Family edition

Light Show Lab: Sequence a Show

Ages 9-12 · about 45 minutes, in one sitting

Your child programs the lights on a house to dance to Jingle Bells in Light Show Lab. They place instructions in order, and write one line that repeats, which is how a real light show is made.

What you need

- A computer or Chromebook with a current browser.
- The link: mytekdev.com/try/lightshowlab?lesson=sequence-a-show&ref=fam-lightshowlab-1. No account, no email and nothing to install.
- Sound helps. The `Sound on` button turns it off.

Before you start: try it once yourself

Open mytekdev.com/try/lightshowlab?lesson=sequence-a-show&ref=fam-lightshowlab-1. A short guide opens over the app. A two-story house stands in the snow at night with lights on the roofline, the windows, the porch, a tree and three bushes. The show is empty.

1. **Play nothing.** Press `Play the show`. Jingle Bells plays, 34 bars in 49 seconds, and the lights only twinkle. A row with no block twinkles.
2. **One block.** Open `Show`. Each row is one run of lights: Everything, Roofline, Upstairs, Downstairs, Porch, Tree, Bushes. Click an empty spot in a row and a block appears, two bars long. Click the block to pick one of eleven looks (On, Twinkle, Chase, Wave, Swap, Pulse, Pop, Sparkle, Rainbow, Fade in, Fade out) and a color set. Drag it to move it; pull its right edge to stretch it.
3. **The same show as words.** `Sentences` shows every block as a line: "at bar 2 for 2 bars: the roofline, chase". Typing changes the blocks about a third of a second after the last key. A line the app cannot read gets a message with its line number, such as: there are no lights called "the chimney".
4. **The loop.** "every 2 bars from bar 9 to bar 16: the bushes, pop" makes four blocks, one bar long, at bars 9, 11, 13 and 15. "every 1 bar from bar 1 to bar 8: the roofline, pop" makes eight, each two beats long.
5. **Ways back.** `Undo` steps back one change. In `Show`, `Empty the show` clears every block and `Bring back the first show` loads a finished twenty-block show to read.

> A block in a run's own row wins over a block in the Everything row at the same time. Two blocks cannot overlap in one row: the newer one trims the older.

The ideas, in plain words

A light show is a program. Hobbyists who run real ones build them in sequencing software, on a timeline much like this one: rows for groups of lights, bars and beats across the top, and effects placed where the music calls for them. The song is fixed, so time itself is the trigger: "at bar 19" is an event the same way "when the green flag is clicked" is.

Three ideas are in play. Sequence: the blocks in one row run in order, left to right. Events: each block waits for its bar. Loops: "every 2 bars from bar 9 to bar 16" repeats one instruction. The rows also run at the same time, which is worth saying aloud, though no elementary standard names it.

What the app does not have is a conditional. No line can say "if". Every show plays the same way every time, which is why scrubbing to a bar always shows what playing to that bar shows.

Common mistakes: putting every block at bar 1; expecting a loop's "to bar 16" to mean a block starts on bar 16 (the last one starts on bar 15 and ends as bar 16 ends); typing a name the house does not have. The app answers the last one in words.

Do it together

1. Open mytekdev.com/try/lightshowlab?lesson=sequence-a-show&ref=fam-lightshowlab-1 together. A short guide opens over a house with its lights up. Ask: who tells each light when to turn on? Then press `Play the show`.

   > **You'll know it worked when:** Every light only twinkles, because the show is empty.

2. Open `Show` and click the `Roofline` row. Then press `Sentences`.

   > **You'll know it worked when:** One block, and one line of words that says the same thing.

3. On a new line type: every 2 bars from bar 9 to bar 16: the bushes, pop

   > **If you get stuck:** A red message under the box names the line it could not read and what to try.
   >
   > **You'll know it worked when:** The message says 5 blocks. Press `Blocks` and count four in the `Bushes` row.

4. Plan a show on paper: what should the tree, the windows and the porch do in the verse, and what changes at bar 19 when the chorus starts? Then build it.

