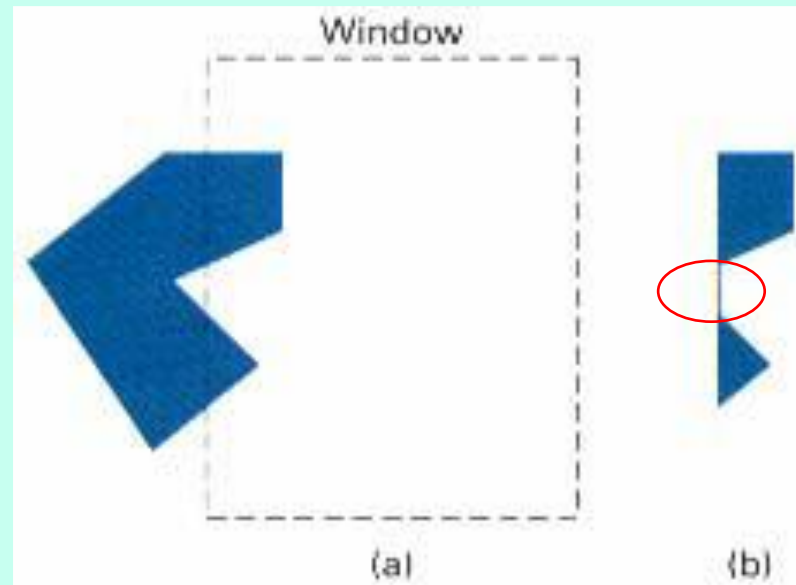


Polygon Clipping

Weiler-Atherton Polygon Clipping

Weiler-Atherton Polygon Clipping

- Convex polygons are correctly clipped by the Sutherland-Hodgeman algorithm, but concave polygons may be displayed with extra areas (area inside the red circle), as demonstrated in the following figure.



Weiler-Atherton Polygon Clipping

- This algorithm was developed for identifying visible surfaces, and can be used to clip a fill area that is either a convex polygon or a concave polygon.
- The basic idea of this algorithm is that instead of proceeding around the polygon edges as vertices are processed, we will follow the window boundaries.
- The path we follow depends on:
 - polygon-processing direction (clockwise or counterclockwise)
 - The pair of polygon vertices outside-to-inside or an inside-to-outside.

Weiler-Atherton Polygon Clipping

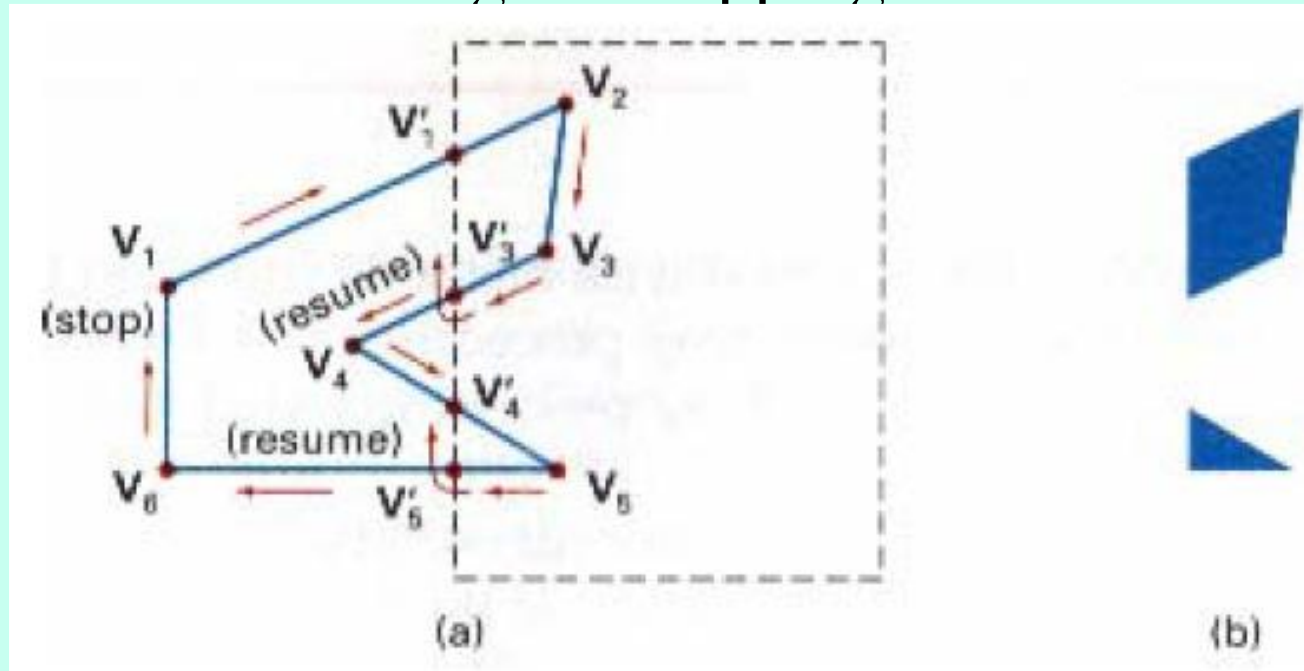
For clockwise processing of polygon vertices, we use the following rules:

- For an **outside-to-inside** pair of vertices, **follow polygon boundaries**.
- For an **inside-to-outside** pair of vertices, **follow window boundaries in a clockwise** direction.

Weiler-Atherton Polygon Clipping

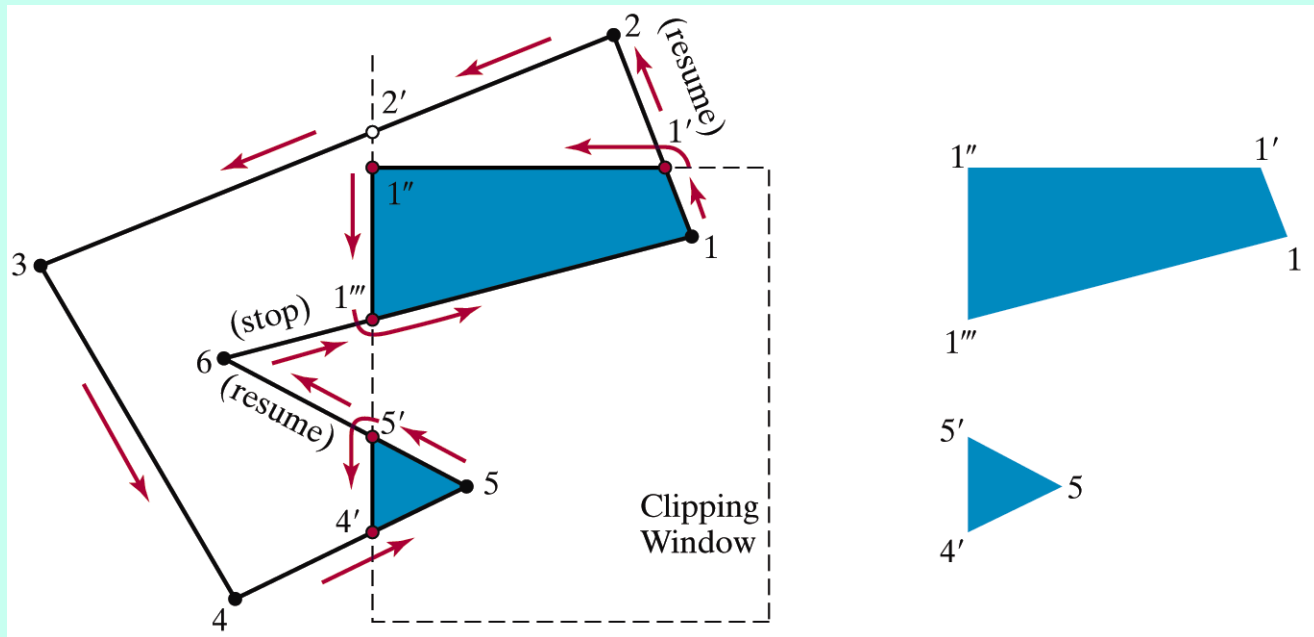
➤ Example

- In the following figure, the processing direction in the Weiler-Atherton algorithm and the resulting clipped polygon is shown for a rectangular clipping window.



