

Welcome, Pattern Explorer!

Have you ever looked closely at a tiled floor, a patterned fabric, or even the way leaves grow on a stem and wondered how those cool designs are made? Many beautiful designs are based on **geometric patterns** – shapes and lines that repeat in a predictable way.

Today, we're going to become pattern architects! We'll learn how to use something called a **Flow Diagram** to give clear instructions for drawing any geometric pattern we can imagine. It's like creating a secret code or a recipe for art!

What are Flow Diagrams?

A flow diagram is a picture that shows the steps to do something, in the right order. Think of it like a map for a task. For us, the task will be drawing awesome geometric patterns!

Our Flow Diagram Toolkit: The Basic Symbols

To build our flow diagrams, we'll use a few simple symbols:

- **Oval (Start/End):** This special shape tells us where our pattern instructions begin and where they finish. Every pattern needs a clear 'Start' and 'End'.
- **Rectangle (Action/Process):** This is for any specific task or instruction. For our patterns, it will be things like 'Draw a square', 'Draw a red circle', 'Move one space to the right', or 'Rotate the triangle'.
- **Arrows (Flow Lines):** These lines connect our ovals and rectangles. They show the order of our steps – which instruction comes next. Always follow the arrow!

Creating Repeating Parts (Loops)

Geometric patterns often have parts that repeat over and over. This is called a loop! In our flow diagrams, we can show a loop in a few ways:

- If it's a very short repeat, we might just write the actions out multiple times.
- We can draw an arrow from the end of the repeating section that points back to the beginning of that section. We'd usually add a note like 'Repeat 3 times' or 'Do this until the row is full'.
- Sometimes, we might describe a set of actions inside a "Repeat" idea. For example: [Start Repeat Block: 3 times] → 'Draw a Star' → 'Move Down' → [End Repeat Block].

We'll practice how to show these repeats clearly!

Let's Try One Together: The Alternating Shapes Pattern!

Imagine we want to draw a pattern like this: **Square - Circle - Square - Circle**

Here's how we could make a flow diagram for it:

1. **Start (Oval)**
2. ↓ (Arrow)
3. **Draw a Square (Rectangle)**
4. ↓ (Arrow)
5. **Move one space to the right (Rectangle)**
6. ↓ (Arrow)
7. **Draw a Circle (Rectangle)**
8. ↓ (Arrow)
9. **Move one space to the right (Rectangle)**
10. ↓ (Arrow)

11. *(Now we repeat the first two drawing steps)*
12. **Draw a Square (Rectangle)**
13. ↓ (Arrow)
14. **Move one space to the right (Rectangle)**
15. ↓ (Arrow)
16. **Draw a Circle (Rectangle)**
17. ↓ (Arrow)
18. **End (Oval)**

Think: Could we make this shorter using a repeat idea? Yes! We could say: Start → Repeat 2 times: [Draw Square → Move Right → Draw Circle → Move Right] → End. We'll explore this more!

Activity 1: Pattern Detective

Let's look at a pattern: Imagine a staircase made of blocks.

Row 1: 1 block (#)

Row 2: 2 blocks (##)

Row 3: 3 blocks (###)

First, can you describe in words the steps to draw this? How does it grow?

Now, try to sketch a simple flow diagram for creating the first 3 rows of this staircase pattern.

Remember your Start, Actions (like 'Draw a block', 'Move to next row', 'Add one more block than last row'), and End.

Activity 2: Your Grand Design Challenge!

This is where your creativity shines! You get to invent your very own geometric pattern and then create a flow diagram that explains exactly how to make it.

1. **Brainstorm & Sketch:** On your paper, start sketching ideas for a geometric pattern. It could use different shapes (circles, squares, triangles, stars, squiggles!), different sizes, or even colors if you have markers/colored pencils. It could be a repeating line, a growing pattern, or something that fills a space.
2. **Plan the Steps:** Once you have a pattern you like, think carefully: what are the exact steps someone would need to follow to draw it perfectly? Write these steps down in order. Think about any repeating parts.
3. **Create Your Flow Diagram:** Now, translate those steps into a flow diagram using ovals, rectangles, and arrows. Make sure it's clear and easy to follow. If you have repeating parts, decide how you want to show that (writing it out, using an arrow to loop back with a note, or describing a 'repeat block').

Tip: Start simple, then you can add more complexity if you want! The goal is to have a clear pattern and a flow diagram that correctly shows how to make it.

Show and Tell!

When you're ready, you can share your amazing pattern and its flow diagram!

- Show us your pattern drawing.
- Explain the steps in your flow diagram. How does it build your pattern?
- What was your favorite part of designing it? Was anything tricky about making the flow diagram?

Awesome Work, Pattern Architect!

You've done a fantastic job today! You've learned how to think like a designer and a programmer by using flow diagrams to bring your geometric pattern ideas to life. This skill of breaking down a big task into smaller steps and showing the order is super useful for all sorts of things, from solving math problems to writing stories, or even planning a fun project.

Bonus Challenge (If you want more!):

- Can you make a flow diagram for a pattern that changes direction?
- Can you design a pattern that uses at least three different shapes in a repeating sequence?
- Could you try to make a rule for your pattern that involves a choice? (e.g., "If the shape count is even, use blue; if odd, use red." This would use a Diamond shape for decisions, which we can talk more about!)

Keep exploring patterns around you and thinking about how you could describe them with a flow diagram!