

Decoder Week: Speak the Computer's Language

Mon, Oct 12 – Tue, Oct 13 · 2:30–4:00 PM · Room 105 (or live on Zoom; the link comes by email)

This week: Read binary and hex, measure storage and speed correctly, and fix problems in the right order. Tuesday ends with your first badge test.

Heads up

- Crews lock Thursday, Oct 15 at 8:00 AM.
- Scan your student ID at the door both days. One scan checks you in and earns your crew attendance points.

Read-aheads

Before Monday (15 minutes)

- Read the Binary and hex notes below and copy the place-value chart (128 64 32 16 8 4 2 1) into your notebook.
- Play one round of Binary Blitz in the app (Arcade). Read the explanation on every miss.
- Make sure you can sign in at firstbadge.org/app with your first initial, last name, class year and PIN.

Before Tuesday (20 minutes)

- Read the Storage vs. speed and Troubleshooting notes below.
- Memorize the 7 troubleshooting steps in order. Say them out loud once.
- Open Zones -> Decoder -> Study cards and work through at least 20 cards. Study minutes count toward your crew bonus.
- Try the Check yourself questions at the end of this brief.

The missions

Monday, Oct 12 · Day 1

1A · Launch Launch Night: Crew Draft and Baseline

Welcome to the Open Tech League. Tonight you meet your crew, pick a crew name, and take a short baseline check so we know where every zone starts. Nobody is graded tonight; the baseline is your starting line, not your finish line.

1. Join your assigned crew channel and agree on a crew name and a captain for Week 1.
2. Complete the 30-question baseline check solo in 20 minutes (no notes, no search).
3. As a crew, compare your zone scores and write one sentence about which zone you will attack first.

Turn in: Crew roster card (name, captain, members) plus each member's baseline score screenshot.

1B · Game Number Systems Relay

Computers only speak binary, and technicians shortcut it with hex. Your crew races the clock to convert decimal, binary, and hexadecimal values, passing the baton after each correct answer. Speed matters, but a wrong conversion sends the baton back.

1. Review the place-value chart for binary (128, 64, 32, 16, 8, 4, 2, 1) and the hex digits 0-9 and A-F.
2. Run three relay rounds in Binary Blitz: decimal to binary, binary to decimal, and hex to decimal.
3. Record your crew's best round time and the two conversions that slowed you down most.

Turn in: Relay scorecard with best time and a worked example of each conversion type.

Tuesday, Oct 13 · Day 2

Decoder Gate today. Your signed permission slip must be in before you test.

2A · Lab Storage Shopping

You have a budget and a wish list: a photo library, a game collection, and a video project. Figure out how much space each needs in KB, MB, GB, and TB, and pick the drive that fits. Then separate storage size from internet speed so you never confuse MB with Mbps again.

1. Calculate the total size of the three sample libraries and convert the total into GB and TB.
2. Compare three drive options by capacity and price per GB and choose one with a reason.
3. Estimate how long the video project takes to upload on 25 Mbps and on 100 Mbps.

Turn in: Shopping sheet showing the math, the chosen drive, and both upload-time estimates.

2B · Gate day Mystery Tickets

Help-desk tickets are rolling in and each one is missing a step. Your crew works the CompTIA troubleshooting methodology on three mystery tickets, then every member takes the Decoder Gate. Pass the gate and your crew earns its first zone badge.

1. Sort the scrambled troubleshooting steps into the correct order and explain why order matters.
2. Work three tickets as a crew, writing the probable cause, test, and fix for each.
3. Take the 20-question Decoder Gate solo; 17 of 20 (85 percent) passes.

Turn in: Three completed ticket cards and each member's Decoder Gate result.

Notes

Binary and hex

- Computers store everything as bits: 0 or 1. Each binary place is worth double the one to its right: 128, 64, 32, 16, 8, 4, 2, 1.
- To read binary, add the place values that have a 1. Example: $1101 = 8 + 4 + 1 = 13$.
- To write binary, start at the biggest place that fits and subtract. Example: $200 = 128 + 64 + 8 \rightarrow 11001000$.
- Hexadecimal (hex) uses 16 digits: 0–9, then A=10, B=11, C=12, D=13, E=14, F=15. One hex digit stands for exactly 4 bits, so one byte is two hex digits ($11111111 = FF = 255$).
- Read hex like binary but with 16s: $1F = (1 \times 16) + 15 = 31$.

Units: storage vs. speed

- 8 bits = 1 byte. 4 bits = a nibble.
- Storage is counted in bytes: KB < MB < GB < TB. Each step is about 1,000 times bigger (operating systems often use 1,024).
- Speed (throughput) is counted in bits per second: Kbps, Mbps, Gbps. A small b means bits; a capital B means bytes.
- Download time = file size in bits ÷ speed in bits per second. A 100 MB file is 800 megabits, so on 100 Mbps it takes about 8 seconds.
- Price per GB = drive price ÷ capacity in GB. Lower is the better deal.

Data types

- Integer: whole number (24). Float: decimal number (3.75). Char: one character ('K'). String: text ("Largo"). Boolean: true or false.
- ASCII covers 128 characters, mostly English. Unicode covers nearly every writing system plus emoji, which is why modern software uses it.

Input, processing, output, storage

- Input brings data in (keyboard, mouse, microphone, scanner).
- The CPU does the processing.

- Output sends results out (monitor, speakers, printer).
- Storage keeps data for later (SSD, hard drive, flash drive, cloud).

The troubleshooting method (memorize the order)

1. Identify the problem: ask questions, find out what changed, reproduce it.
2. Establish a theory of probable cause (question the obvious, like a loose cable).
3. Test the theory. If it fails, make a new theory or escalate.
4. Establish a plan of action to fix it.
5. Implement the solution or escalate.
6. Verify full system functionality and add preventive measures.
7. Document findings, actions and outcomes.

Vocabulary

Bit	A single 0 or 1
Byte	8 bits
Hexadecimal	Base-16 number system, digits 0–9 and A–F
Throughput	How fast data moves, in bits per second
Capacity	How much data a device can hold, in bytes
Boolean	A data type that is only true or false
Escalate	Hand a problem to someone with more access or skill

Check yourself

1. What is 10110 in decimal?
2. A plan is sold as 50 Mbps. Is that storage or speed?
3. You fixed a frozen laptop. What are the last two steps?

Answers: 1. 22 (16 + 4 + 2) 2. Speed. Mbps = megabits per second. 3. Verify full system functionality, then document what happened.

Bring

- A charged device or a school laptop
- Your student ID card for check-in
- A pencil and notebook for the relay and ticket cards