Weiler-Atherton Polygon Clipping

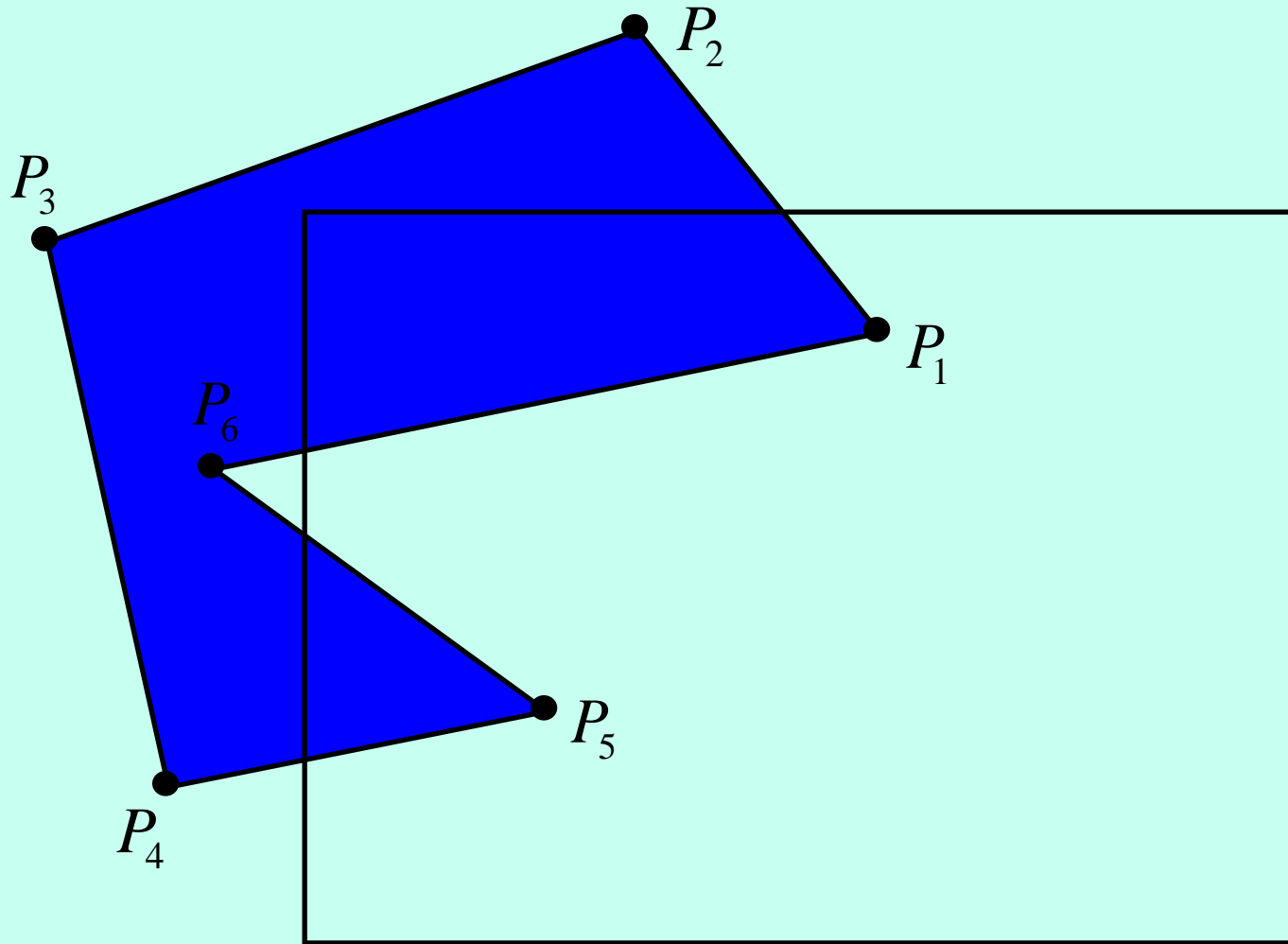
- For an outside-to-inside pair of vertices, follow the polygon boundary
- For an inside-to-outside pair of vertices, follow the window boundary in a clockwise direction



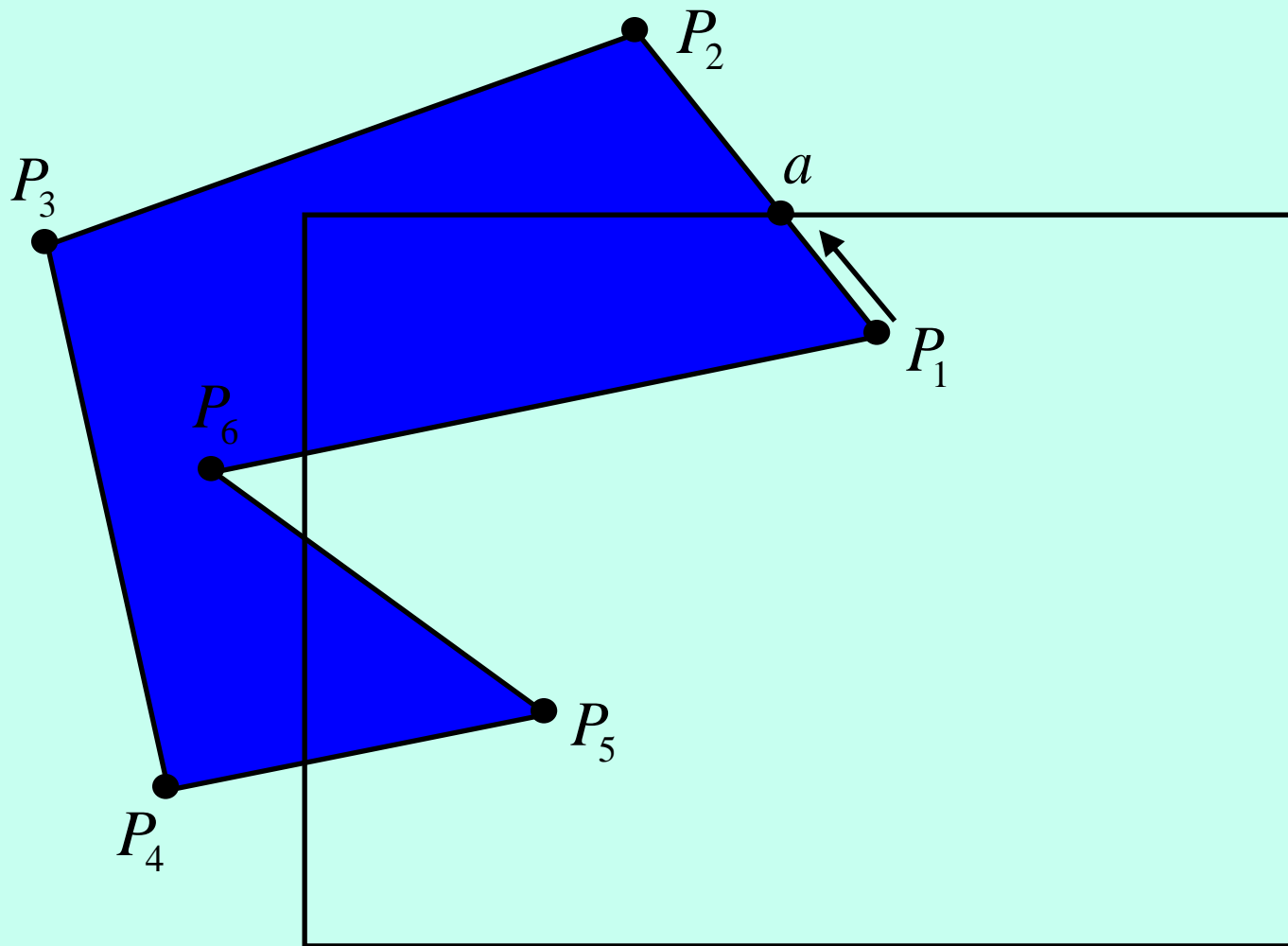
Weiler-Atherton Algorithm

- Process the edges of the polygon in a counterclockwise order until an inside-outside pair of vertices is encountered
- Follow the window boundaries in a counterclockwise direction from the exit-intersection point to another intersection point with the polygon
- Repeat until at a previously processed vertex
- Return to the exit-intersection point and continue processing the polygon edges in a counterclockwise order

