



Radio

Merit Badge Workbook

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. Requirements revised: 2008, Workbook updated: November 2008.

Scout's Name: _____ Unit: _____

Counselor's Name: _____ Counselor's Ph #: _____

1. Explain what radio is. Then discuss the following: _____

a. The differences between broadcast radio _____

and hobby radio. _____

b. The differences between broadcasting _____

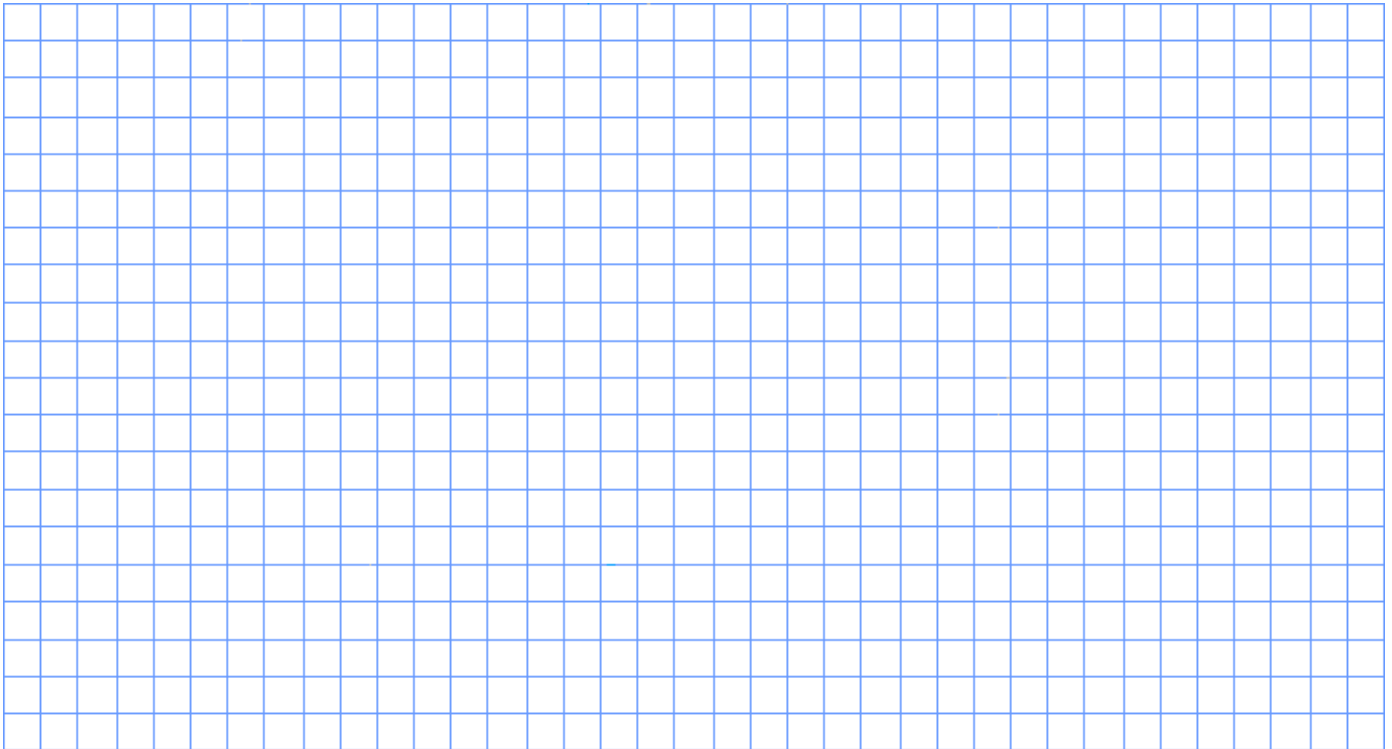
and two-way communications. _____

c. Radio call signs and how they are used in broadcast radio and amateur radio _____

d. The phonetic alphabet and how it is used to communicate clearly. _____

2. Do the following:

- a. Sketch a diagram showing how radio waves travel locally and around the world.



Explain how the broadcast radio stations, WWV and WWVH can be used to help determine what you will hear when you listen to a shortwave radio? _____

b. Explain the difference between a DX _____

and a local station. _____

Discuss what the Federal Communication Commission (FCC) does _____

and how it is different from the International Telecommunication Union. _____

3. Do the following:

- a. Draw a chart of the electromagnetic spectrum covering 100 kilohertz (kHz) to 1000 megahertz (MHz).
- b. Label the MF, HF, VHF, UHF, and microwave portions of the spectrum on your diagram.
- c. Locate on your chart at least eight radio services such as AM and FM commercial broadcast, citizens band (CB), television, amateur radio (at least four amateur radio bands), and public service (police and fire).

