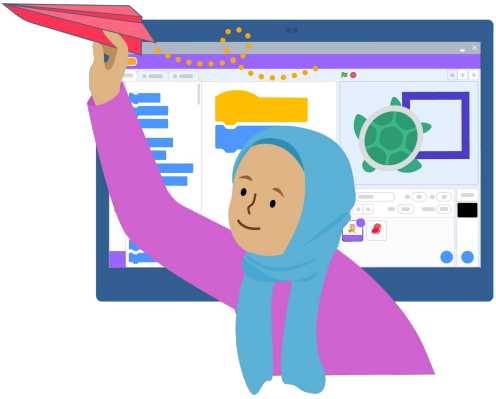
Paper Planes, Turtle Graphics, and Computational Concepts

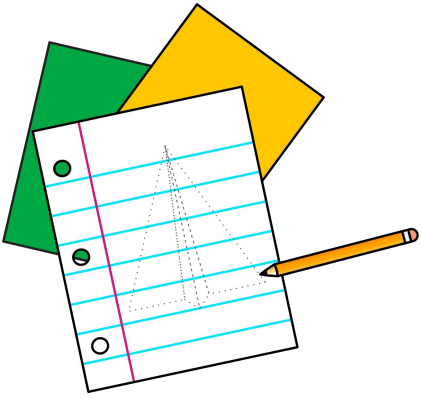


Explore Decomposition and Sequencing

Cards in This Pack

- Fold a Paper Plane / Reflection
- Customize Your Plane / Practice Decomposition
- Turtle Graphics / Draw with a Virtual Pen
- Key Points / Reflection
- Advanced Challenge / Creating Patterns (Looping)

Fold a Paper Plane



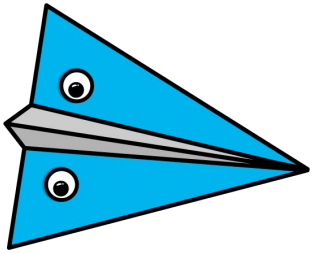
Instructions:

1. Fold the paper in half.
2. Unfold and then fold the top two corners into the center line.
3. Repeat step one and fold the paper in half again.

Reflection

- Does your plane fly? How far? What was the flight path (straight, in a circle, up then down)?
- Does the size of the paper matter? Does the material (tissue paper, construction paper, printer paper…) matter? Does the condition of the paper matter (is it crisp or wrinkled)? Experiment! Test different materials and conditions and see the results.
- Can you debug any issues? How could the instructions be written in a different way to help you achieve different results?
- What additional steps would you add to make your plane fly straighter or fly further?

Customize Your Plane



Options:

- Write a message on your paper plane. What message would you share with learners in a different part of the world or with your future self or with a classmate if you could throw your plane far enough to reach them?
- Add designs, your name, characters, etc., to help you identify your plane among all the others.

Practice Decomposition

Think of a simple activity you know how to do well (kick a ball, make a food, go through a morning routine, etc.) and write out the steps to describe it to a computer. Share these steps with a peer. Determine if they are ordered correctly and clearly enough/contain enough detail that one could follow without asking for additional clarification.

Activity: _____

Step 1: _____

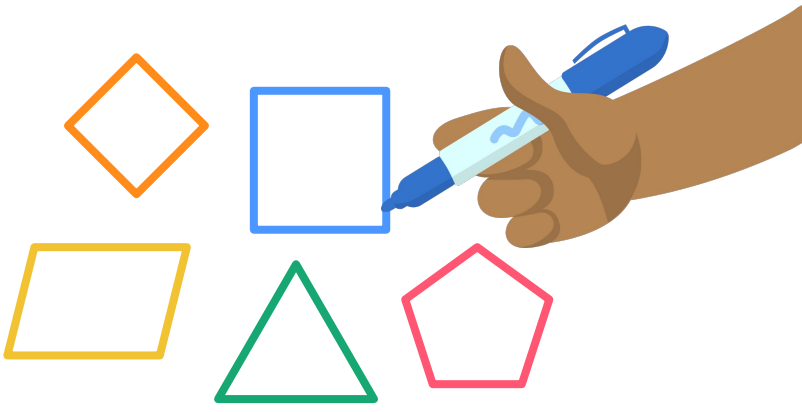
Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

Turtle Graphics



Instructions:

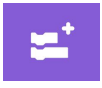
1. Look at these shapes and pick one to recreate in Scratch.
2. Study your shape. Are the sides the same length or different length? Are the angles the same or different? Are there any points where the steps you'd take might be the same/repeat?

