

Engineering Merit Badge Worksheet



Requirement 1

Know what high school preparation is required for admission to an accredited engineering college.

Name of College: _____

List the High School Preparation Required for Admission:

Requirement 2

Briefly describe the type of work done by an engineer.

Explain how the following branches of engineering benefit our society:

Aeronautical Engineer

Scout Name _____ Unit # _____ Date _____

Chemical Engineer

Civil Engineer

Computer Engineer

Electrical Engineer

Mechanical Engineer

Mining Engineer

Metallurgical Engineer

Requirement 3

With the assistance of your Merit Badge Counselor, make an inspection trip to a manufacturing or processing plant, or an engineering project in your locality.

Name of Manufacturing Plant, Processing Plant, or Engineering Project: _____

Where is this located? _____

When did you do the inspection? _____

Do any three of the following:

- a. Design a cam, linkage, gear train, or other mechanical device for transforming motion. Prepare a working drawing and build a working model from wood, plastic, or metal.
- b. Design and build a simple electrical or electronic device such as an amplifier, radio, or an electric motor.
- c. Show by diagram how forces are distributed in a lock bridge carrying a 100-kilogram load at the center, if the two members are inclined thirty degrees above the horizontal.
- d. Explain with the aid of a diagram, and calculate how much it would cost to pump 100,000 gallons of water from sea level into a reservoir whose surface is at 550 feet elevation – if electric power costs P 2.50 per kilowatt-hour, and motor efficiency is 80 percent, and 5 percent of the water is lost in leaks along the way.
- e. Write a report explaining how energy in a fuel is converted into useful work in a typical machine such as an automobile, diesel tractor, drilling machine, airplane, rocket, or turbine engine. Use sketches and diagrams to illustrate the process.
- f. Select with the advice of your Merit Badge Counselor, a busy street or other traffic artery in the community. Go to the location and make a study of the traffic flow both in periods of light and heavy traffic. Obtain from an appropriate local official the predicted increase and population over the next five years. Report on the investigation, including your plan on how the traffic situation five years hence might be alleviated at the particular location.
- g. Set up a distilling apparatus with and without a fractionating column. Draw a graph of product purity versus percent distilled. Explain why better results are obtained with a fractionating column.
- h. Demonstrate how to use one device for obtaining engineering measurements such as a transit, builder's level, micrometer calipers, Wheatstone bridge, potentiometer, thermocouple for measuring stroboscopic tachometer, oscilloscope, and frequency counter.
- i. Set up a device for measure heat transfer. Draw a graph plotting heat transfer versus rate of flow. Explain why better heat transfer is obtained with a high rate of flow than with a low rate of flow.
- j. In place of one activity under this requirement, the Merit Badge Counselor may choose subjects that will make use of engineering activities in the local area.

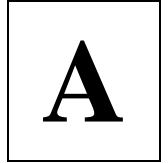
Which three requirements did you complete. Write the letter in the boxes. Attach the appropriate worksheet from the succeeding pages corresponding to the requirement you have selected to complete.

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Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3A.



What are you designing?

Cam Linkage Gear Train Other mechanical device for transforming motion: _____

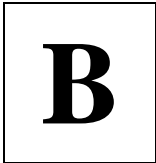
Use the area below to prepare a working drawing.

Bring your working model for your Merit Badge Counselor to check. Attached a photo to this worksheet.

Signature of Merit Badge Counselor

Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J



Requirement 3B.

What simple electrical or electronic device are you designing?

- Amplifier Radio Receiver Electric Motor Other: _____

Use the area below to prepare a working drawing.

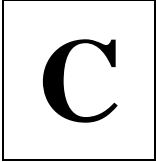
Bring the simple electronic or electrical device you built for your Merit Badge Counselor to check. Attached a photo to this worksheet.

