STRETCHLEARN · WORKBOOK

Amateur Radio (Ham Radio) — Workbook

This workbook turns course knowledge into licensed, on-air competence. Work through each section alongside the corresponding module: complete exercises before moving to the next lesson, fill worksheets with your actual gear choices and frequency plans, and check off items only when you have done them — not just read about them. By the end you will have a study tracker, a programmed radio, a logged first contact, and a clear plan to upgrade your licence.

Licence Foundations and Radio Theory

Lock in the exam strategy, electronics formulas, and FCC rule knowledge you need to pass the Technician test on your first attempt.

Exercise: Subelement Triage — Find Your Weak Spots

Go to HamStudy.org and take one 35-question practice exam without any prior study. Record your score per subelement in the worksheet below. Subelements where you score below 50% are your priority study targets.

• Which two subelements gave you the lowest scores? What is your plan to address each one this week?

• T5 (Electrical Principles) tests Ohm's law and decibels with numbers. Write out the three Ohm's law variants and the two decibel rules (double power, ten times power) in your own words without looking at the material.

• T0 (Safety) and T1 (Rules) together are 34% of your exam score. List three Part 97 rules that surprised you or that you did not know before this course.

• Set a target exam date. What is the minimum number of full practice exams you will complete before that date?

Worksheet: Practice Exam Score Tracker

After each full 35-question HamStudy.org practice exam, record your results. Continue until you score 30 or higher on three consecutive attempts before booking the real exam.

Exam attempt number

Date taken

Total score (out of 35)

T1 Rules score (out of 6)

T0 Safety score (out of 6)

T5 Electrical score (out of 4)

Weakest subelement this attempt

One concept to review before next attempt

Checklist: Pre-Exam Readiness Checklist

[ ] Scored 30+ on three consecutive HamStudy.org full practice exams
[ ] Memorised the phonetic alphabet end-to-end without prompting
[ ] Can recite all three Ohm's law formulas and the power formula from memory
[ ] Know the station ID rule: at end of contact and every 10 minutes
[ ] Located a VEC exam session (ARRL VEC, W5YI, or other) within driving distance or confirmed online proctoring
[ ] Prepared government-issued photo ID and $15 exam fee
[ ] Reviewed the FCC ULS database process so you know how to check for your call sign after passing

Radio Wave Propagation and Band Selection

Apply propagation theory to real operating decisions — choose bands intelligently based on solar conditions, time of day, and contact distance goals.

Exercise: Propagation Forecast Reading Drill

Visit NOAA Space Weather Prediction Center (swpc.noaa.gov) and DXHeat.com. Record today's solar conditions and identify which bands are likely open. Repeat on three different days to see how conditions change.

• What is today's Solar Flux Index (SFI)? Based on the thresholds covered in the course (SFI > 120 = good 10 m), is 10 m likely to support intercontinental contacts today?

• What is the current planetary K-index? What does a K-index above 4 mean for HF propagation, and what would you do differently on air today because of it?

• Check DXHeat.com for 10 m spots. List three call signs being spotted and the approximate path distance. Does this match what you expect from the course theory?

• You want to contact a station in Europe from North America on 2 m SSB. What propagation mode would be required, and how often does it occur at 144 MHz?

Worksheet: Band Selection Decision Matrix

For each scenario below, fill in the recommended band, the propagation mode that applies, and the likely time window. Use the course band plan and propagation tables.

Scenario description

Recommended band (metres and MHz range)

Primary propagation mode

Best time of day (UTC)

Technician privilege level on this band (full / limited / none)

Notes on conditions that would close this path

Checklist: Propagation Tools Setup Checklist

[ ] Bookmarked NOAA Space Weather: swpc.noaa.gov
[ ] Bookmarked DXHeat.com or DXSummit.fi for real-time spots
[ ] Bookmarked VOACAP Online for long-path HF prediction
[ ] Checked SFI and K-index on at least three different days and noted the differences
[ ] Identified the current solar cycle phase (Cycle 25) and expected peak year from an ARRL or NOAA source
[ ] Listened on 28.300 MHz for at least 5 minutes to confirm whether 10 m is open today

Exercise: Wavelength and Antenna Length Calculations

Calculate the half-wave dipole length for each of the following frequencies using the formula: L (feet) = 468 / frequency (MHz). Show your working for each calculation.

• Calculate the total dipole length for the 2 m FM calling frequency (146.520 MHz). Express in feet and inches.

• Calculate each element length (half of total) for a 10 m SSB dipole at 28.400 MHz.

• If the radio horizon formula is: range (km) = 4.1 x sqrt(height in metres), what height (in metres) gives you 50 km of reliable 2 m coverage?

Operating Procedures and On-Air Practices

Practise the procedures, Q-codes, net etiquette, and emergency communications protocols that separate a confident operator from a licensed-but-inactive one.

