



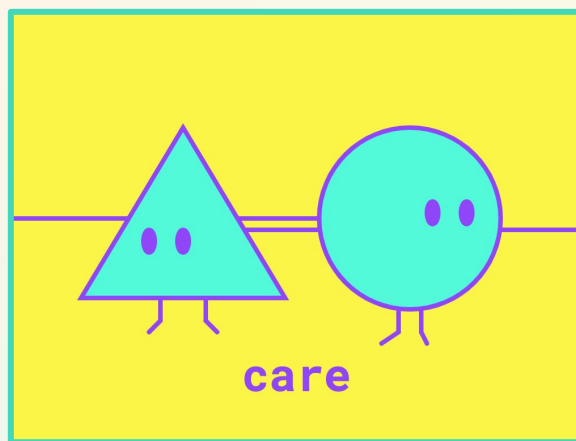
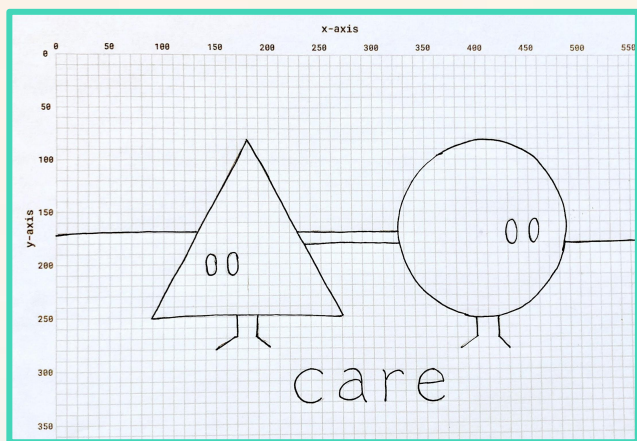
Girls Who Code At Home

Digital Art Rules

Part 1

Activity Overview

Are you an artist or designer who is interested in exploring code? Or maybe you have some experience with code and want to explore creative processes. Or perhaps you want to explore both! Either way, this project is for you! Over two activities, we will learn the basics of [p5.js](#), a JavaScript library made for beginners and creative coders, by creating a piece of digital art.



Part 1 is all about planning, brainstorming, and paper prototyping. We will work on developing a set of rules to guide your artwork, then draw it on a grid. **Part 2** is focused on introducing you to the basics of p5.js so you can translate your analog drawing to a digital sketch. Along the way, you will practice using the design process and get to know a range of Black and African American women and female-identifying designers and artists.

Learning Goals

By the end of this activity you will be able to...

- ☐ describe in your own words how to use rules as part of a creative process.
- ☐ plot shapes, lines, and text on a coordinate system.
- ☐ brainstorm and prototype a paper version of your digital artwork.

Materials

- Paper
- Pencil
- Markers, colored pencils, or crayons
- Timer (phone, clock, microwave, etc)
- Straight edge like a ruler or piece of paper
- [Digital Art Rules Part 1 Reference Guide](#)

Prior Knowledge

No prior knowledge is needed to complete this activity.

Women in Tech Spotlight: Ari Melenciano



Source: [ITP NYU](#)

Ari Melenciano is an artist, designer, creative technologist, researcher, and educator who is passionate about exploring the relationships between various forms of design and sentient (or sensorial) experiences.

Ari has been fascinated with technology since she was young, but it wasn't until she enrolled in NYU's Interactive Telecommunications Graduate Program (ITP) that she discovered how to merge her love of art and technology. With technology, she found a way to expand what was possible through art. While there she developed her art practice of combining electronics and new media art (i.e. art made using digital tools) through various projects like interactive sound sculptures and

custom synthesizers she made with circuits. Her latest sound sculpture collection is called [Electro•Negro•Synesthesia](#). When she made them, "[Ari] was thinking about Black cultural artifacts that are often negatively stigmatized, but are very beautiful to [her], and imagined their presence in the future" (Source: [Curbed](#)).

During her time at ITP, she founded [Afrotectopia](#), a social institution fostering interdisciplinary innovation at the intersections of art, design, technology, Black culture, and activism. It is a festival, an experimental school, a fellowship, and a space for people of color to create new media art, share resources, and imagine new futures for themselves. For Ari and her collaborators, code and design are tools to dream new possibilities outside of the societal systems that created racial disparity and denied access to Black people.

Check out [this video](#) (start at 1:00:39 to 1:05:00) to watch Ari discuss her work in her own words. Want to learn more? You can visit Ari's [personal website](#) or listen to [this episode](#) of the createCanvas podcast.