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100kHz

1MHz

10MHz

100MHz

1000MHz

4. Explain how radio waves carry information. _____

Include in your explanation: transceiver, _____

transmitter, _____

amplifier, _____

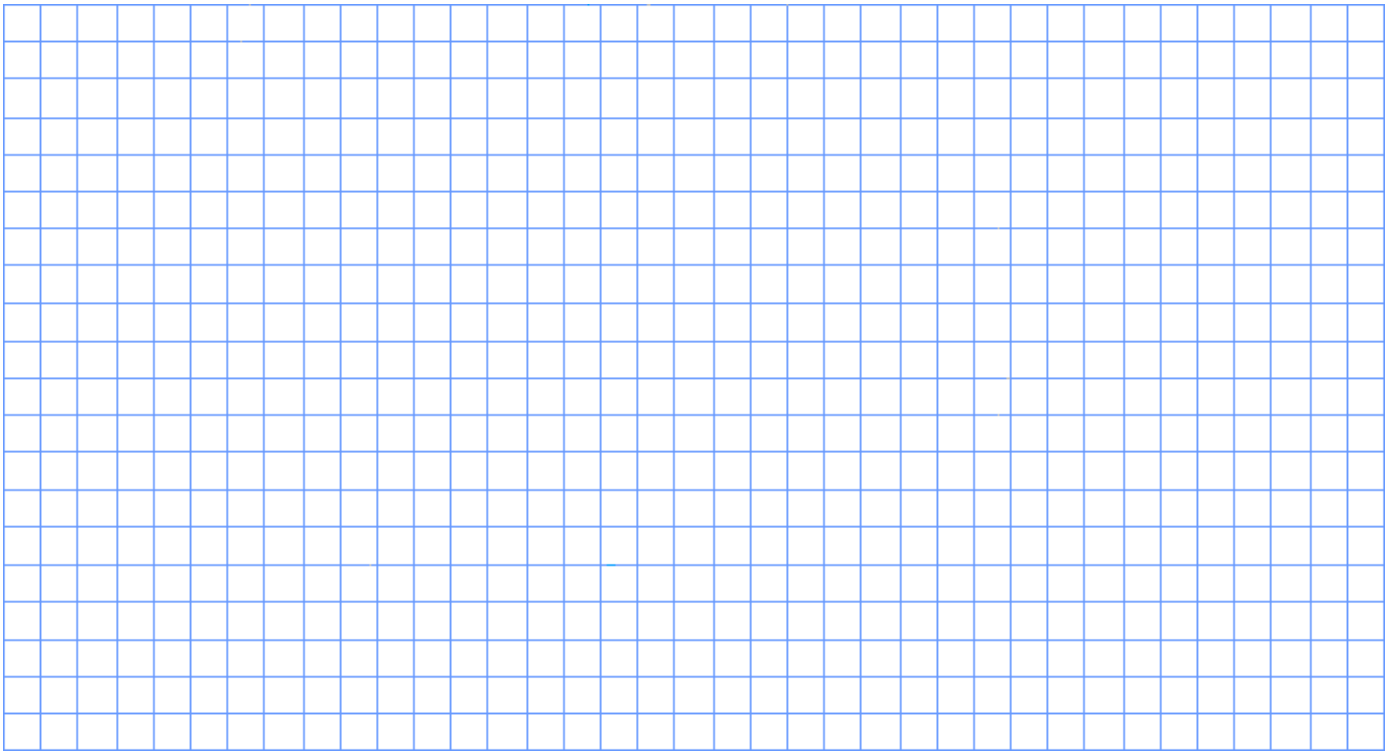
and antenna. _____

5. Do the following:

a. Explain the differences between a block diagram _____

and a schematic diagram. _____

b. Draw a block diagram for a radio station that includes a transceiver, amplifier, microphone, antenna, and feed line.



