Family edition

Pixel Art Animation: Make a Blob Bounce

Ages 9-14 · about 45 minutes, in one sitting

Your child starts with a small green blob that already bounces, drawn as four still pictures. They add something to one picture, watch it blink, and work out how animation really works. By the end, the blob has a look of its own and one part that moves.

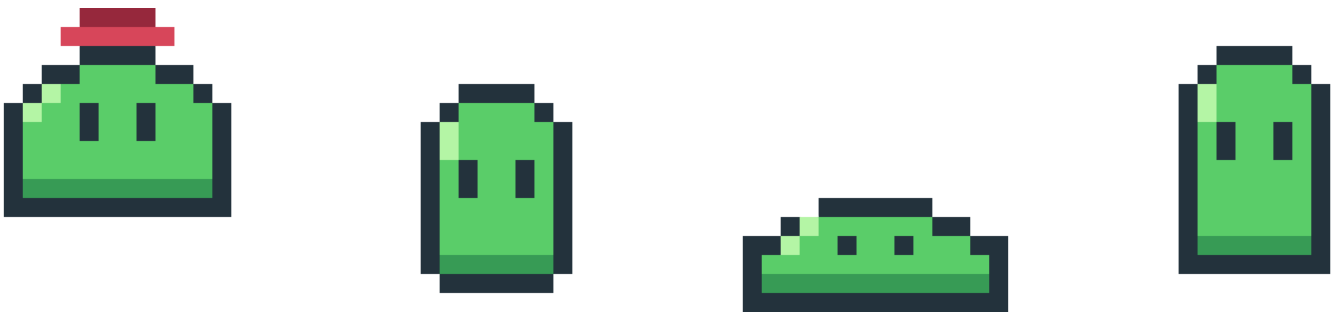
What you need

- A computer or Chromebook with a current browser. A mouse makes small pixels easier than a trackpad.
- The lesson link: mytekdev.com/try/pixelart?lesson=make-a-blob-bounce&ref=fam-pixelart. No account, no email and nothing to install.
- Optional: the activity sheet at the end of this plan, printed, and a pencil.

Before you start: try it once yourself

Do the first change yourself once before you start. It takes about ten minutes, and you will see exactly what your child will see.

1. **Open the lesson.** Go to mytekdev.com/try/pixelart?lesson=make-a-blob-bounce&ref=fam-pixelart. The sixty-second guide opens over the app; the four frames are down the left, and the preview at the top right plays the bounce, with `8 FPS` under it.
2. **Add a hat.** Pick a color from `Current colors`. The pen is already picked, so draw a small hat on top of the blob on frame 1 and watch the preview: the hat blinks.
3. **Fix the blink.** Click frame 2 and draw the hat again, on top of the blob where it is now. Do the same on frames 3 and 4; in the squash frame the blob's top is much lower.
4. **Change the speed.** Drag the FPS slider under the preview. The number beside it changes and the blob bounces faster or slower; put it back on 8.
5. **Onion skin.** Click the onion icon beside the FPS number (its tooltip says `Toggle onion skin`). On frame 2, frames 1 and 3 now show faintly under the blob.



After step 2: the hat is on 1 frame out of 4, so it blinks. The hat here is red; any color from Current colors works the same way.

> If you see something else: a hat on the wrong frame means another frame was selected; the selected one is highlighted in the list on the left, and Ctrl+Z undoes. If the preview stops moving, the FPS slider was dragged all the way down to 0; drag it back up. To place a pixel exactly, hover over it: the bottom right corner shows its column and row.

The ideas, in plain words

An animation is a row of still drawings, called frames, shown one after another fast enough that the eye sees motion. The frame rate is how many frames are shown each second. The blob has four frames at 8 frames per second, so each frame is on the screen for 1/8 of a second and one bounce takes half a second. A higher frame rate plays the same drawings faster; it adds no new drawings. Because each frame is its own drawing, anything added to one frame only shows for that frame's moment, which is why a hat drawn once blinks. Onion skin is a drawing aid from hand animation, where animators laid thin paper over the last drawing: the app shows the neighboring frames faintly under the one being drawn, so it is easy to see where the blob was and where it goes next.