Reflect

Being a computer scientist is more than just being great at coding. Take some time to reflect on how Ari and her work relates to the strengths that great computer scientists focus on building - bravery, resilience, creativity, and purpose.



PURPOSE

Ari uses art, design, and technology to imagine new worlds and futures where a long history of racial discrimination doesn't limit possibilities and access for Black people. What is a piece of technology or work of art you have seen that inspires you to dream of a more equitable world?

Share your responses with a family member or friend. Encourage others to read more about Ari to join in the discussion!

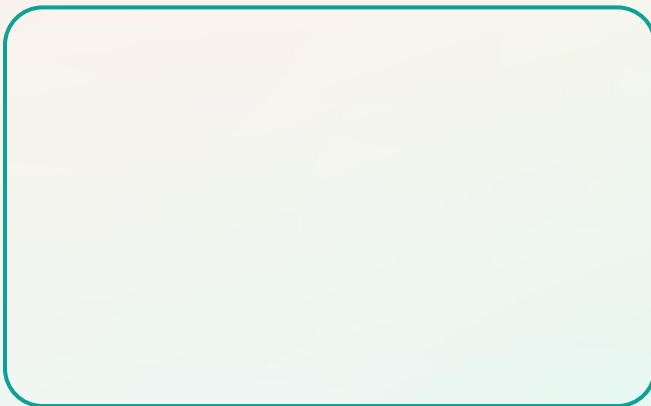
Step 1: Question the systems (8-10 mins)

Over this activity and the next, you will be working towards designing a piece of digital art using p5.js, a web-based coding environment that uses JavaScript. We will learn more about p5.js in Part 2. For now, let's concentrate on brainstorming your piece of art. But where should we begin? How should we start?

Let's do a short exercise to compare two approaches to drawing. First, we'll notice how it feels to make something when anything is possible. Next, we'll reflect on how it feels to make something when you have a few guidelines. This is just a warmup, so don't worry about being perfect. Instead, pay attention to how you feel as you complete each exercise.

Exercise 1 (2-3 mins)

Set a timer for **2 minutes**. You can sketch anything you want in the box below. GO!



Without thinking too much about it, take a minute to write down a few words that describe how you felt during those two minutes.

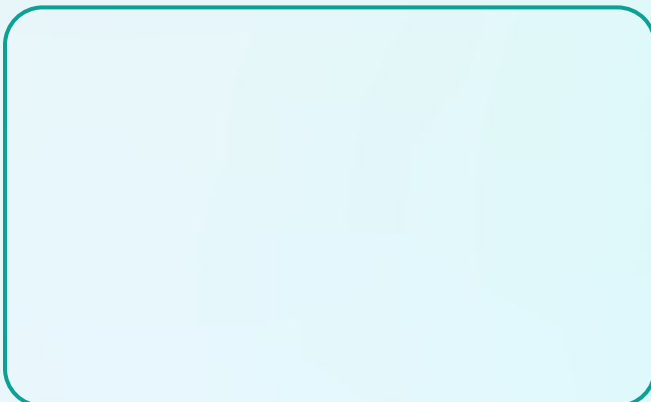
Remember: All feelings are valid. It's always important to be honest with yourself about how you feel in a creative process!

Exercise 2 (2-3 mins)

Set a timer for **2 minutes**. Use the rules below to help you sketch. Again, this is practice - it doesn't have to be perfect. GO!

- Your theme is dream.
- Use 3 circles.

- Use 1 color.
- Use as many lines as you want.



Without thinking too much about it, take a minute to write down a few words that describe how you felt during those two minutes.

Step 1: Question the systems (cont.)

Reflect (1-3 mins)

Compare your descriptions from Exercises 1 and 2. You can jot down notes if it's helpful, discuss with a friend, or simply think about each question individually.

- Did anything about one or both exercises surprise you?
- Was one easier or more enjoyable than the other? Why or why not?
- Was one more frustrating or confusing? Why or why not?

As you get to know yourself as an artist, designer, and programmer, it's just as important to think about *how* you create work as it is to brainstorm what you are making and why. For this activity, we are not going to give you a prompt for your piece of digital art. Instead, you will build your own set of design rules that will help you generate a piece of digital art: your own mini-world. This is one process you can use over and over again when you start a new project or when you are feeling a creative block.

We will also discuss the similar ways designers, artists, and programmers use rules in their projects or work. In fact, you'll discover a new world called **creative coding** where artists use programming as a tool to express themselves.

Step 2: Get inspired (15-17 mins)

What can art and design do? (3-4 mins)

Let's step back for a moment. Think about this question:

What can art and design do?