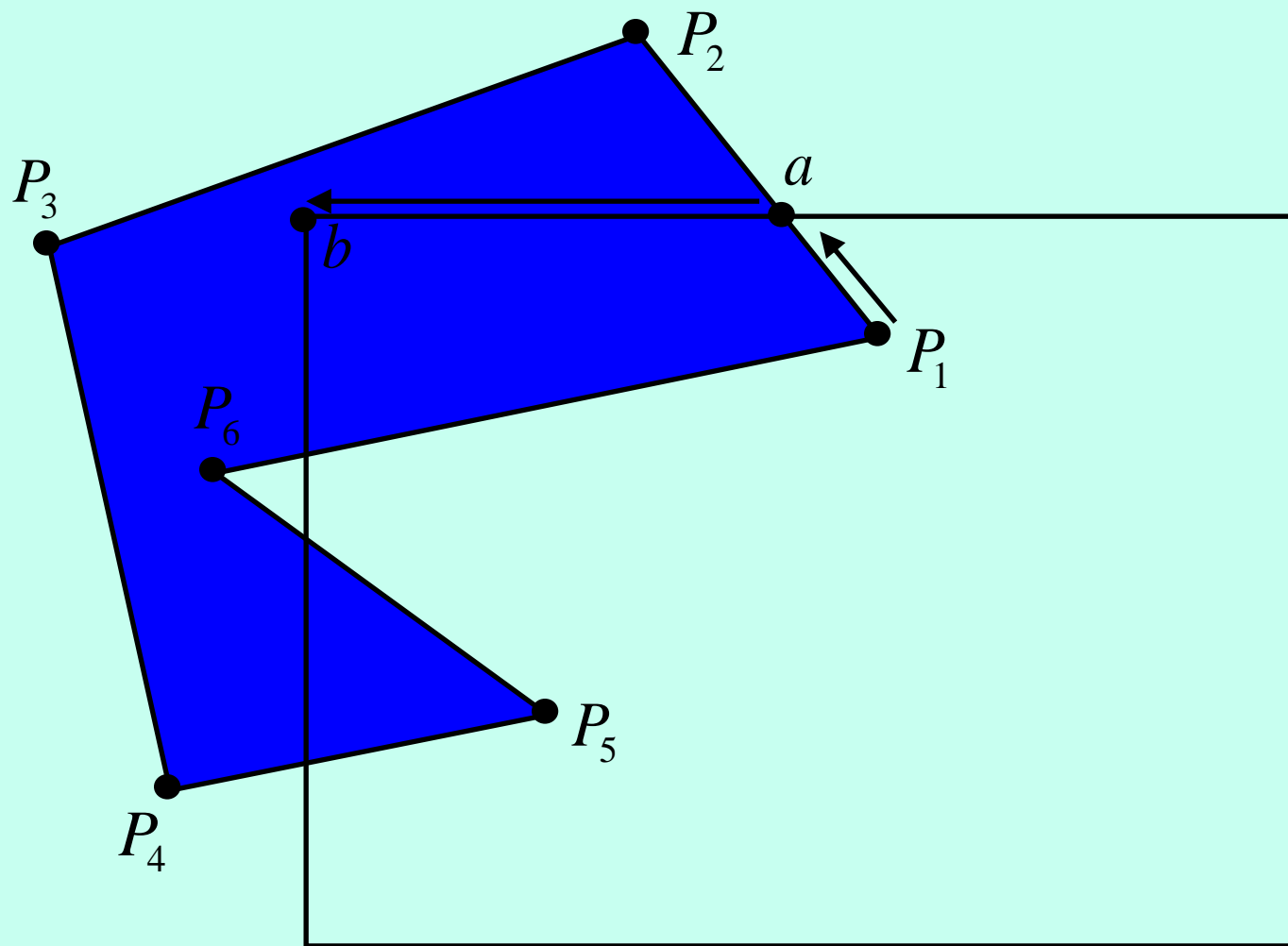
Weiler-Atherton Algorithm



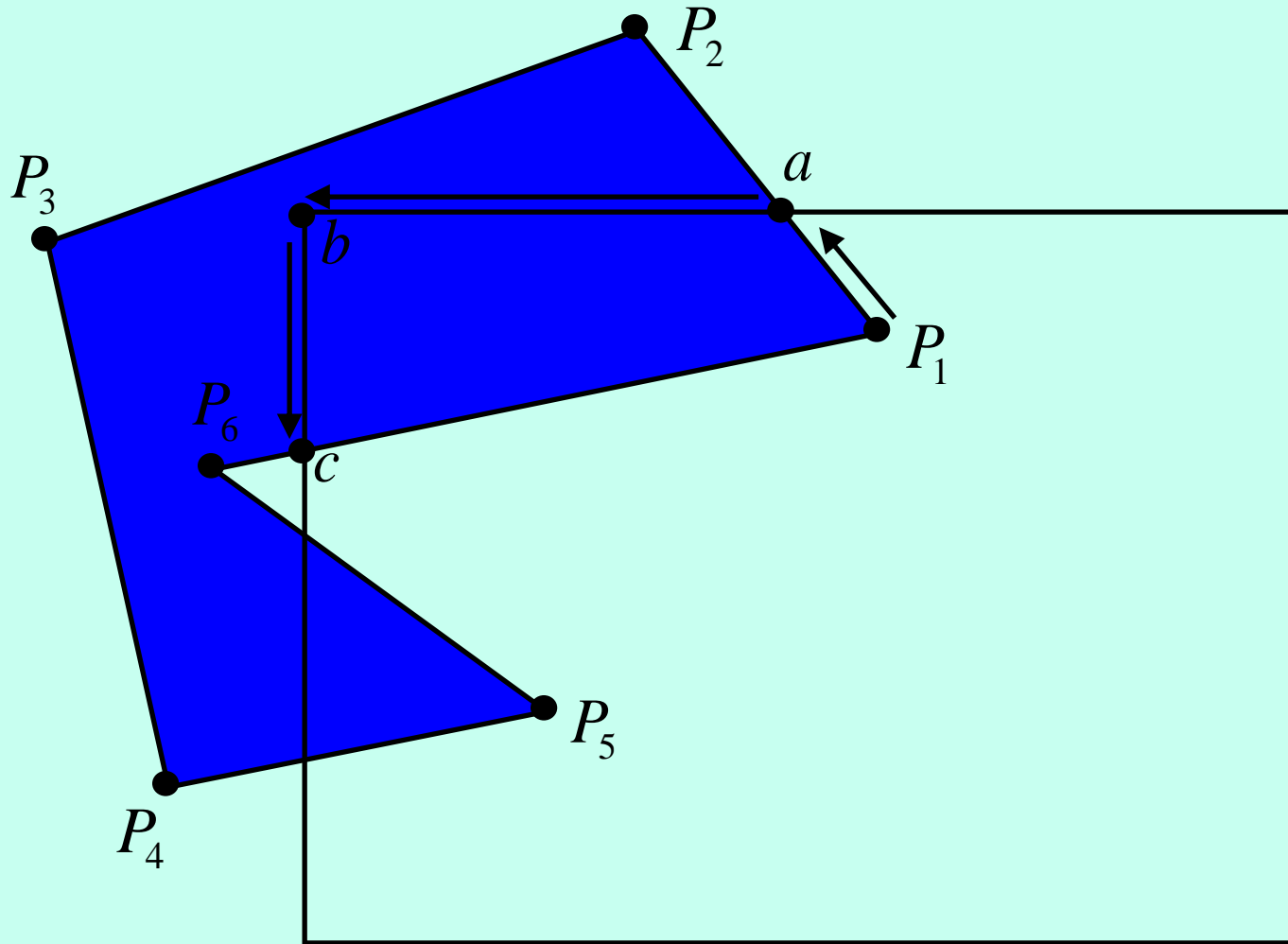
Weiler-Atherton Algorithm



