



# Radio

## Merit Badge Workbook



This workbook can help you but you still need to read the merit badge pamphlet.

This Workbook can help you organize your thoughts as you prepare to meet with your merit badge counselor.

You still must satisfy your counselor that you can demonstrate each skill and have learned the information.

You should use the work space provided for each requirement to keep track of which requirements have been completed, and to make notes for discussing the item with your counselor, not for providing full and complete answers.

If a requirement says that you must take an action using words such as "discuss", "show", "tell", "explain", "demonstrate", "identify", etc, that is what you must do.

**Merit Badge Counselors may not require the use of this or any similar workbooks.**

No one may add or subtract from the official requirements found in Scouts BSA Requirements (Pub. 33216 – SKU 653801).

The requirements were last issued or revised in 2018 • This workbook was updated in January 2023.

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

Counselor's Name: \_\_\_\_\_ Phone No.: \_\_\_\_\_ Email: \_\_\_\_\_

<http://www.USScouts.Org> • <httpwww.MeritBadge.Org>

Please submit errors, omissions, comments or suggestions about this **workbook** to: [Workbooks@USScouts.Org](mailto:Workbooks@USScouts.Org)

Comments or suggestions for changes to the **requirements** for the **merit badge** should be sent to: [Merit.Badge@Scouting.Org](mailto:Merit.Badge@Scouting.Org)

1. Explain what radio is.


Then discuss the following:

a. The differences between broadcast radio and hobby radio.


**Workbook © Copyright 2023 - U.S. Scouting Service Project, Inc. - All Rights Reserved  
Requirements © Copyright, Boy Scouts of America (Used with permission.)**

**This workbook may be reproduced and used locally by Scouts and Scouters for purposes consistent with the programs of the Boy Scouts of America (BSA), the World Organization of the Scout Movement (WOSM) or other Scouting and Guiding Organizations. However it may NOT be used or reproduced for electronic redistribution or for commercial or other non-Scouting purposes without the express permission of the U. S. Scouting Service Project, Inc. (USSSP).**

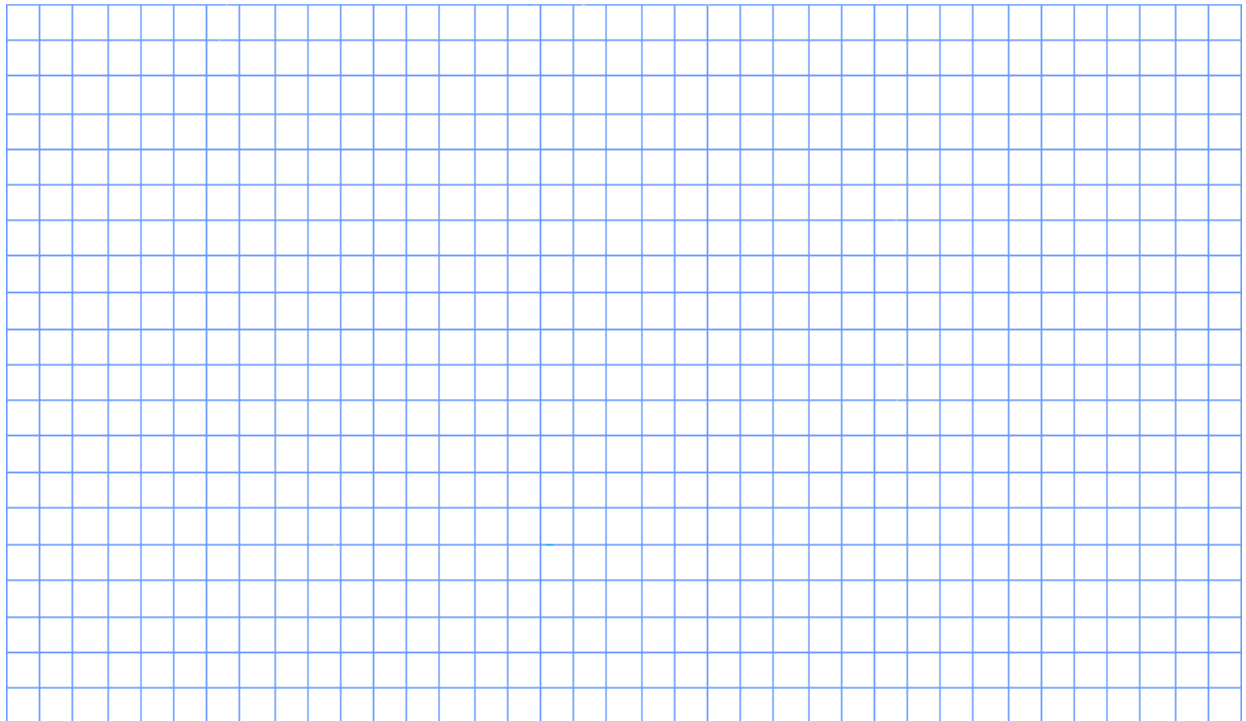
- b. The differences between broadcasting and two-way communications.