Art and design can help us solve problems, offer moments of beauty, spread messages or ideas, express emotions and identities, and more. They create opportunities for us to imagine new worlds. Check out a few examples of worlds the artists below have created:



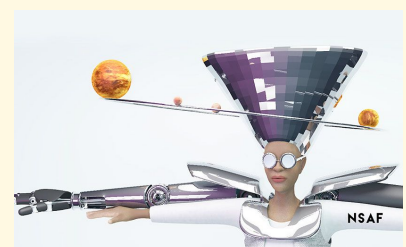
Not the Only One by Stephanie Dinkins

A voice-interactive AI (artificial intelligence) that tells the memoir of one Black family across generations. Unlike many AI systems, the artist designed and trained this AI to make decisions based on the needs and ideals of Black and brown people. The memoir changes and evolves based on the data it receives.



Iyapo Repository by Salome Asega and Ayo Okunseinde

A collection of future artifacts created to affirm and project the future of people of African descent. The artists hold workshops in which they ask participants of African descent to generate ideas about the future they envision, then build models of their artifacts to add to a growing archive.



NeuroSpeculative AfroFeminism by Hyphen Labs

Uses VR to imagine a future where Black women pioneer brain research and cognitive improvement in a NeuroCosmetology lab, a reimagined Black hair salon.

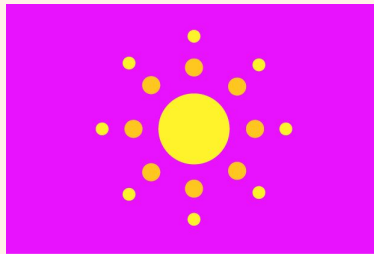
Step 2: Get inspired (cont.)

Designers and artists use systems to make their work. Sounds cool, but vague. For this activity, instead we might ask, *what does it mean to draw within a system?* When we design or make art, we are making a set of intentional choices that reflect how we see or how we want to see the world. You could call these choices rules.

Visual artists and designers use a set of design elements like color, lines, shapes, text, and more to communicate an idea or feeling. They use rules to figure out how those elements work together to send the desired message or emotion. Let's examine a few digitally created images:



"This image feels a bit menacing to me. I think it is intense because the shapes and colors look like teeth."



"This image feels happy and bright to me because the circles look like a sun and the colors are warm and vibrant."



"This image feels calming like a sunset. I like how the triangles and lines create a horizon."

Sometimes, many experts agree on a set of rules that they think everyone should use because it creates a common language and set of expectations. Other times, communities and individuals will create their own rules to make a statement about new ideas or critique old processes. It's up to you as the artist and designer to decide which rules best fit the world you want to make, the story you are trying to tell, or the feeling you want to convey. In the next section, we'll check out how a few artists do this in their own work.

Analyze a piece of digital art (10-12 mins)

Let's explore some examples and analyze them as designed systems. Identifying **precedents** is a key part of the design process. Precedents are works other people have made that inspires or informs your own project. You might even find yourself using similar techniques or remixing their ideas, which is great! If you do this, remember to always attribute them by citing them as part of your project. *Remember: whether art or code, it's never cool to reproduce someone else's work and not give them credit.*

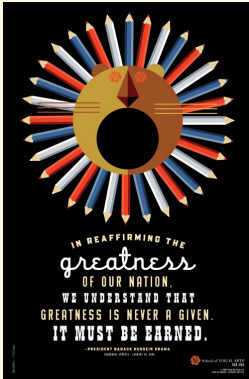
Choose a designer from the list on the next page that you like and analyze their work using the questions below the list. Keep in mind that the digital art we code in p5.js will be much simpler since this is a beginner activity. As you learn more about what you can do with that tool, you will be able to do much more - we promise!



Check the Reference Guide on pg 1-2 for an example.

Step 2: Get inspired (cont.)

[Gail Anderson](#)



[Jen White Johnson](#)



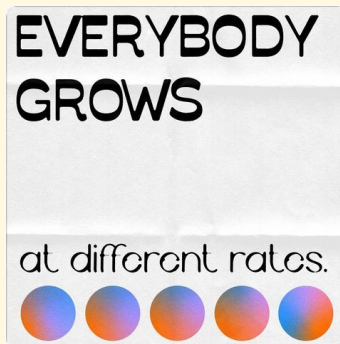
[Andrea Pippins](#)



[Sophia Yeshi](#)



[Kemunto](#)



[Charity Ekpo](#)



First, start from your overall impression or experience with the work. Set a timer for **3 minutes** then answer the questions below:

Briefly describe the piece in a couple sentences or bullet points. What do you notice? What sticks out to you?