Signature of Merit Badge Counselor

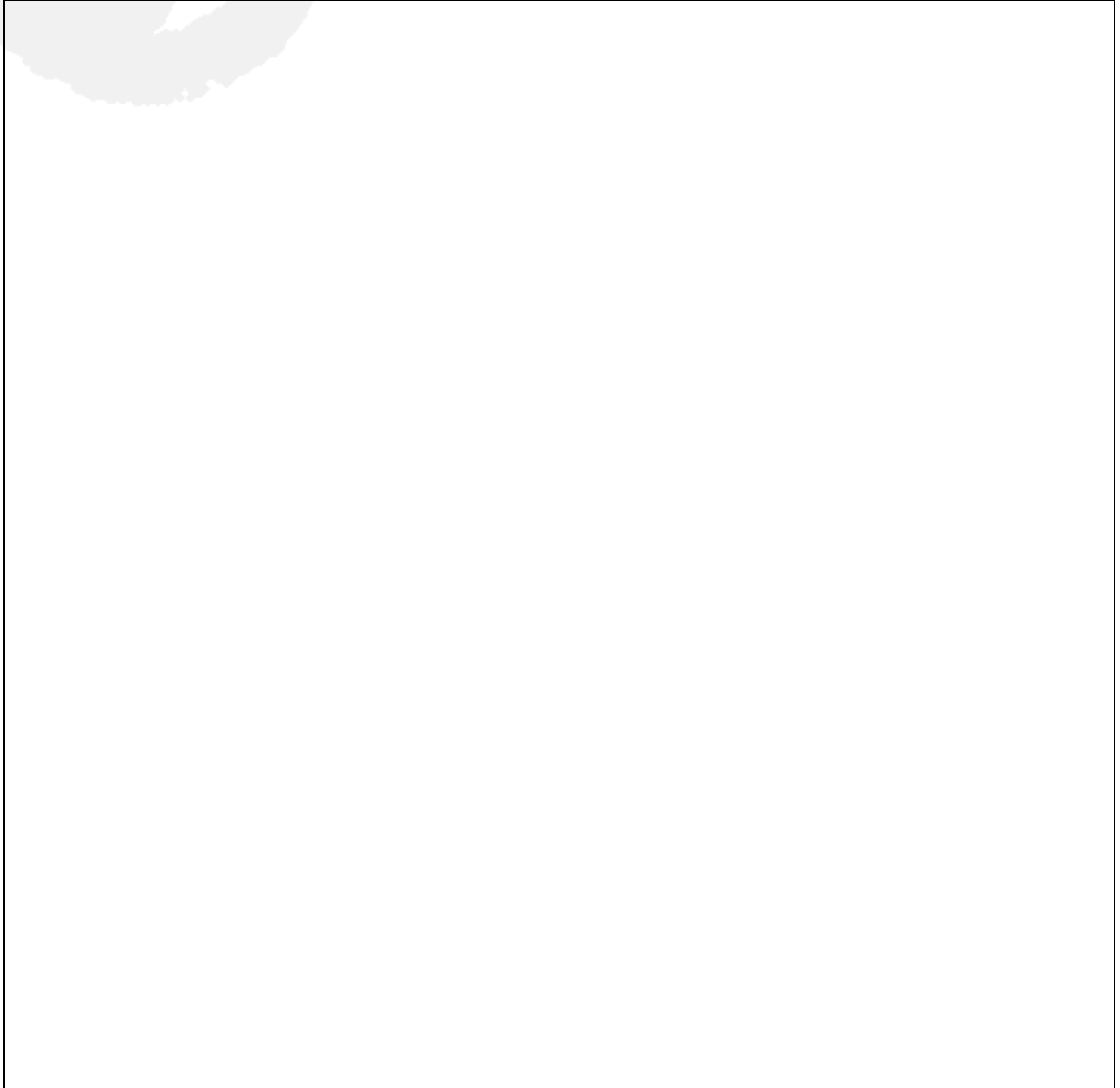
Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3C.



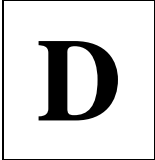
Draw the diagram using the area below and show how the forces are distributed based on the requirement specifications.



