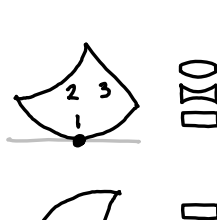


# Contour Code reading order

## Reading a single shape

When a composition has just one shape, start from the bottommost point on the shape and read the sides clockwise from there. Imagine setting the shape down on flat ground: wherever the shape touches the ground is where to start reading.

- If the shape touches the ground on a single vertex, start with whichever side is next clockwise from it (which will be to the left of it.)



- If the shape touches the ground in the middle of a convex side, start with that side.



- If the shape sits on a straight horizontal side, start with that side.



- If multiple sides or vertices are touching the ground, start with the leftmost one.



## Reading a composition of multiple shapes

There is always a single correct order to read any composition. The general idea is to start at the bottommost shape, and then repeatedly apply the following rule.

### How to read a shape in a composition

To read a shape (S):

- 1: Go around shape S clockwise and record the sides.
- 2: If any other shapes are touching shape S, read each of those neighbor shapes one by one, ordered clockwise around S. Apply these two steps to each neighbor before moving on to the next.

So, when reading a neighbor of S (a shape touching S), you'll also read all of the neighbor's neighbors, and so on, before moving to the next neighbor of S. (A depth-first search, if that means anything to you.)

### Where to start reading a shape

For the first shape, start at the bottommost point, as described above.

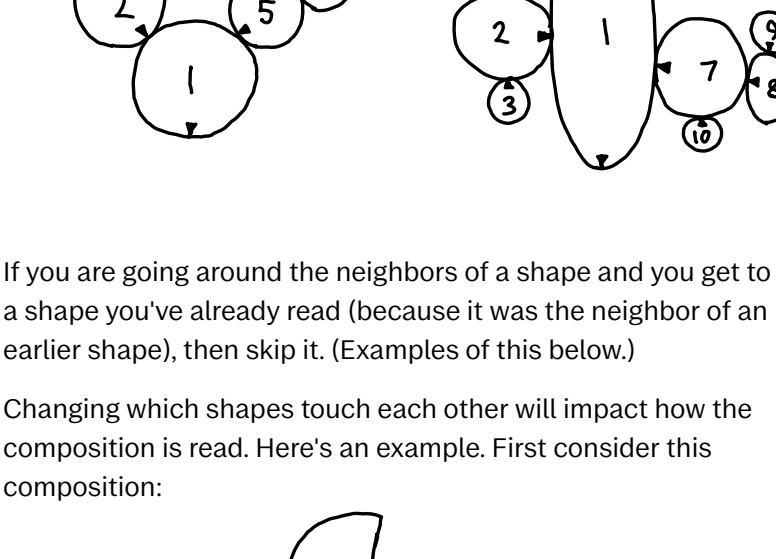
For any other shape, start at the place it touches the previous shape.

### What shape to start at

Again, imagine setting the whole composition down on a flat ground, and see which shape contacts the ground. Start with that shape, at the contact point as described above. If multiple shapes touch the ground, start with the leftmost one.

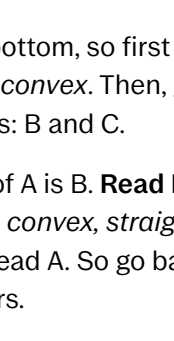
## Examples

Here are a few examples of reading order, using circles and ovals for simplicity. (None of these examples says any real word.) The starting point of each shape is marked with a triangle: for each shape, its neighbors are read clockwise starting from that point, and if the shape had multiple sides, the sides would also be read starting from that point.



If you are going around the neighbors of a shape and you get to a shape you've already read (because it was the neighbor of an earlier shape), then skip it. (Examples of this below.)