How does this work make you feel? What emotions does it bring up?

What is the message? What is it trying to communicate?

Step 2: Get inspired (cont.)

Next, set the timer for **4 minutes** to analyze the design elements:

| | |
|--|--|
| What colors do they use? <i>What adjectives would you use to describe the color palette?</i> | |
| What shapes do they use? <i>Where are they in space? Are they in the corners or center? Are they touching too far apart? Which shapes are big? Which are small?</i> | |
| Do they use lines? <i>Are they thick or thin? Wavy or straight?</i> | |
| Do they use text? <i>If yes, how? For example, why do you think they chose that font? Is the text big or small?</i> | |

Finally, set a timer for **2 minutes** and reflect on the system:

| | |
|--|----|
| What are three rules this artist might have used to create this piece of work? <i>What guidelines do you think they followed?</i> | 1. |
| | 2. |
| | 3. |

All of the examples above were created by artists and designers who are Black and African American women or female-identifying. If you like their work, find them on IG and give them a shoutout! If you want to learn more about, amplify the work of, and/or participate in design and art communities of color, here are three resources to get started:

- [The Black Experience in Graphic Design: 1968 and 2020](#). from Print Magazine
- [Where Are All the Black Designers?](#) A conference to celebrate Black voices in design and address pressing issues in the design industry. The site has free recorded talks.
- [Blacks Who Design](#). Blacks Who Design highlights all of the inspiring Black designers in the industry. The goal is to inspire new designers, encourage people to diversify their feeds, and discover amazing individuals to join your team.

Step 3: Write your rules (8-10 mins)

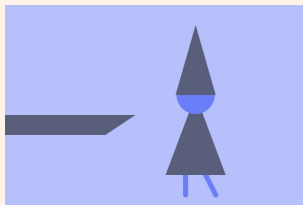
We are going to build a rule set using design elements, ideas, and emotions to guide your piece of digital art. Every designer - and programmer! - works within a set of rules to create a design or code a piece of software. Rules can be helpful because they help rein us in when the world feels too big (e.g. describe a dream without using words). Rules can also be oppressive when they prevent people from being able to express themselves (e.g. don't create art about your gender).

The rules we will use are meant to expand your creativity, not limit it. We will try to stick to the rules you choose for the rest of this activity, but if you want to change one later on, that's ok! Just keep in mind that you will have to code it later.

Observe rules in action (2-3 mins)

Check out the sketches below. List 1-2 rules that you observe at play in each sketch.

Example



Rules:

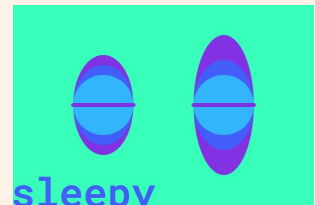
- 3 colors: gray, purple, and light purple
- 2 triangles
- 1 quadrilateral
- Feeling: anticipatory

Sketch 1



Rules:

Sketch 2



Rules:

Reflect on the following questions. You can write down your answers if it's helpful.

- Why did that rule stick out to you?
- Do you think that rules are helpful? Why or why not?

Create your rule set (6-7 mins)

Fill in the template below to create your rules. For now, we are limiting the rules based on what you will learn in Part 2. In the future, you can be much more free form with your creative rules!

Choose a keyword.

This can be a theme, idea, or message.

Choose an emotion.

How do you want someone to feel when they view your piece?

Step 3: Write your rules (cont.)

| | |
|---|---|
| Choose up to 10 <u>shapes</u> from the following list. <i>You can use a shape multiple times or you don't have to use shapes at all. Keep in mind that you will have to program each one.</i> | <input type="checkbox"/> Rectangle <input type="checkbox"/> Square <input type="checkbox"/> Circle <input type="checkbox"/> Oval <input type="checkbox"/> Triangle <input type="checkbox"/> Quadrilateral <i>A four-sided figure.</i> |
| Choose the number of <u>lines</u> you want to use, if any. | |
| Choose the <u>words</u> you want to include, if any. <i>It can be a sentence or one word or one word written multiple times.</i> | |
| Choose your colors. <i>We recommend sticking to about 3-5 colors. Try this color picking tool or a palette tool like Coolors.</i> | |

Step 4: Brainstorm your design (7-10 mins)

Start sketching! (6 mins)

Time to put pencil to paper! In this step, you are going to use your rules to create three sketches in the boxes below. You will have up to two minutes to create each sketch. If you do not use all of your rules, that is OK! Remember: this is not about perfection - it is about the process. You will have a chance to refine one of them later on.