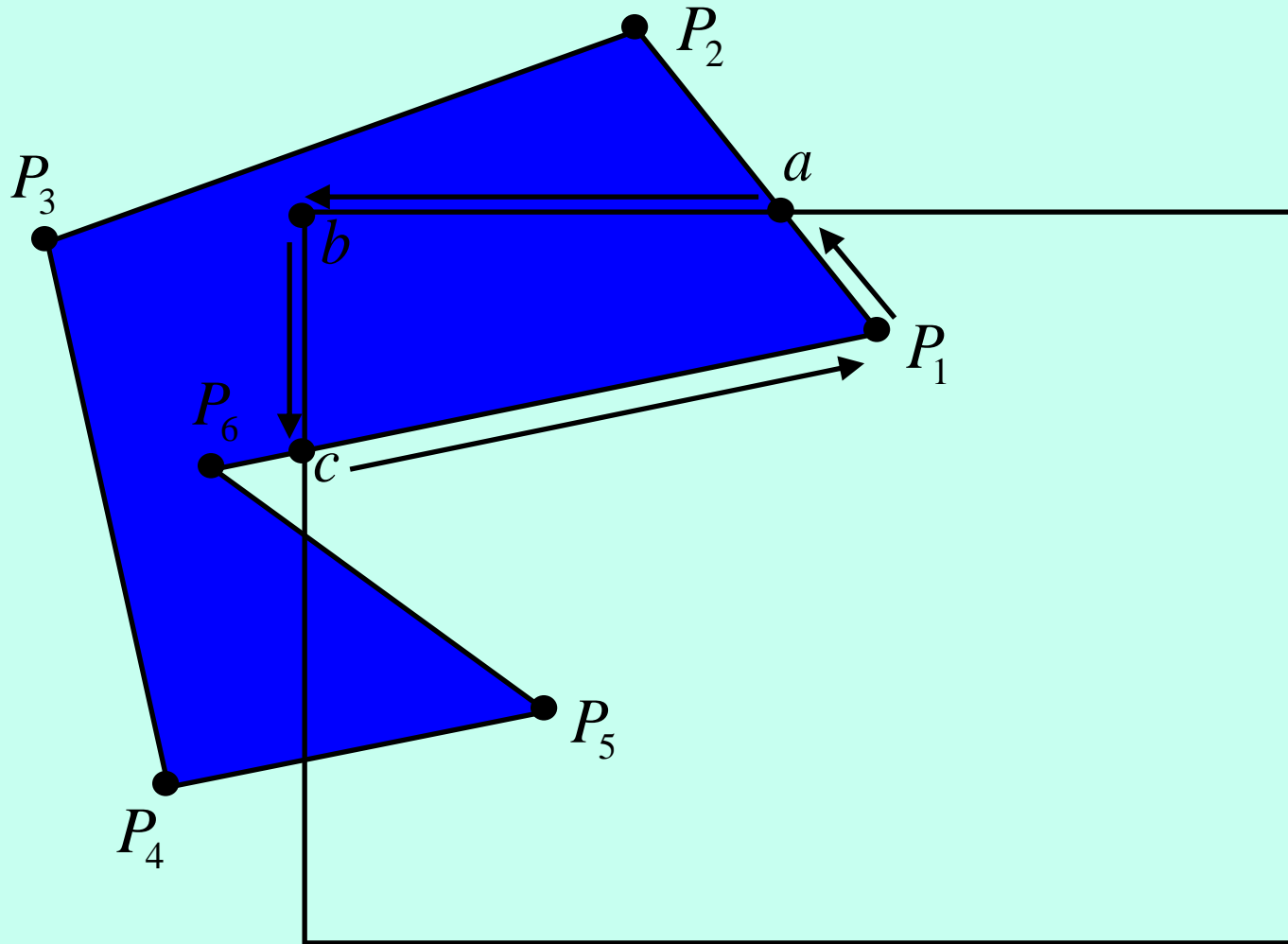
Weiler-Atherton Algorithm



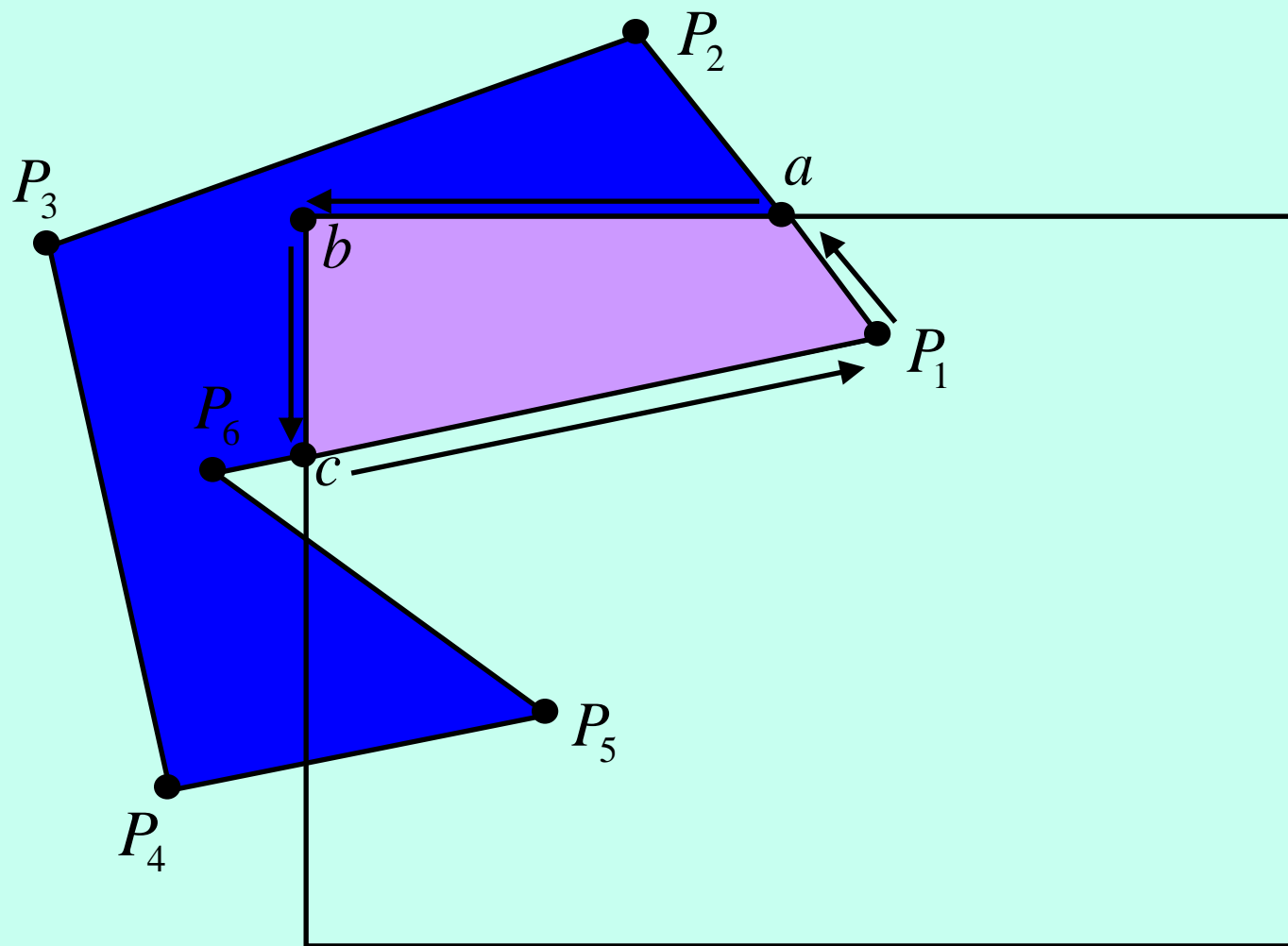
Weiler-Atherton Algorithm



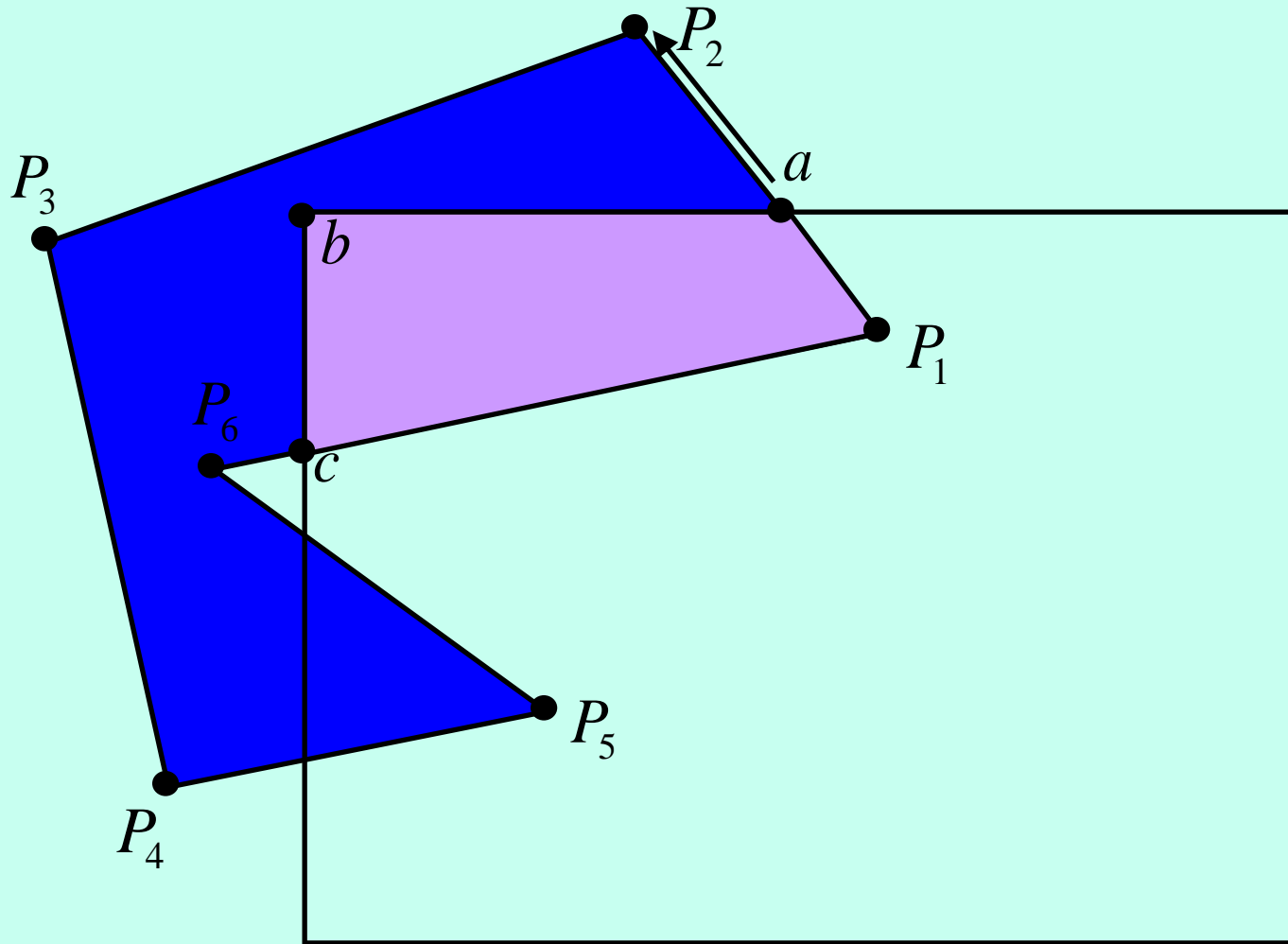