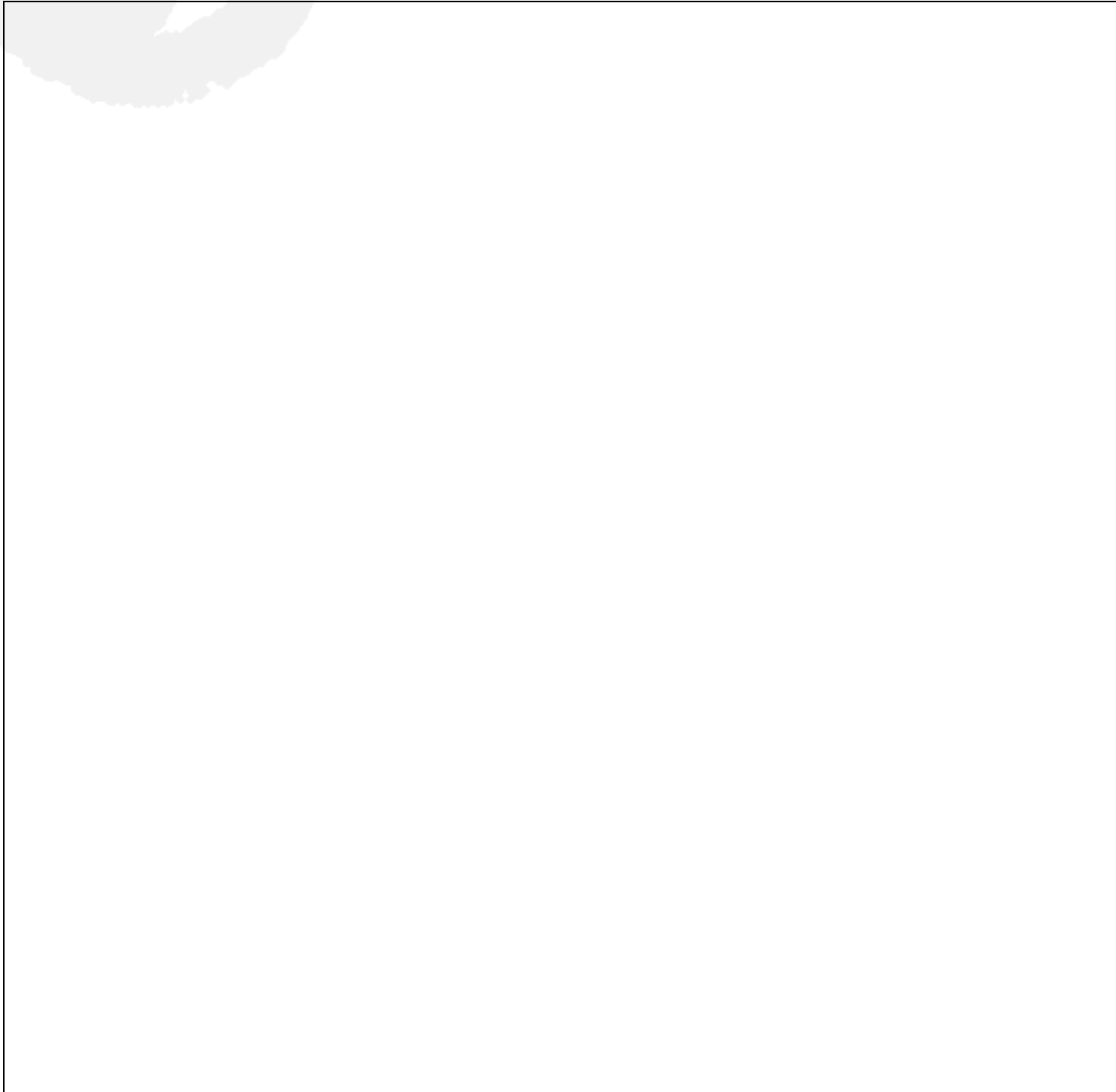
Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3D.



Draw the diagram using the area below and show how the forces are distributed based on the requirement specifications.



NOTE: Select up to three activities between Requirements 3A – 3J



Requirement 3E.

Write your report using the space below:

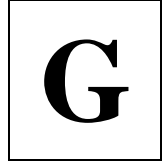
Use the space below to sketch or diagram the process your reported above.

Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3G.

Draw your graph below.

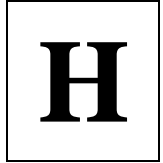


Explain below why better results are obtained with a fractionating column.

Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3H.



Which device are you demonstrating?

- Transit
- Builder' Level
- Micrometer Caliper
- Wheatstong Bridge
- Potentiometer
- Thermocouple for Measuring Stroboscopic Tachometer
- Oscilloscope
- Frequency Counter

Device was demonstrated to the Merit Badge Counselor's satisfaction.

Signature of Merit Badge Counselor

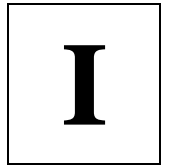
Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3I.

Set a device for measuring heat transfer.

Draw your graph below.



A large rectangular area defined by a thin black border, intended for drawing a graph.

Explain why better heat transfer is obtained with high rate of flow then with low rate of flow.

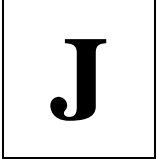
Eight horizontal lines provided for writing an explanation.

Scout Name _____ Unit # _____ Date _____

NOTE: Select up to three activities between Requirements 3A – 3J

Requirement 3J.

Have your Merit Badge Counselor write the engineering activity here:



Use the area below to write a report on the activity and what you learned in relation to engineering.