Draw with a Virtual Pen

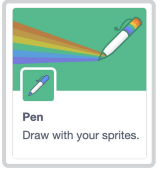
scratch.mit.edu

GET READY

Choose any sprite.

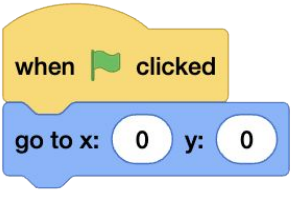


Add Pen Extension.

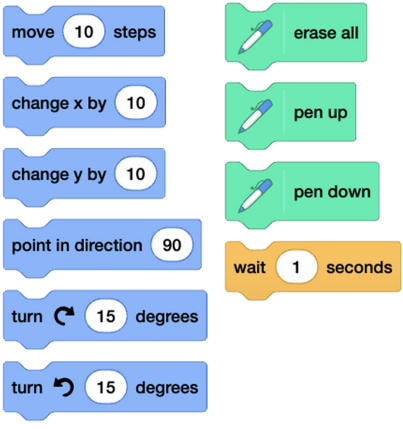


ADD CODE

Position Sprite



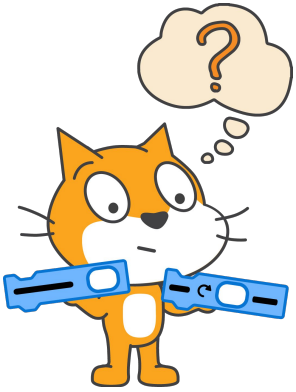
Blocks to Try



TRY IT

You don't have to use all of these blocks, and you can use any of these blocks as many times as you need. Create your script, test, and debug.

Key Points



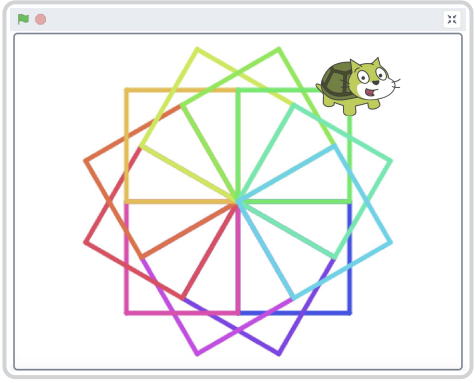
Remember:

1. Details matter.
2. Sequential order matters.
3. We can't make assumptions about the computer's knowledge. A programmer has to be very explicit in their instructions.

Reflection

- Did your shape look as expected? If not, can you spot the problem and debug?
- Do you need to slow down the action? How can you use the wait block to help?
- Sequential order matters: Where have you used blocks like erase all, pen up, and pen down in your sequence? What happens if you place these blocks at the beginning or end of a sequence or in a different order?
- There is often more than one solution or path to accomplish a task. Compare your code with other solutions drawing the same shape (in pairs or a small group). Was your solution similar or different? Analyze the other solution(s) and discuss why you chose the blocks you did.

Advanced Challenge



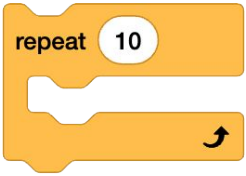
Options:

- Customize your shape using additional blocks (such as set pen size and color)
- Create a paper plane sprite or turtle sprite by drawing one using the Paint Editor tools
- Create a complex shape using a loop

Creating Patterns

scratch.mit.edu

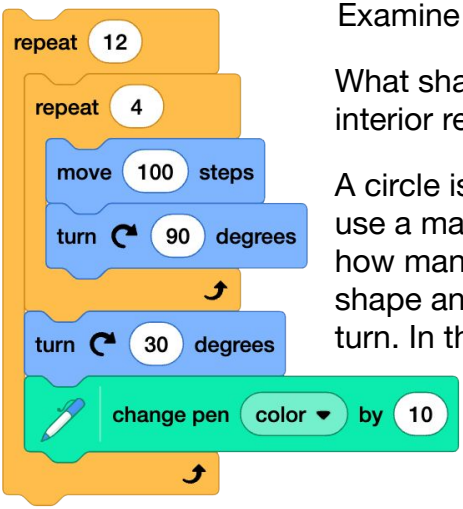
BLOCKS TO TRY



Select a “repeat” block from the Control category.

Select a block that sets or changes the pen size or color from the Pen category.

CREATE YOUR CODE



Examine this example script:

What shape do you think the interior repeat script makes?

A circle is 360 degrees. You can use a math equation to determine how many times to repeat the shape and how many degrees to turn. In this script: 30 x 12 = 360.

What happens if you move the “change pen color” block inside the interior repeat script? Test and debug.