c. Explain the differences between an open circuit, _____

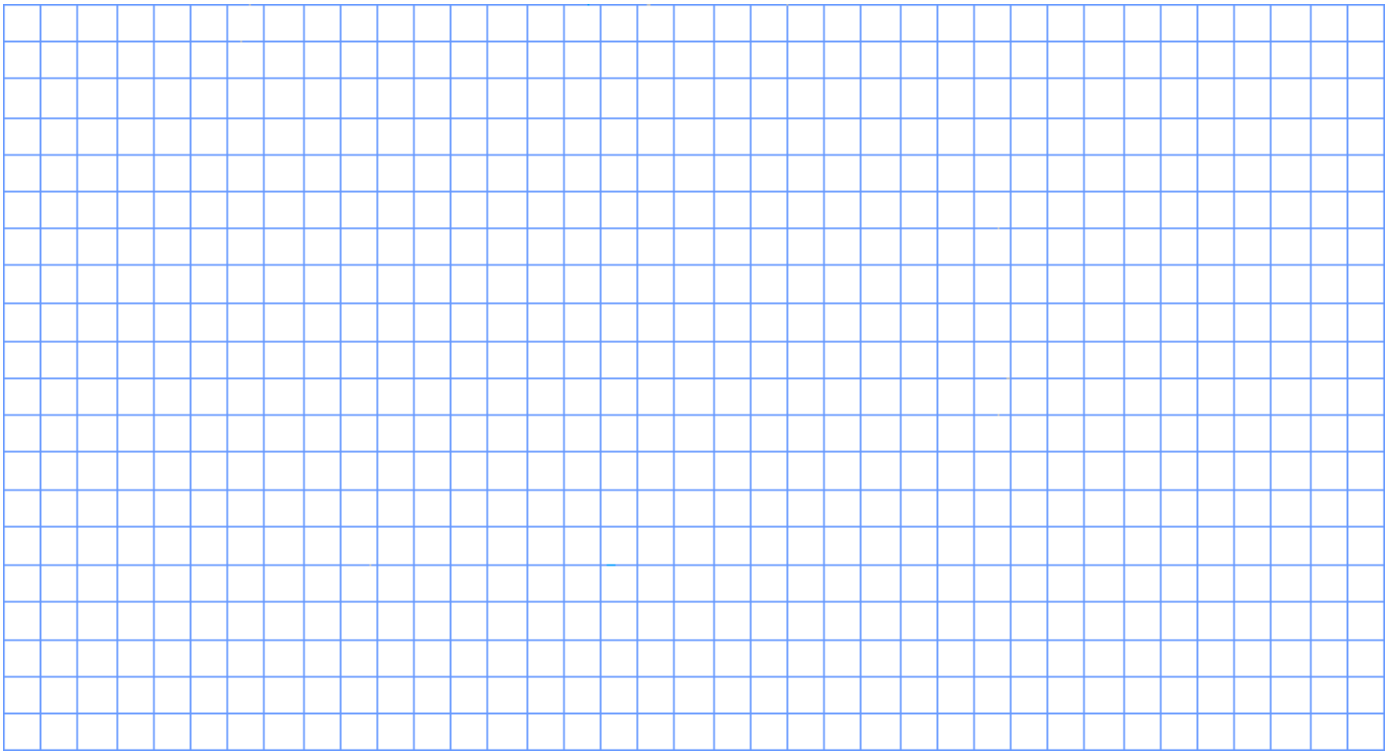
a closed circuit, _____

and a short circuit. _____

d. Draw eight schematic symbols. (*See the graph paper below.*)

Explain what three of the represented parts do.

Find three electrical components to match to three of these symbols.



6. Explain the safety precautions for working with radio gear, _____

including the concept of grounding for direct current circuits, _____

power outlets, _____

and antenna systems. _____

7. Visit a radio installation (an amateur radio station, broadcast station, or public communications center, for example) approved in advance by your counselor. _____

Discuss what types of equipment you saw in use, how it was used,

what types of licenses are required to operate and maintain the equipment, _____

and the purpose of the station. _____

8. Find out about three career opportunities in radio. _____

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. _____

9. Do ONE of the following: (a OR b OR c)

a. **AMATEUR RADIO**

1. Tell why the FCC has an amateur radio service. _____

Describe some of the activities that amateur radio operators can do on the air, once they have earned an amateur radio license. _____

2. Using proper call signs, Q signals, and abbreviations, carry on a 10 minute real or simulated radio contact using voice, Morse Code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with amateur radio operators from at least three different call districts.) Properly log the real or simulated ham radio contact and record the signal report. _____

3. Explain at least five Q signals or amateur radio terms you hear while listening.

4. Explain some of the differences between the Technician, _____

General, _____

and Extra Class license requirements and privileges. _____

Explain who administers amateur radio exams. _____

5. Explain how you would make an emergency call on voice or Morse code. _____

6. Explain the differences between handheld transceivers _____

and home "base" transceivers. _____

Explain the uses of mobile amateur radio transceivers _____

and amateur radio repeaters. _____

b. **BROADCAST RADIO**

1. Prepare a program schedule for radio station "KBSA" of exactly one-half hour, including music, news, commercials, and proper station identification. Record your program on audiotape or in a digital audio format using proper techniques.

2. Listen to and properly log 15 broadcast stations.

Determine the program format and target audience for five of these stations.

3. Explain at least eight terms used in commercial broadcasting, such as segue, _____

cut, _____

fade, _____

continuity, _____

remote, _____

Emergency Alert System, _____

network, _____

cue, _____

dead air, _____

PSA, _____

and playlist. _____

c. **SHORTWAVE LISTENING**

1. Listen across several shortwave bands for four one-hour periods - at least one period during daylight hours and at least one period at night. Log the stations properly

and locate them geographically on a globe.