- ☐ Grab a pencil or pen and a timer.
- ☐ Review your rule set.
- ☐ Set a timer for **2 minutes**. You can draw the whole time, or stop when you're done.
- ☐ Start sketching in box 1!
- ☐ Repeat these steps for boxes 2 and 3.

Sketch 1

Sketch 2

Sketch 3

Step 4: Brainstorm your design (cont.)

Refine one sketch (1-3 mins)

Pick the sketch you like the most. You can leave it as is or take a few minutes to refine it in the box to the right.

Phew, that was a lot of creative energy! Let's take a break to explore the rules we'll need as *programmers* when we translate our sketch to the screen in Part 2.

Step 5: Meet the grid (8-10 mins)

Let's say your friend gives you an instruction to draw a circle on a piece of paper. You could either just draw the circle or ask for more information. If you ask for more information, you might inquire: where on the paper? How big? What color? A perfect circle or more of an oval? To answer the question of where, your friend might say "A third of the way from the left side and three-fourths of the way down towards the bottom." That kind of instruction might work if you are talking to a human and don't need to be specific. But it won't work for a computer. Computers want you to be specific and precise with the rules you give them.

The coordinate system (3-4 mins)

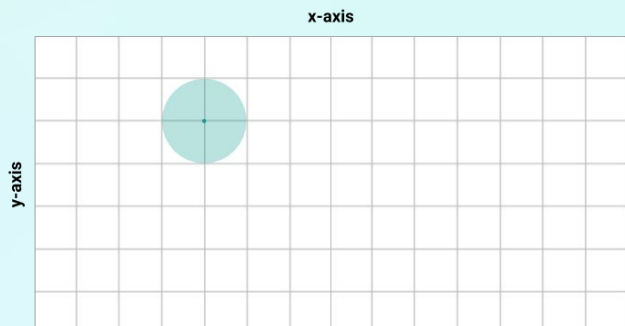
We can use the coordinate system to tell our program where to display an element on our computer screen. The coordinate system is a system that uses one or more numbers to identify the location of a point in space. They can be on a 2D plane or in 3D space. Coordinate planes (i.e. 2D) have an x-axis that runs horizontally and a y-axis that runs vertically to form a grid. They use an ordered pair to signify a point: (x position, y position).

Consider the coordinate plane to the right.

- ❑ What instructions would you give to a computer to draw the circle in that location?



Check your ideas in the
Reference Guide on pg 3.

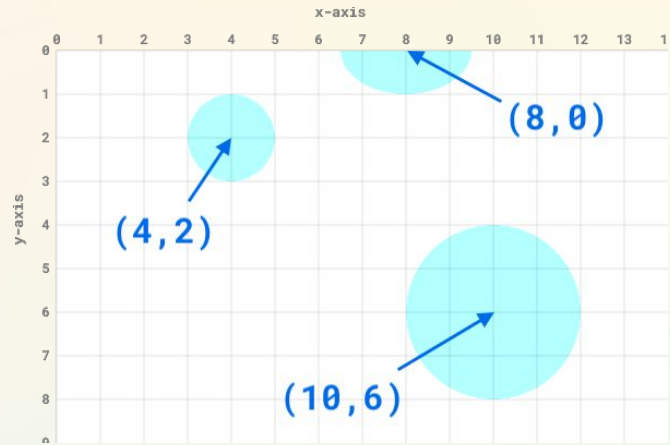


Step 5: Meet the grid (cont.)

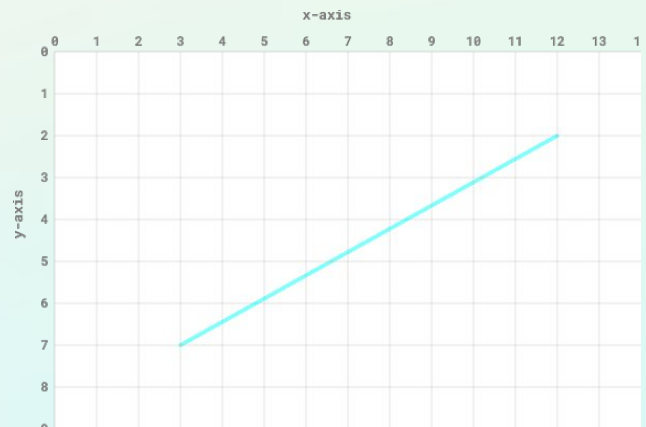
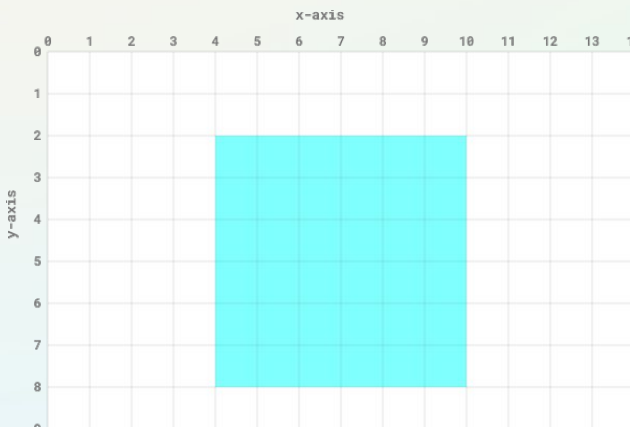
Pixel perfect (4-5 mins)