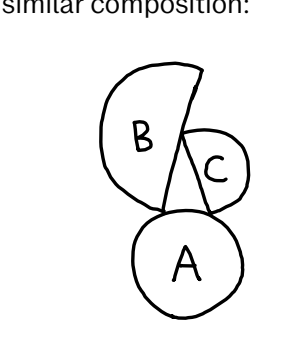
Changing which shapes touch each other will impact how the composition is read. Here's an example. First consider this composition:



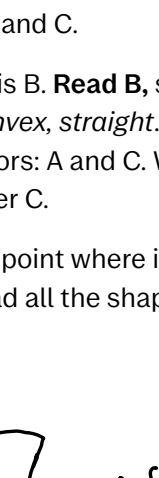
The composition is read like this:

- Shape A is on the bottom, so first **read A**, starting at the bottommost point: *convex*. Then, go around A from that point to find its neighbors: B and C.
- The first neighbor of A is B. **Read B**, starting at the point where it touches A: *convex, straight*. B has one neighbor, A, but we've already read A. So go back to A and continue around its neighbors.
- The next neighbor of A is C. **Read C**, starting at the point where it touches A: *straight, convex*. We've now read all the shapes, so we're done.

The result:



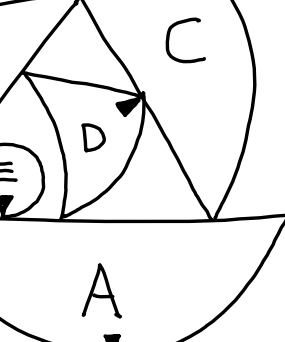
Now consider this similar composition:



The composition is read like this:

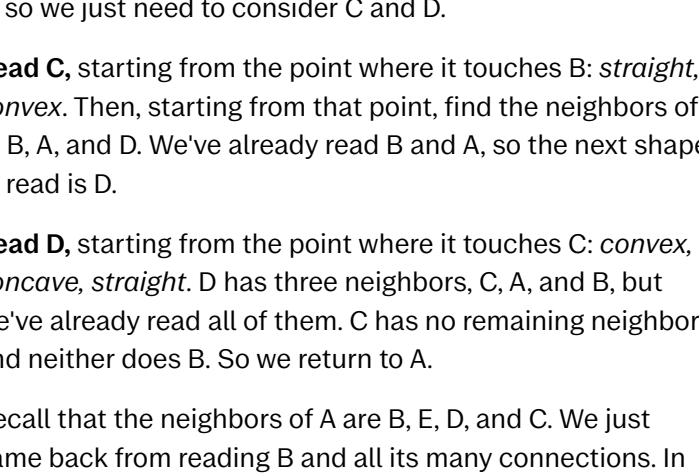
- Shape A is on the bottom, so first **read A**, starting at the bottommost point: *convex*. Then, go around A from that point to find its neighbors: B and C.
- The first neighbor of A is B. **Read B**, starting at the point where it touches A: *convex, straight*. Go around B from that point to find its neighbors: A and C. We've already read A, so we just need to consider C.
- **Read C**, starting at the point where it touches B: *convex, straight*. We've now read all the shapes, so we're done.

The result:



In the first case, where B and C are not touching, C is read as a neighbor of A, while in the second case, where B and C are touching, C is read as a neighbor of B. This difference means that C is read from different starting points in these two compositions, so the resulting sequence of sides is different.

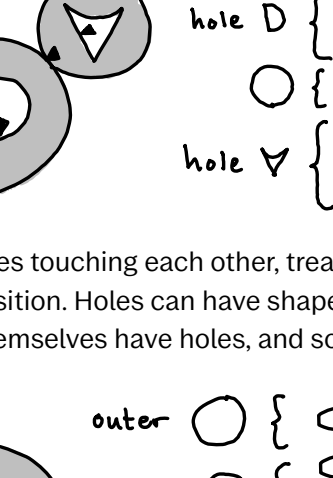
Here's a more complicated example:



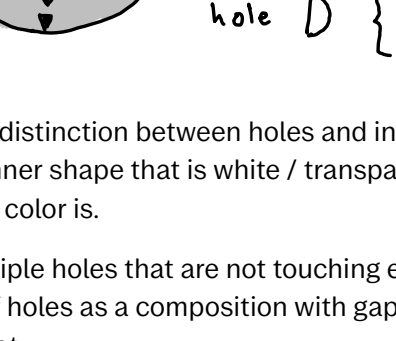
- The bottommost point is on shape A. So first, **read A**, starting from that bottommost point: *convex, straight*. Then, go around A from that point to find its neighbors: B, E, D, and C.
- The first neighbor of A is B. **Read B**, starting from the point where it touches A: *convex, convex*. Then, starting from that point, find the neighbors of B: A, C, and D. We've already read A, so we just need to consider C and D.
- **Read C**, starting from the point where it touches B: *straight, convex*. Then, starting from that point, find the neighbors of C: B, A, and D. We've already read B and A, so the next shape to read is D.
- **Read D**, starting from the point where it touches C: *convex, concave, straight*. D has three neighbors, C, A, and B, but we've already read all of them. C has no remaining neighbors, and neither does B. So we return to A.
- Recall that the neighbors of A are B, E, D, and C. We just came back from reading B and all its many connections. In doing so, we also ended up reading D and C. So all that's left is to **read E**: *convex*.

## Holes / shapes within shapes

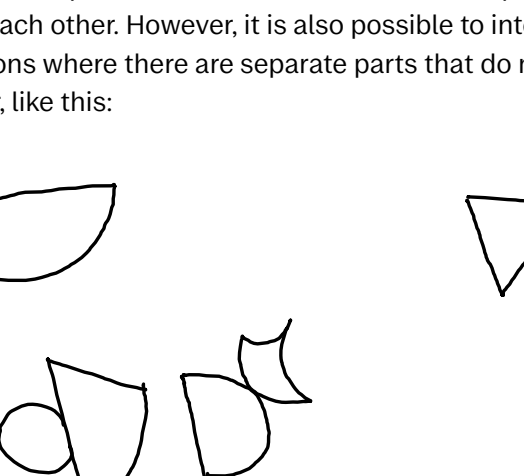
If a shape has a hole or other shape inside it, read the inner shape before reading any of its neighbors.



If a hole has multiple sides, the start point of the hole should be whatever point on the edge of the hole is closest to the start point of the surrounding shape.



If there are multiple holes touching each other, treat the whole thing as its own composition. Holes can have shapes inside them too (which can themselves have holes, and so on).

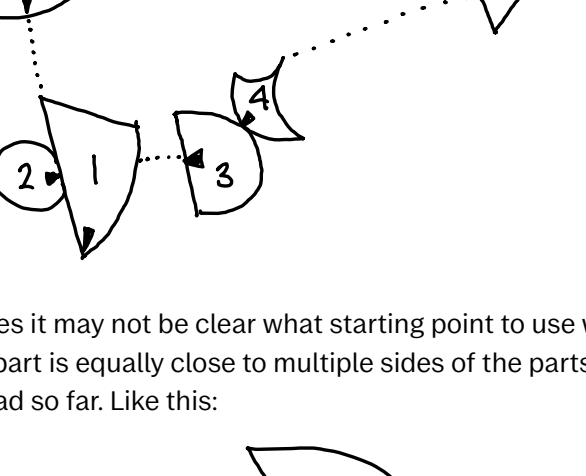


There is no real distinction between holes and inner shapes. A hole is just an inner shape that is white / transparent / whatever the background color is.

If there are multiple holes that are not touching each other, read the whole set of holes as a composition with gaps — see below on how to do that.