2. For several major foreign stations (BBC in Great Britain or HCJB in Ecuador, for example), list several frequency bands used by each. _____

3. Compare your daytime and nighttime logs; _____

note the frequencies on which your selected stations were loudest during each session. _____

Explain the differences in the signal strength from one period to the next. _____

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

Boy Scouts of America: ► 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 -or- meritbadge.org **Merit Badge Books:** www.scoutstuff.org

Requirement Resources

- 1:** Radio (in General): <http://en.wikipedia.org/wiki/Radio>
- 1a:** Amateur radio: http://en.wikipedia.org/wiki/Amateur_radio Broadcasting: <http://en.wikipedia.org/wiki/Broadcasting>
 Amateur Radio Service: http://wireless.fcc.gov/services/index.htm?job=service_home&id=amateur
- 1b:** Broadcasting (commercial): http://en.wikipedia.org/wiki/Commercial_broadcasting
 Broadcasting (public): http://en.wikipedia.org/wiki/Public_broadcasting
- 1c:** Call Signs: http://en.wikipedia.org/wiki/Call_sign FCC: <http://www.fcc.gov/>
 Amateur Radio call signs: http://wireless.fcc.gov/services/index.htm?job=call_signs_1&id=amateur
 Amateur Radio Call Sign Map: <http://www.radioing.com/hamradio/callareas.html>
- 1d:** Phonetic Alphabet: http://en.wikipedia.org/wiki/NATO_phonetic_alphabet
 International Phonetic Alphabet (US Navy): <http://www.history.navy.mil/faqs/faq101-1.htm>
 International Phonetic Alphabet (NASA): <http://www.grc.nasa.gov/WWW/MAEL/ag/phonetic.htm>
- 2a:** Radio Waves in the Atmosphere: http://en.wikipedia.org/wiki/Radio_propagation#Tropospheric_modes
 WWV: <http://en.wikipedia.org/wiki/WWV> WWVH: <http://en.wikipedia.org/wiki/WWVH>
- 2b:** DXing: <http://en.wikipedia.org/wiki/DXing> Communication: http://en.wikipedia.org/wiki/DX_communication
 FCC: <http://en.wikipedia.org/wiki/FCC> Getting an amateur license: <http://www.hello-radio.org/>
 ITU Website: <http://www.itu.int/> ITU Overview: <http://en.wikipedia.org/wiki/ITU>
- 3:** Frequency Spectrum: http://en.wikipedia.org/wiki/Radio_frequency
 Frequency Chart: <http://www.ntia.doc.gov/osmhome/allochrt.html>
 Radio Communications Sector: <http://www.itu.int/ITU-R/>
- 4:** Modulation to carry information - great animated graphics: <http://en.wikipedia.org/wiki/Modulation>
 Propagation: <http://www.arrl.org/tis/info/propagation.html> Transceiver: <http://en.wikipedia.org/wiki/Transceiver>
 Transmitter: <http://en.wikipedia.org/wiki/Transmitter> Amplifier: <http://en.wikipedia.org/wiki/Amplifier>
 Antenna: [http://en.wikipedia.org/wiki/Antenna_\(radio\)](http://en.wikipedia.org/wiki/Antenna_(radio))
- 5:** Block Diagram: http://en.wikipedia.org/wiki/Block_diagram Circuit diagrams: http://en.wikipedia.org/wiki/Circuit_diagram
 Electronic symbols: http://en.wikipedia.org/wiki/Electronic_symbol
- 5b:** Microphone: <http://en.wikipedia.org/wiki/Microphone> Feed Line: http://en.wikipedia.org/wiki/Feed_line
- 5c:** Open Circuit: http://en.wikipedia.org/wiki/Open-circuit_voltage
 Open vs. Closed Circuit: http://en.wikipedia.org/wiki/Circuit_theory#Open_circuit_vs._closed_circuit
 Short Circuit: http://en.wikipedia.org/wiki/Short_circuit
- 5d:** Electrical components: http://en.wikipedia.org/wiki/Electrical_components
- 6:** Electrical Safety: <http://www.arrl.org/tis/info/pdf/AntBk.pdf> Direct Current: http://en.wikipedia.org/wiki/Direct_current
 Grounding: [http://en.wikipedia.org/wiki/Ground_\(electricity\)](http://en.wikipedia.org/wiki/Ground_(electricity))
- 7:** Broadcasting: <http://en.wikipedia.org/wiki/Broadcasting>
 Amateur Radio Station: http://en.wikipedia.org/wiki/Amateur_radio_station
- 9a:** Short-wave Listening: http://en.wikipedia.org/wiki/Shortwave_listening
 International Broadcasting (Short-wave Listening): http://en.wikipedia.org/wiki/International_broadcasting

General Resources

ARRL (Amateur Radio Relay League): <http://www.arrl.org/> Jamboree On The Air: <http://www.arrl.org/FandES/ead/jota.html>