Each pixel on your screen has a unique address in the coordinate system. In order to draw pixels to the screen, we must give our program the x coordinate (i.e. the location on the x-axis) and the y coordinate (i.e. the location on the y-axis) of the pixel.

The origin or (0, 0) on the screen coordinate system is located at the top left corner. As you move right on the screen, the value of the x-coordinate increases. As you move down on the screen the value of the y-coordinate increases. This may appear a little different than the coordinate system layouts you have seen in math class, where the origin is in the center or at the bottom left corner.



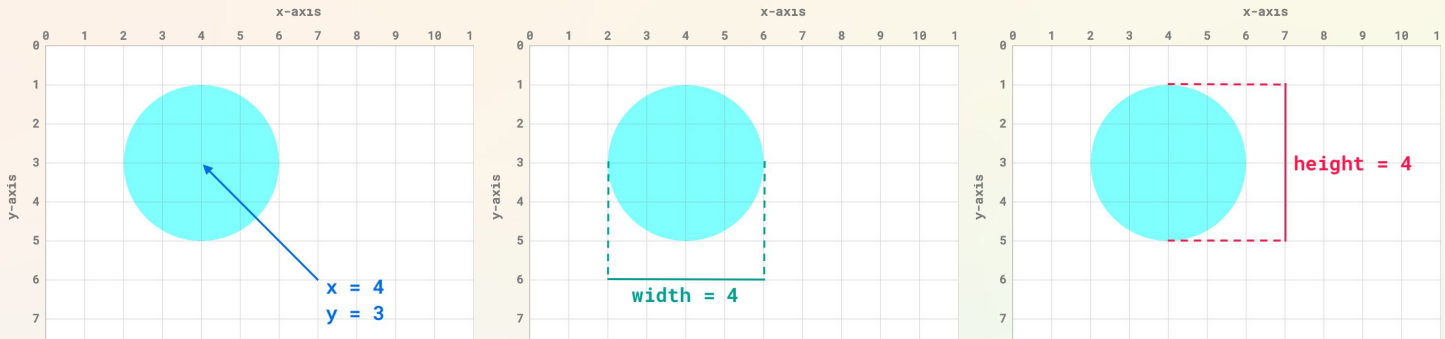
What information would you need to give a computer to display the following shapes? Write it in the box below each grid, then check your answers.



Check your code in the Reference Guide on pg 4.

Step 6: Practice drawing shapes (7-9 mins)

Luckily for us, the creators of p5.js included a set of pre-programmed instructions that we can use to perform specific tasks. This means that instead of drawing each pixel of a circle, we can use these pre-programmed instructions to do most of the work for us. We only need to give it a few key pieces of data: the x coordinate, the y coordinate, the width, and the height.



Shape reference (3-4 mins)

Review the values you need to know to draw the following shapes in p5.js. Keep these in mind as you translate your sketch to the grid in Step 6 and record the values for each shape in Step 7.

| ELEMENT | VALUES | EXAMPLE |
|----------------------------|--|---|
| Line | <ul style="list-style-type: none"> → x and y coordinates of starting point → x and y coordinates of ending point | <p>A coordinate grid with x-axis from 0 to 13 and y-axis from 0 to 9. A cyan line segment connects the point (5, 4) to the point (12, 7). Both points are labeled in blue text.</p> |
| Rectangle or square | <ul style="list-style-type: none"> → x and y coordinates of the center point → width → height <p><i>Note: To create a square, the values of width and height should be equal.</i></p> | <p>A coordinate grid with x-axis from 0 to 13 and y-axis from 0 to 9. A cyan rectangle is centered at (6, 3). An arrow points from the center to the label (6, 3). Below the rectangle, the text <code>width = 6</code> is shown. To the right of the rectangle, the text <code>height = 4</code> is shown.</p> |