Weiler-Atherton Algorithm



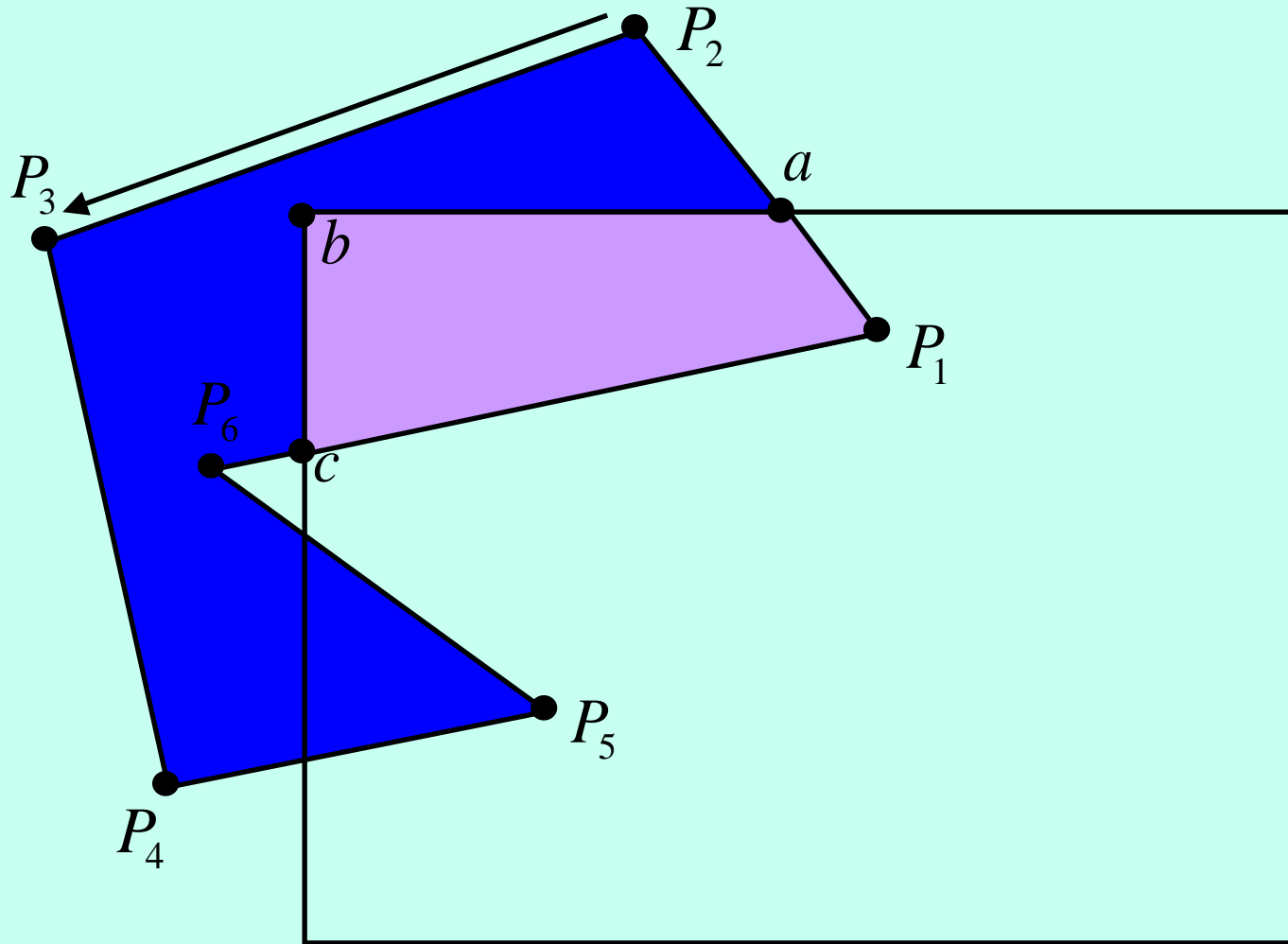
Weiler-Atherton Algorithm



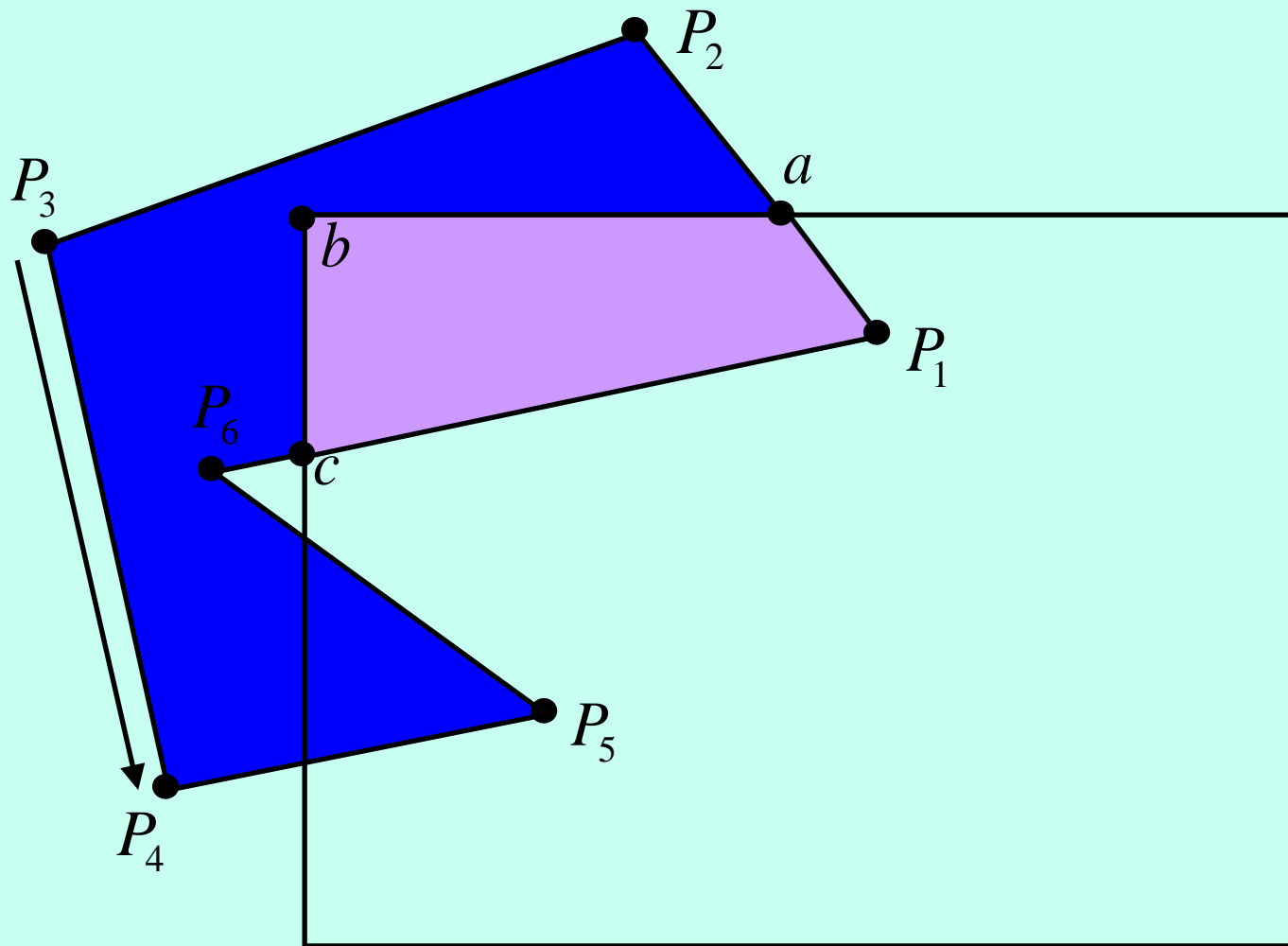
