http://www.nasa.gov>

Smithsonian National Air and Space Museum: <http://www.nasm.si.edu>

National Society of Black Engineers: <http://www.nsbe.org>

Soc. of Hispanic Professional Eng.: <http://www.shpe.org>

Soc. of Petroleum Eng.: <http://www.spe.org>

Amer. Soc. of Civil Eng.: <http://www.asce.org>

Institute of Electrical and Electronics Eng.: <http://www.ieee.org>

Junior Engineering Technical Soc.: <http://www.jets.org>

Nat. Action Council for Minorities: <http://www.nacme.org>

National Society of Professional Eng.: <http://www.nspe.org>

Soc. of Manufacturing Eng.: <http://www.sme.org>