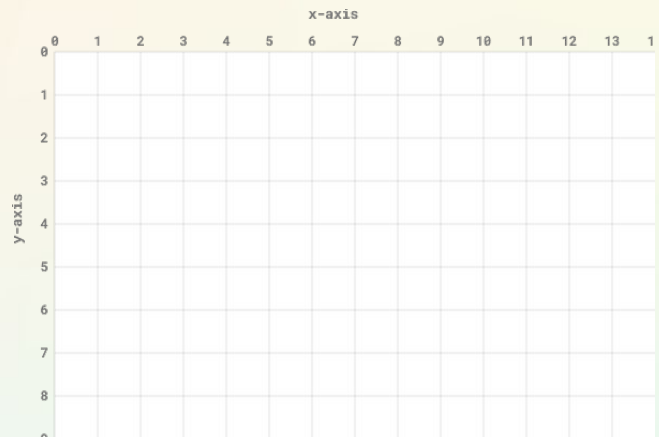
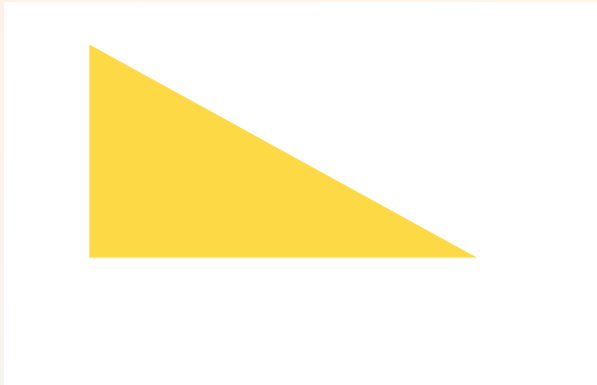
| ELEMENT | VALUES | EXAMPLE |
|--|--|---------|
| Circle or oval | <ul style="list-style-type: none"> → x and y coordinates of the center point → width → height <p><i>Note: To create a circle, the values of width and height should be equal.</i></p> | |
| Triangle | <ul style="list-style-type: none"> → x and y coordinates of 1st point → x and y coordinates of 2nd point → x and y coordinates of 3rd point <p><i>Note: It doesn't matter which order.</i></p> | |
| Quadrilateral <i>A quadrilateral is a four sided shape.</i> | <ul style="list-style-type: none"> → x and y coordinates of 1st point → x and y coordinates of 2nd point → x and y coordinates of 3rd point → x and y coordinates of 4th point <p><i>Note: You should list all points in a clockwise or counterclockwise motion.</i></p> | |
| Text | <ul style="list-style-type: none"> → word or words → x and y coordinates to set the center of the text's location | |
| Color <i>We will use RGB color mode. It uses combinations of red, green, and blue light to create a range of digital colors.</i> | <ul style="list-style-type: none"> → red value from 0 to 255 (R) → green value from 0 to 255 (G) → blue value from 0 to 255 (B) <p><i>Note: Try this color picking tool or a palette tool like Coolors.</i></p> | |

Step 6: Practice drawing shapes (cont.)

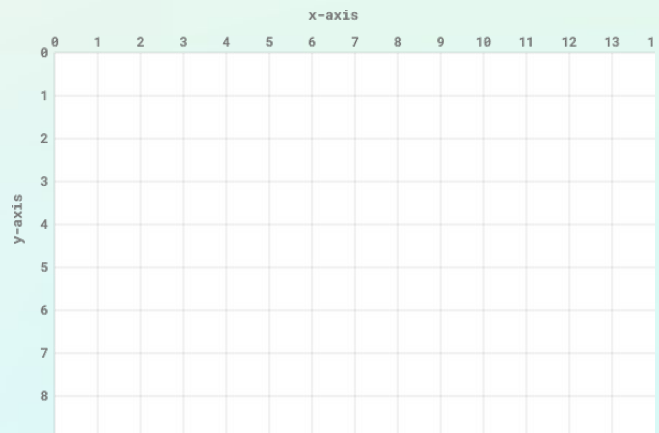
Practice (3-4 mins)

Use the information above to practice drawing shapes on a grid. You can estimate the location or you can be precise and use a ruler.

- ❑ **Draw the triangle on the grid.** First, label the triangle with the information you would need to give a program. Next, use that information to translate it to the grid.