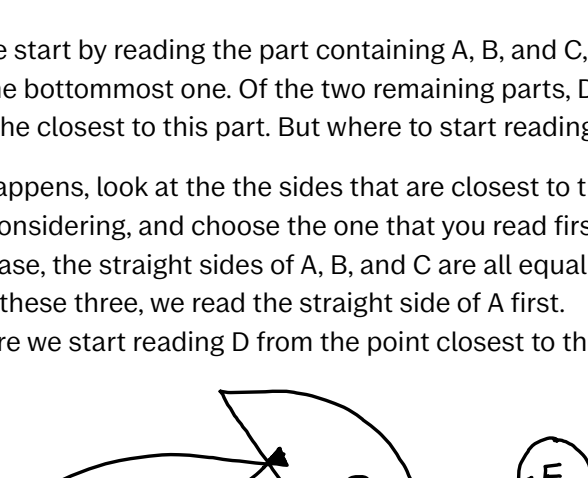
## Gaps between shapes

Most of the compositions I've made have all the shapes touching each other. However, it is also possible to interpret compositions where there are separate parts that do not touch each other, like this:

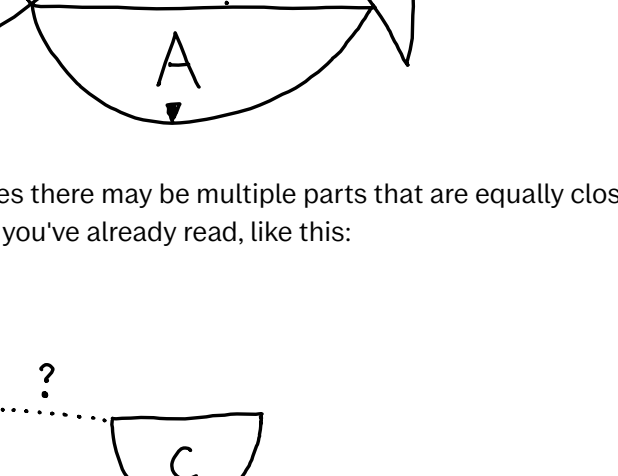


To handle this:

- First read the bottommost part, starting from the bottom.
- Then read whichever part is closest to the first part, starting at whatever point on that part is closest to a shape you've already read.
- Then read whichever of the remaining parts is closest to either of the first two, starting at whatever point on that part is closest to any of the shapes you've already read.
- Etc.

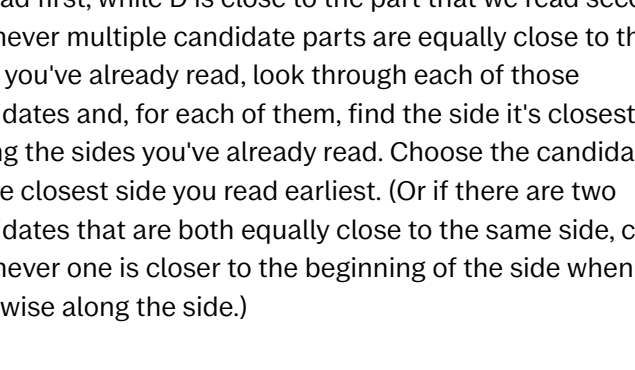


Sometimes it may not be clear what starting point to use when the next part is equally close to multiple sides of the parts you've read so far. Like this:



Here, we start by reading the part containing A, B, and C, since that's the bottommost one. Of the two remaining parts, D is clearly the closest to this part. But where to start reading D?

If this happens, look at the the sides that are closest to the part you're considering, and choose the one that you read first. In the above case, the straight sides of A, B, and C are all equally close to D. Of these three, we read the straight side of A first. Therefore we start reading D from the point closest to that side.



Sometimes there may be multiple parts that are equally close to the parts you've already read, like this:



Here, we start by reading the part containing A and B. Then we read C, since that part is closest to the first part. But after that, both D and E are equally close to a part that we read before. Which do we read next?

In this case, we'd read E next, because it's close to the part that we read first, while D is close to the part that we read second. Whenever multiple candidate parts are equally close to the parts you've already read, look through each of those candidates and, for each of them, find the side it's closest to among the sides you've already read. Choose the candidate whose closest side you read earliest. (Or if there are two candidates that are both equally close to the same side, choose whichever one is closer to the beginning of the side when going clockwise along the side.)