- 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.



- b. 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?

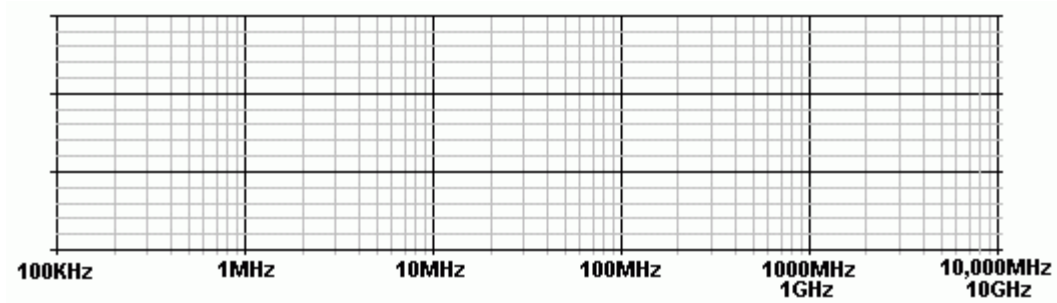

- c. Explain the difference between a distant (DX) and a local station.

DX	
Local	

- d. Discuss what the Federal Communication Commission (FCC) does and how it is different from the International Telecommunication Union.

FCC:	
International Telecommunication Union:	

- 3. Do the following:
  - a. Draw a chart of the electromagnetic spectrum covering 300 kilohertz (kHz) to 3,000 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).



television, amateur radio (at least four amateur radio bands), and public service (police and fire).

- 4. Explain how radio waves carry information.


Include in your explanation: transceiver, transmitter, receiver, amplifier, and antenna.

Transceiver:	
Transmitter:	
Receiver:	
Amplifier:	

Antenna:

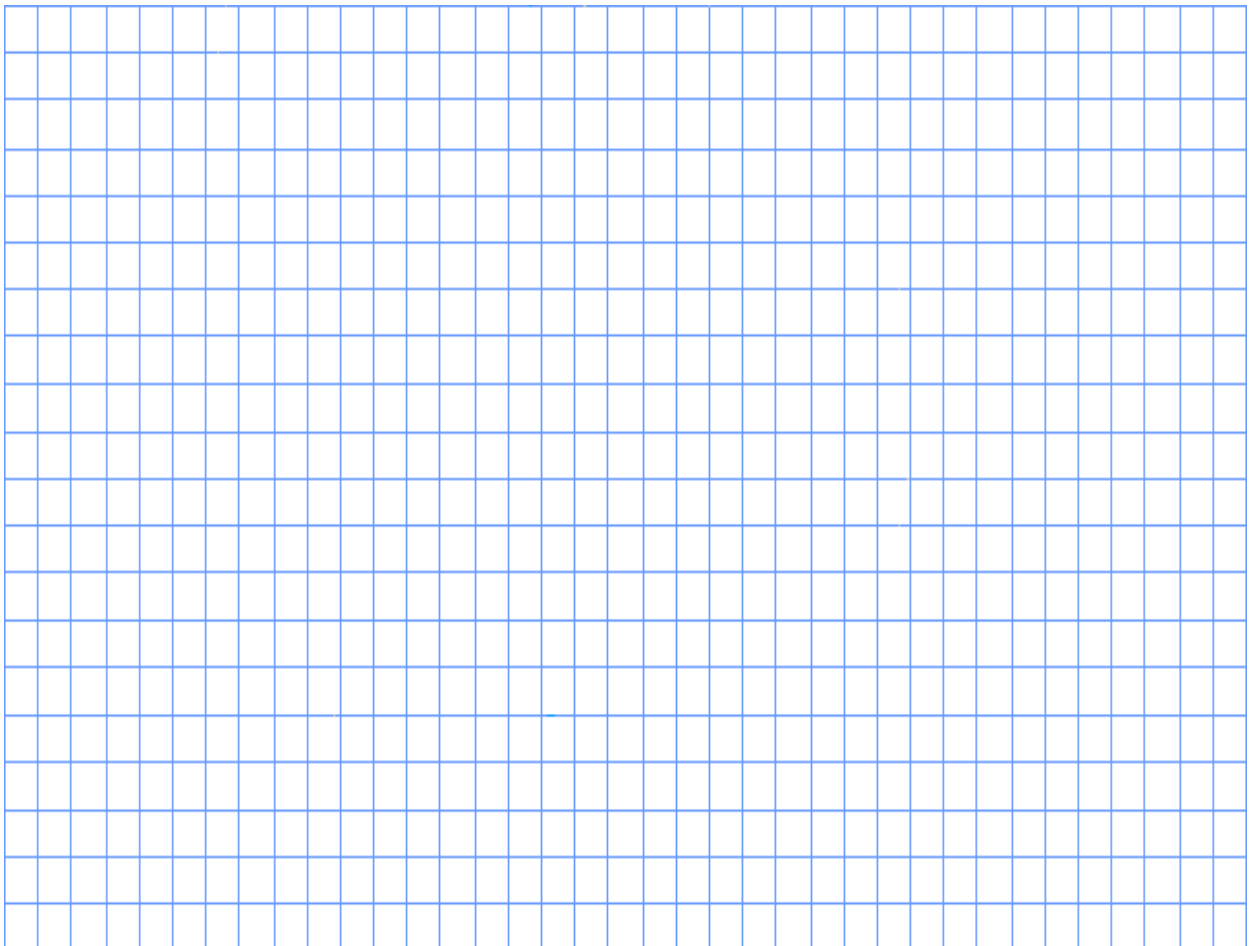

5. Do the following:

a. Explain the differences between a block diagram and a schematic diagram.

Block diagram:


Schematic diagram:


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



- c. Discuss how information is sent when using amplitude modulation (AM), frequency modulation (FM), continuous wave (CW) Morse Code transmission, single sideband (SSB) transmission, and digital transmission.

Amplitude modulation (AM):	
Frequency modulation (FM),	
Continuous wave (CW) Morse Code transmission	
Single sideband (SSB) transmission	
Digital transmission.	

- d. Explain how NOAA Weather Radio (NWR) can alert you to danger.


d. Explain how cellular telephones work. Identify their benefits and limitations in an emergency.


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.

Equipment:	
Licenses:	
Purpose:	

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

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. Explain differences between the Technician, General, and Extra Class license requirements and privileges..

Technician:


General:


Extra Class:


Explain who administers amateur radio exams.





3. Explain at least five Q signals or amateur radio terms.

Q signal or Term	Explanation

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


5. Explain the differences between handheld transceivers and home "base" transceivers.

Handheld	
Base	

--	--

Explain the uses of mobile amateur radio transceivers and amateur radio repeaters.

Transceivers:


Repeaters:


- 6. Using proper call signs, Q signals, and abbreviations, carry on a 10-minute real or simulated amateur radio contact using voice, Morse code, or digital mode. (Licensed amateur radio operators may substitute five QSL cards as evidence of contacts with five amateur radio operators. Properly log the real or simulated ham radio contact, and record the signal report.)