A computer stores each frame as a grid of pixels. The blob's frame is 16 by 16, so 256 squares, and each square is saved as one color code or left empty. A code like #5CCF6B, the blob's green, is three pairs of hexadecimal digits: how much red (5C, or 92), green (CF, or 207) and blue (6B, or 107) to mix, each from 0 to 255. The same four frames can be saved as an animated GIF, which plays on its own, or as a sprite sheet, one picture with the frames side by side, which is the form many game engines read.

YOUR CHILD MIGHT ASK	A GOOD ANSWER
Why does my hat blink?	It is only on frame 1. The preview shows frame 1 with the hat, then frames 2, 3 and 4 without it, over and over.
Does a higher FPS make it smoother?	It makes it faster. Smoother motion comes from more drawings with smaller steps between them.
Will the faint blob show up in my animation?	No. Onion skin is only a guide while you draw. The preview plays the real frames.
Why are there letters in a color code?	Each pair of digits counts from 00 to FF in base 16, where A to F stand for 10 to 15. FF is 255, the most of that color.

Do it together

1. Open mytekdev.com/try/pixelart?lesson=make-a-blob-bounce&ref=fam-pixelart together. A short guide opens over the app, and your child follows it: speed the bounce up with the FPS slider, pick a color from `Current colors`, add a hat or a spot on frame 1, then draw it again on frames 2, 3 and 4.

   > **If you get stuck:** In the squash frame the blob's top is much lower, so the hat goes lower too.
   >
   > **You'll know it worked when:** The guide is done and the new part bounces with the blob, without blinking.

2. Look back at what the guide showed: the bounce is four drawings. Click each frame on the left and say what changes from one to the next. Then ask: what would it look like with only two?

   > **You'll know it worked when:** Your child names the four (up, down, squash, stretch) and says two would jump instead of bounce.

3. Ask why the change blinked before it was on every frame. Then click the onion icon beside the FPS number: onion skin shows the frames before and after faintly, under the one being drawn.

   > **If you get stuck:** A change on the wrong frame means another frame was selected. The selected one is highlighted in the list on the left, and Ctrl+Z undoes.
   >
   > **You'll know it worked when:** Your child explains it: the change was on 1 frame out of 4, so it showed for one moment and was gone for three.

4. Make one part move: the eyes, the hat or an antenna, drawn a little differently on each frame. Sketching the four boxes on the activity sheet first helps.

   > **If you get stuck:** If the part jumps instead of moving, it changed too much between frames. Make the steps between frames smaller.
   >
   > **You'll know it worked when:** One part moves on its own while the blob bounces.

5. Put the FPS slider back on 8. Then the real question: can you make the blob bounce higher without touching the slider?

   > **If you get stuck:** If the preview stops moving, the slider was dragged all the way to 0. Drag it back up.
   >
   > **You'll know it worked when:** Your child moves the blob farther up in frame 1 instead of looking for a setting. That means they see that the motion comes from the drawings.

Talk about it

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

- How many drawings make this bounce? What would it look like with only two?
- At 8 frames a second, how long is each drawing on the screen?
- Why does your change blink when you only drew it on one frame?
- Show me the onion skin. What is it telling you?
- Pick one color in your blob. What is its color code, and what do the three parts stand for?
- Make it bounce higher without touching the FPS slider.

> The last one is the real test. A child who moves the blob farther up in frame 1, instead of looking for a setting, understands that the motion comes from the drawings.

For younger and older kids

Younger: For ages 7 and 8, skip the color codes. Make the first change side by side, one frame at a time, and call it done when the hat stops blinking.

Older: For teens, add a fifth frame where the blob lands and wobbles, then work out the timing: at 8 FPS, how long does one bounce take with 5 frames? (5/8 of a second.) The color code question under Keep going fits here too.