Weiler-Atherton Algorithm



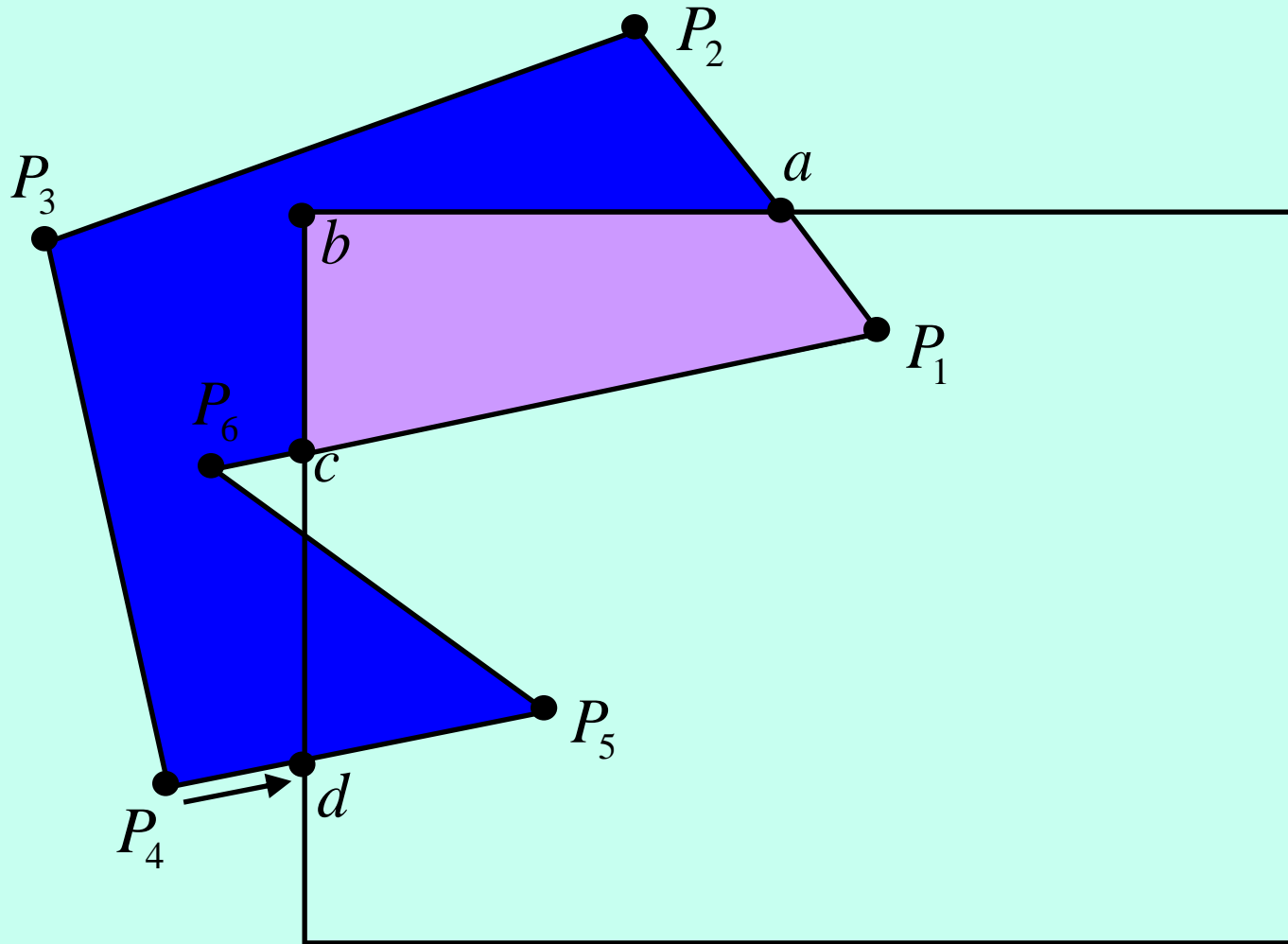
Weiler-Atherton Algorithm



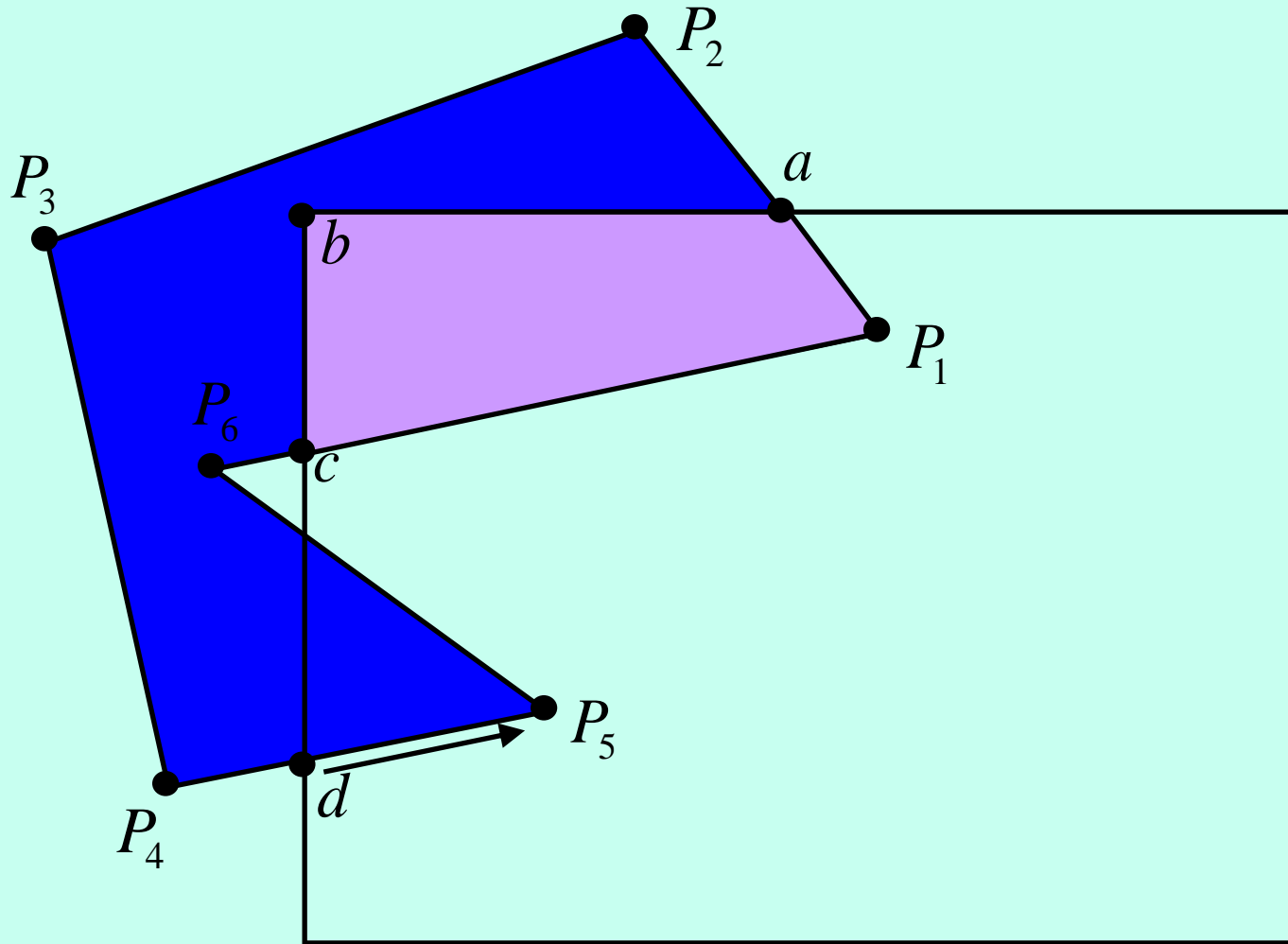