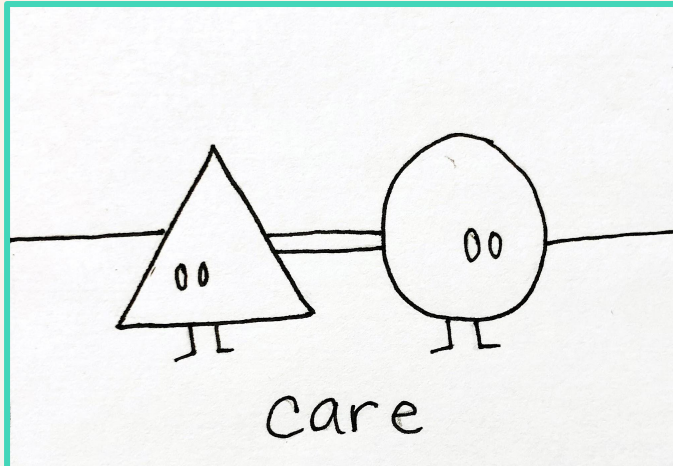
- ❑ **Draw the text on the grid.** First, label the text with the information you would need to give a program. Next, use that information to translate it to the grid.



Check your code in the Reference Guide on pg 5.

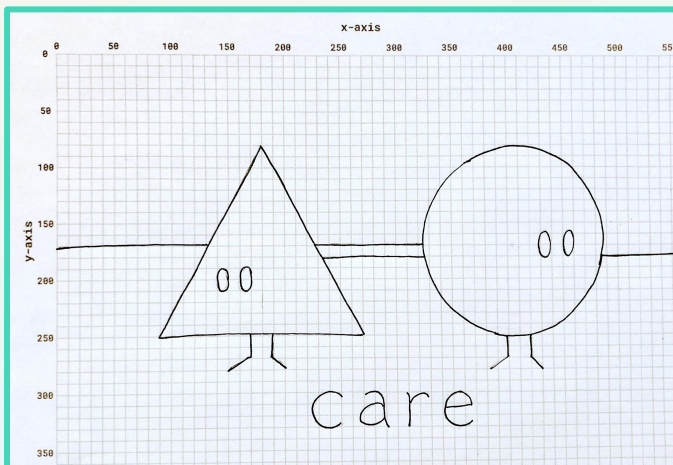
Step 7: Translate your sketch to the grid (5-15 mins)

Now that we've had some practice with the coordinate system, it's time to draw your sketch onto the grid on the next page. Keep in mind that it's ok if it's not exact! You can always make adjustments in Part 2. Right now, our goal is to get the basic layout.



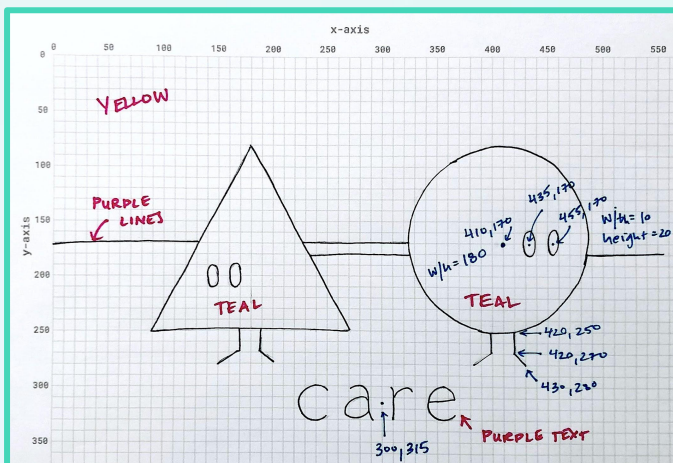
Estimate the elements' location.

First, think about the general location of each element. If you have one element in a central location, you can try starting with that one. This will make it easier to figure out the placement of the other elements.



Draw your elements.

Next, finish drawing your shapes, lines, and/or text on the grid. Plot the points of each shape, line, and/or text. You should also include any additional information you will need like width or height.



Add some color!

Finally, use your color palette to label each element with the color you want to use. If you have a wide assortment of markers or colored pencils, you can also just color it in!



Step 8: Write your instructions (5-7 mins)

We have all the information we need to start programming your piece of digital art! Before we break, let's take one final step to make our lives a bit easier later on when we translate it to p5.js. Record the data you need for each shape, line, and text with corresponding colors in the table below. Use the table in Step 6 if you need a refresher.

| ELEMENT | VALUES | COLOR |
|---------|--|----------------------------------|
| Circle | Center = (410, 170) width = 180 height = 180 | Teal R = 82, G = 250, B = 218 |
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Step 9: Share Your Girls Who Code at Home Project! (5 mins)

We would love to see your work and we know others would as well. Share your sketch with us! Don't forget to tag [@girlswhocode](#) [#codefromhome](#) and we might even feature you on our account!

Stay tuned for Digital Art Rules Part 2!