Keep going

- Add a fifth frame where the blob lands and wobbles.
- Make the moving part lag behind the body, the way a hat flies up a moment late.
- Color codes: find the blob's green with the color picker (#5CCF6B). Split it into red, green and blue (5C, CF, 6B) and change each to a number from 0 to 255 (92, 207, 107). Then: the blob uses 4 colors, and some squares are empty, so each square has 5 choices. How many bits does one square need, at least? (3 bits: 2 bits make only 4 patterns, 3 bits make 8.) How many bits for one 16 by 16 frame? (3 x 256 = 768 bits.)

Bring it into other subjects

- Art: a 16 by 16 self-portrait, then a second frame where the eyes close.
- Science: a life cycle (egg, caterpillar, chrysalis, butterfly) with one frame per stage.
- Math: at 8 FPS, each frame shows for 1/8 of a second. How long does one 4-frame bounce take? (1/2 second) At 12 FPS? (1/3 second)
- Computer science: export the blob as a PNG sprite sheet, a format many game engines use for animated characters.

For your records

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

LESSON	Pixel Art Animation: Make a Blob Bounce
SUBJECTS	Computer science, Art
TIME	45 minutes
WHAT WE DID	Animated a 16 by 16 pixel sprite in four frames. Learned that an animation is a sequence of still drawings, fixed a detail that blinked by drawing it on every frame, and made one part of the sprite move.
SKILLS PRACTICED	animation as a sequence of frames; frame rate and timing; digital pictures as grids of pixels; planning motion before drawing it

Activity sheet (optional)

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/pixelart?lesson=make-a-blob-bounce

Essential question: How can a few still pictures look like they are moving?

1. **Change one thing.** Pick a color from `Current colors` and add something to the blob: a hat, spots, a face.
2. **Watch the preview.** Your change blinks. Write down why:

   _____

3. **Fix the blink.** Draw it on frames 2, 3 and 4 too, wherever the blob is in that frame.
4. **Make one part move.** Pick one part (eyes, a hat, an antenna) and draw it a little differently on each frame.

Plan the moving part. Sketch it in each box first. Change it a little from box to box.

1 UP	2 DOWN	3 SQUASH	4 STRETCH

1. What did you add to the blob, and what part moves?

_____

_____

2. If you added a fifth frame, what would you draw in it?

_____

Quick check

Name: _____

1. The blob bounces in 4 frames. With only 2 frames, the bounce would look: (A) exactly the same, (B) choppier, with bigger jumps between drawings, (C) slower and smoother.

2. You draw a hat on frame 1 only. When the animation plays, the hat: (A) stays on the whole time, (B) never shows up, (C) blinks on and off.

3. Name two different ways to make the blob bounce faster.

Answers

QUESTION	ANSWER	WHY
1	B	Fewer drawings means each step covers more distance, so the motion jumps.
2	C	The hat is on 1 frame out of 4. It shows for 1 frame, then it is gone for 3.
3	Any two of: raise the FPS; take out a frame; draw the blob moving farther between frames	Any two count. Raising the FPS is the answer most kids give, since the lesson shows it.

Want the whole subject taught?

This is one lesson to do together. If you would rather have the whole subject taught, our Information Technology 1 and Information Technology 2 courses teach it as part of a full course, with an instructor, live and recorded classes, graded work and credit.

If your state or umbrella school asks, this lesson covers CSTA 2017 1A-DA-05, CSTA 2017 2-DA-07, NCAS Visual Arts VA:Cr2.1.4a, NCAS Visual Arts VA:Cr2.1.5a, NCAS Visual Arts VA:Cr2.1.8a, NCAS Media Arts MA:Cr3.1.4a, NCAS Media Arts MA:Cr3.1.5a, NCAS Media Arts MA:Cr3.1.8b.

The PixelArt app is built on Piskel by Julian Descottes, open source under the Apache License 2.0.

Terms of use

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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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