Weiler-Atherton Algorithm



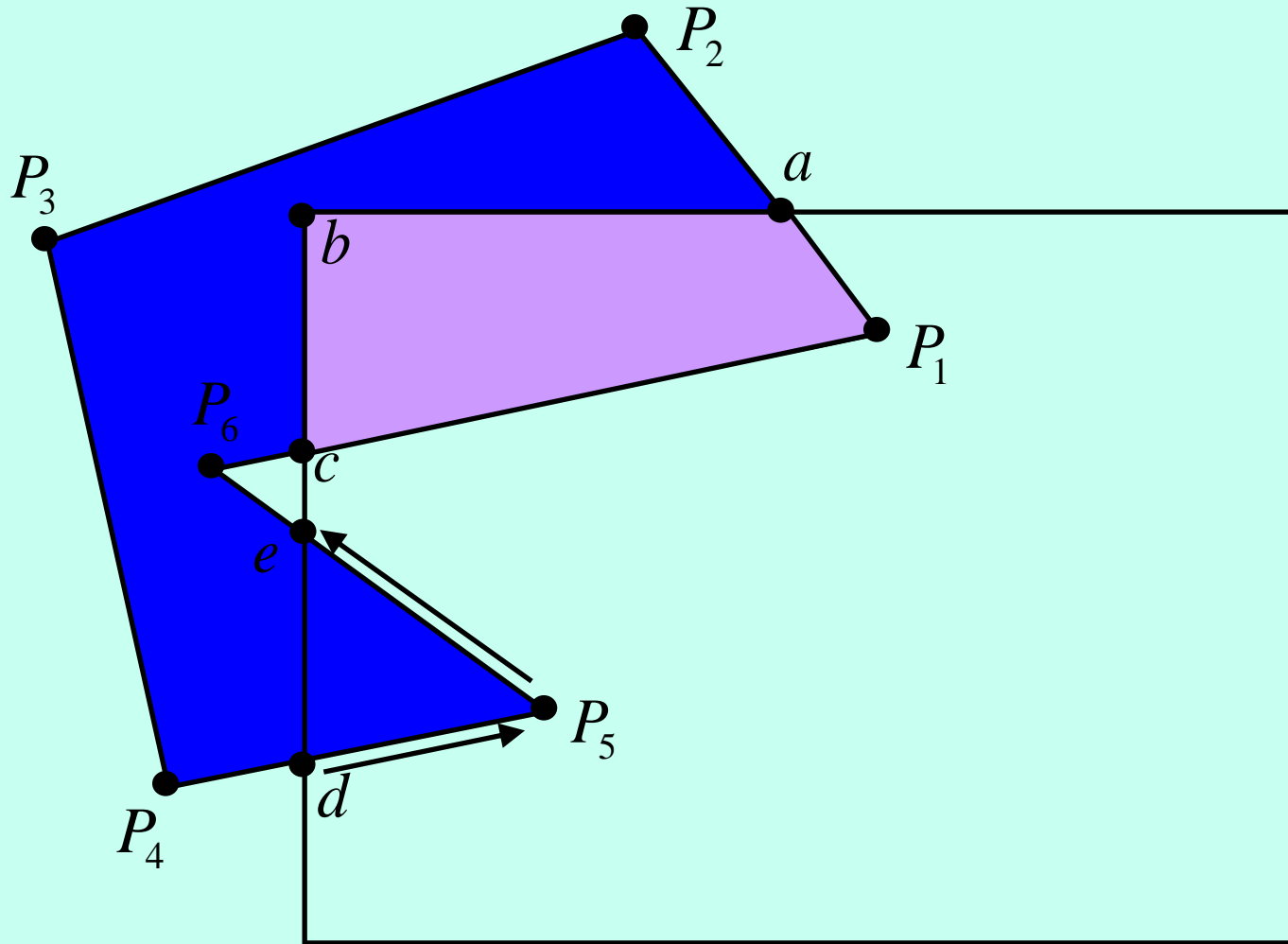
Weiler-Atherton Algorithm



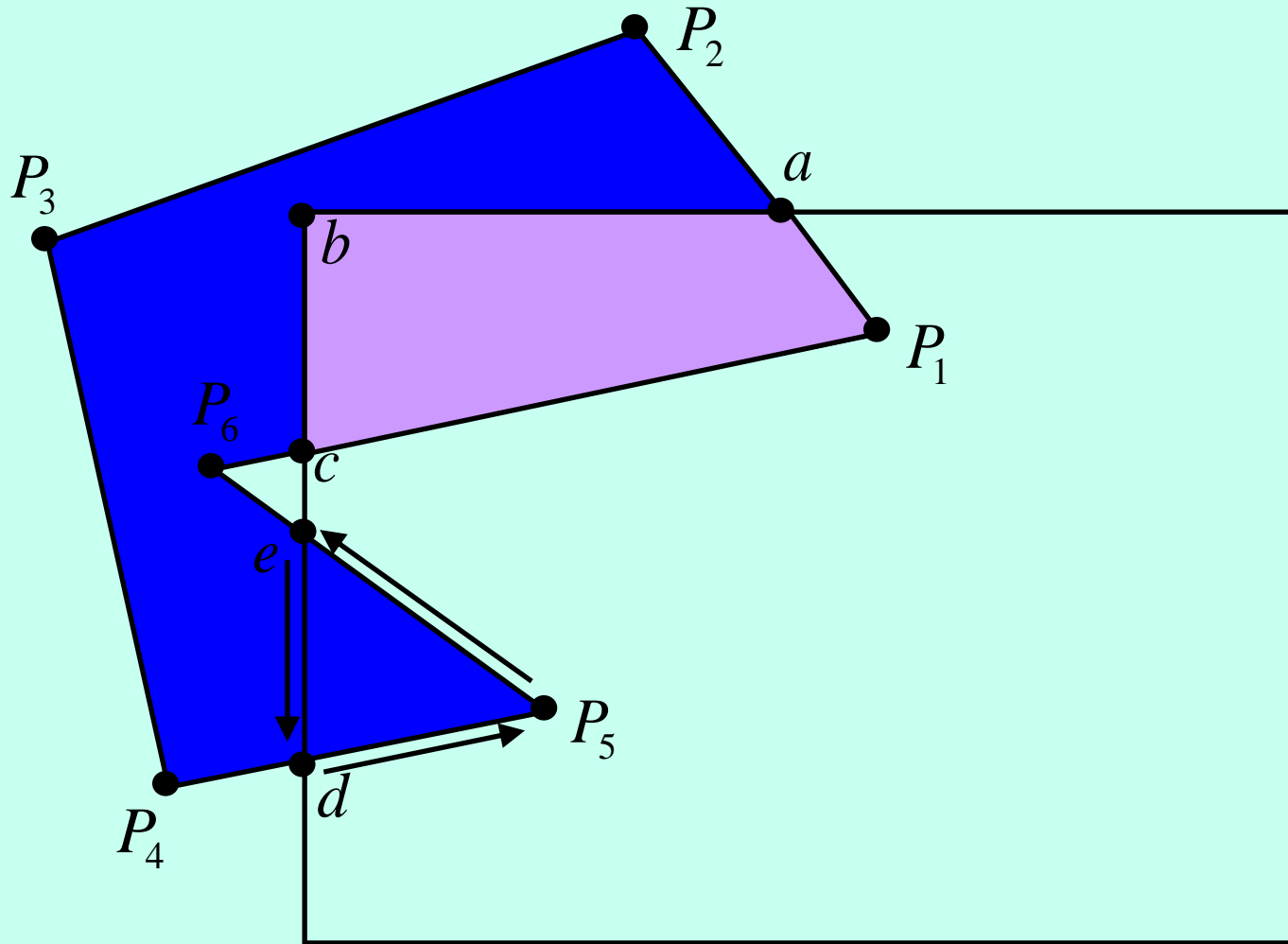
Weiler-Atherton Algorithm