Worksheet: Local Repeater Programme Card

Look up three repeaters in your area on RepeaterBook.com and complete this card for each. Programme all three into your radio memory channels before checking off the checklist below.

Repeater callsign and trustee

Output frequency (MHz)

Offset direction (+ or -) and offset amount (kHz)

CTCSS tone (Hz) or DCS code

Mode (FM or FM-Narrow)

Coverage radius (km) if listed

Active net name and schedule if listed

Memory channel number assigned in your radio

Exercise: Net Check-In Simulation

Listen to a local ARRL net (find one at netlogger.org) for at least two sessions before checking in. On your third session, check in using correct procedure. Complete the prompts below after each session.

• Describe the net format you observed: directed, round-table, or traffic net? How did Net Control open the net and take check-ins?

• Write out the exact phrase you will use to check in when Net Control asks for check-ins (call sign phonetically, name, location, and whether you have traffic).

• List all Q-codes you heard during the net session. Match each to its meaning from the course.

• After your first check-in, what went well and what would you do differently next time?

Checklist: Emergency Communications Readiness Checklist

[ ] Completed FEMA IS-100 (ICS Basics) at training.fema.gov — certificate saved
[ ] Completed FEMA IS-700 (NIMS Introduction) — certificate saved
[ ] Located the ARES Emergency Coordinator for your county at arrl.org/sections and sent an introduction email
[ ] Downloaded and installed Winlink Express or Pat for off-grid email
[ ] Assembled a basic go-kit: charged radio, spare charged battery, antenna, tactical frequency list for your county
[ ] Attended or registered for a local ARES Simulated Emergency Test (SET)

Antennas, Feed Lines, and Station Setup

Plan, build, and commission your first antenna system, select appropriate coax, verify SWR, and make your first contact as a licensed operator.

Exercise: Antenna Design and Build Plan

Design a half-wave dipole for one of your licensed bands. Calculate the dimensions, choose a mounting method for your location, select the coax type, and sketch the system including connectors.

• Which band and frequency did you choose for your dipole? Show the full length calculation (L = 468 / freq) and each element length.

• What coax type will you use between the feed point and your radio? From the course loss table, calculate the total dB loss for your specific run length at your chosen frequency.

• What is your antenna's expected SWR at the design frequency (assume approximately 1.5:1 for a well-cut dipole)? How much power is lost to reflected waves at 1.5:1 vs. 3:1?

• Describe your safety plan for raising the antenna: tools required, who helps you, how you will handle the coax entry point to prevent water ingress.

Worksheet: Station Equipment Log

Record all station equipment as you acquire and install it. Keep this log current — it is useful for insurance purposes and when troubleshooting RF issues.

Equipment item (transceiver, antenna, coax, SWR meter, etc.)

Manufacturer and model number

Serial number

Purchase date and price

Installed location

Frequency range covered

Key specification (power output, cable loss per 100 ft, antenna gain, etc.)

Notes or known issues

Checklist: First QSO Checklist

[ ] FCC call sign visible in ULS database at fcc.gov/uls
[ ] Radio programmed with at least one local repeater (output, offset, CTCSS, mode)
[ ] Antenna connected and SWR measured below 2:1
[ ] Station ground rod installed and chassis bonded
[ ] Coax lightning arrester installed at building entry point
[ ] Listened on the repeater frequency for 60 seconds to confirm it is clear before transmitting
[ ] Made first transmission — call sign given correctly in phonetics
[ ] First contact logged with date (UTC), frequency, mode, their call sign, and signal report
[ ] QRZ.com account created with your call sign and biography
[ ] Sent or received first QSL card or logged first LoTW confirmation

Your Action Plan

1. Create a HamStudy.org account today and take a baseline 35-question Technician practice exam to identify your weakest subelements
2. Schedule four to six weeks of daily 30-minute study sessions following the course study plan (T1/T0 first, then T5/T6, then T3/T8/T9, then full exams)
3. Book a VEC exam session (in-person or online via ARRL VEC) for no later than six weeks from now
4. After passing, monitor the FCC ULS database daily until your call sign appears (typically 1–2 business days)
5. Within one week of getting your call sign, look up three local repeaters on RepeaterBook.com and programme them into your radio
6. Listen to a local net twice before checking in — then check in on your third session
7. Complete FEMA IS-100 and IS-700 online (free, roughly 3 hours each) and contact your county ARES Emergency Coordinator
8. Build or purchase a half-wave dipole or 5/8-wave vertical for 2 m, measure SWR, and confirm below 2:1
9. Make your first voice contact and log it — date, time (UTC), frequency, mode, their call sign, signal report
10. Create a QRZ.com profile, register for LoTW, and target your first award (WAS or a local club certificate) within six months of licensing