   > **You'll know it worked when:** At least four rows have blocks, and the chorus looks different from the verse.

5. Play it from the start and watch together.

> **You'll know it worked when:** Your child can point at a loop and say how many blocks it made.

Talk about it

Ask these while you work together. A child who has understood it can answer them without help:

- What will the roofline be doing at bar 10? How do you know without playing it?
- Which part of this line says when? Which part says which lights?
- How many blocks will "every 4 bars from bar 1 to bar 16" make?
- The app says it cannot read line 3. What does the message tell you to try?
- What is different in your show when the chorus starts?

> The third question is the test for loops: four blocks, at bars 1, 5, 9 and 13. A child who counts them before pressing anything has the idea.

For younger and older kids

Younger: For a younger child, stay in `Blocks`: click a row to add a block and click the block to choose what the lights do.

Older: For an older child, write the whole show in `Sentences`, then press `Record` and play the lights live with the number keys.

Keep going

- Write "every 1 bar from bar 1 to bar 8: the roofline, pop". How many blocks, and how long is each one?
- Press Record in Show, then play the lights live with the number keys in time with the song. Read the blocks it kept as sentences.
- Open Song and pick Deck the Hall. The show is 18 bars now. What happened to your blocks past bar 18?

Bring it into other subjects

- Music: clap the beat of Jingle Bells and count the bars aloud. Where does the chorus start?
- Math: a loop runs every 2 bars from bar 1 to bar 34. How many blocks is that? What about every 3 bars?
- Writing: write instructions for a friend that explain what one of your lines does, word by word.
- Art: pick one color set for the verse and another for the chorus, and say why.

For your records

Ready to copy into an hour log, a portfolio or a transcript.

LESSON	Light Show Lab: Sequence a Show
SUBJECTS	Computer science, Music
TIME	45 minutes
WHAT WE DID	Programmed a light show to music: placed instructions in sequence on a timeline, wrote a loop in one line and predicted its result, and fixed lines the program could not read.
SKILLS PRACTICED	Sequence and events; Loops; Debugging

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/lightshowlab?lesson=sequence-a-show

Essential question: How do you tell a house full of lights what to do, and when?

Warm-up: Some houses have lights that dance to music. Who, or what, tells each light when to turn on?

_____

1. **Vocabulary.** Sequence, event, loop, bar, debug: write each in your own words.

2. **The loop.** I typed: every 2 bars from bar 9 to bar 16: the bushes, pop. It made _____ blocks, starting on bars _____, _____, _____ and _____.
3. **My show plan.** Verse (bars 3 to 18): the roofline will _____, the tree will _____, the _____ will _____. Chorus (bars 19 to 34): the roofline will _____, the tree will _____, the _____ will _____.

4. **My loop.** Copy one loop line from your show: every _____ bars from bar _____ to bar _____: _____, _____. I predict _____ blocks. It made _____.

1. A line of yours that the app could not read at first: what did the message say, and how did you fix it?

2. How is your chorus different from your verse?

Quick check

Name: _____

1. "at bar 19 for 8 bars: the roofline, chase". What sets this instruction off? (A) pressing a key (B) the song reaching bar 19 (C) the roofline

2. How many blocks does "every 2 bars from bar 9 to bar 16: the bushes, pop" make? (A) 2 (B) 4 (C) 8

3. Write one sentence about why a loop is useful.

Answers

QUESTION	ANSWER	WHY
1	B	The bar is the event. Nothing in this show waits for a key or a sensor: the song reaching a bar starts each block.
2	B	Bars 9, 11, 13 and 15: one block every 2 bars across 8 bars.
3	Open answer	A full answer says a loop repeats an instruction, so one line does the work of many and is easier to change.

If your state or umbrella school asks, this lesson covers CSTA 2017 1B-AP-10, CSTA 2017 1B-AP-11, CSTA 2017 1B-AP-15.

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The app this lesson uses is free and runs in the browser, with nothing to install and no account needed. It is at mytekdev.com.

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