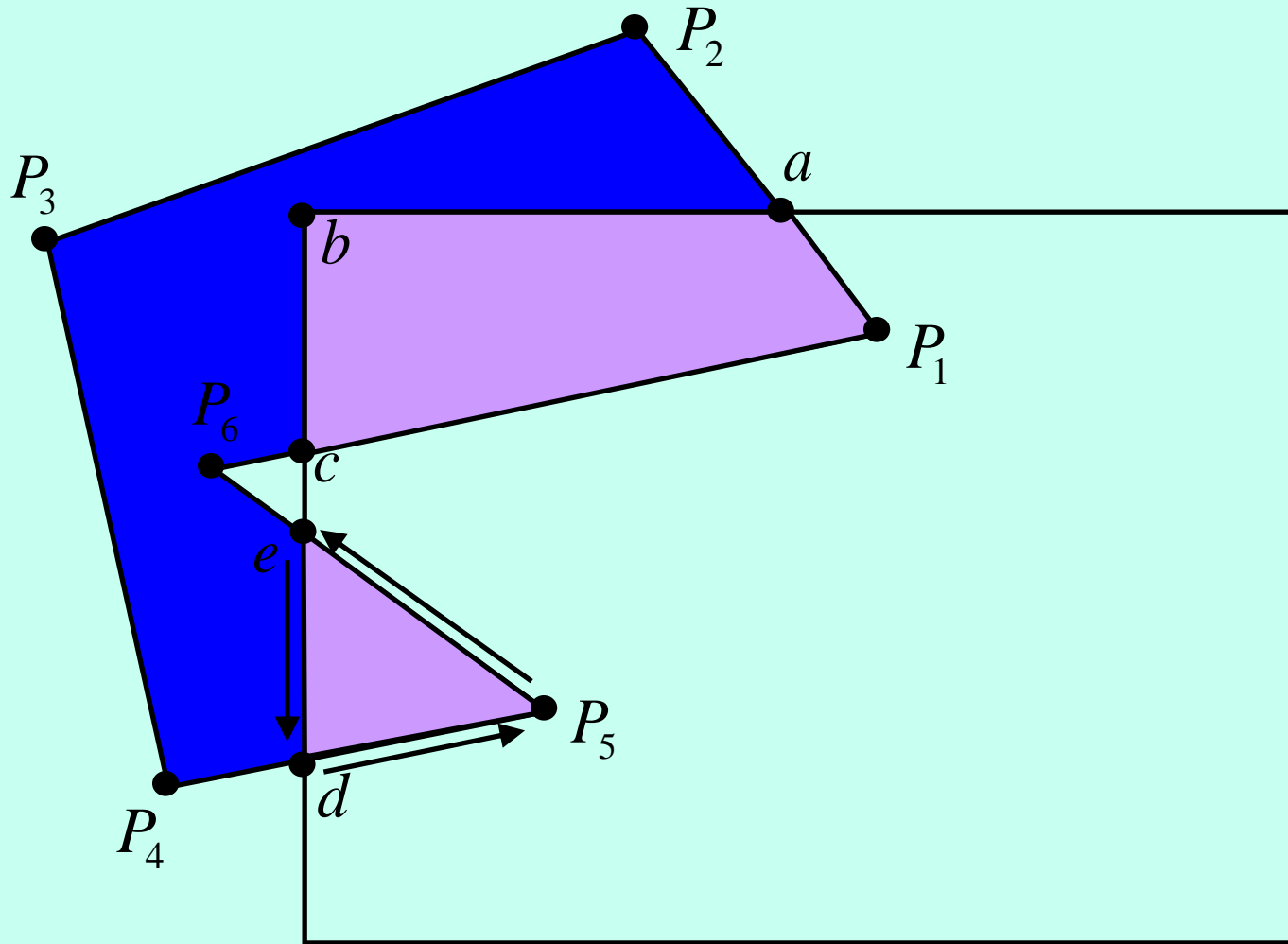
Weiler-Atherton Algorithm



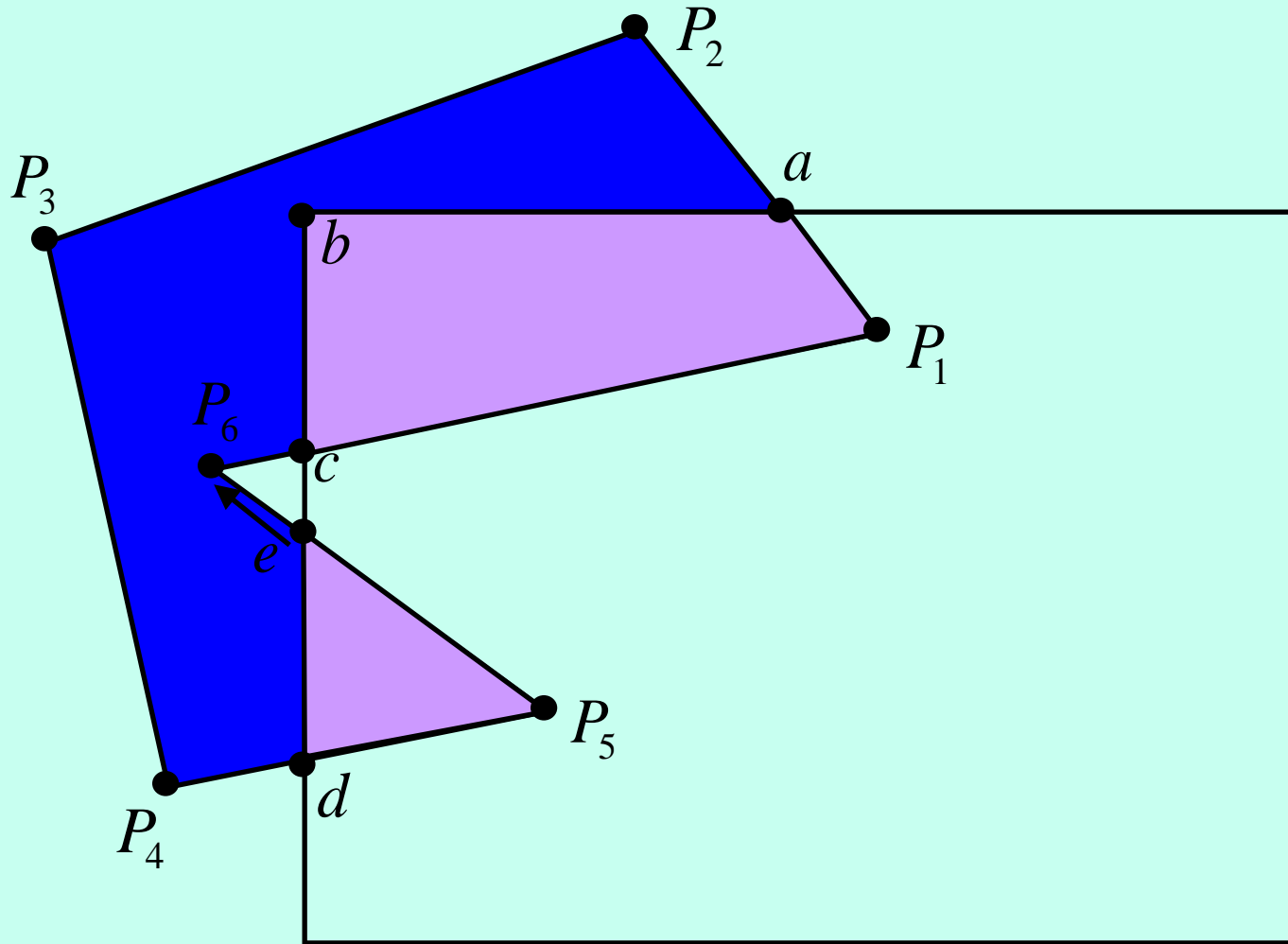
Weiler-Atherton Algorithm



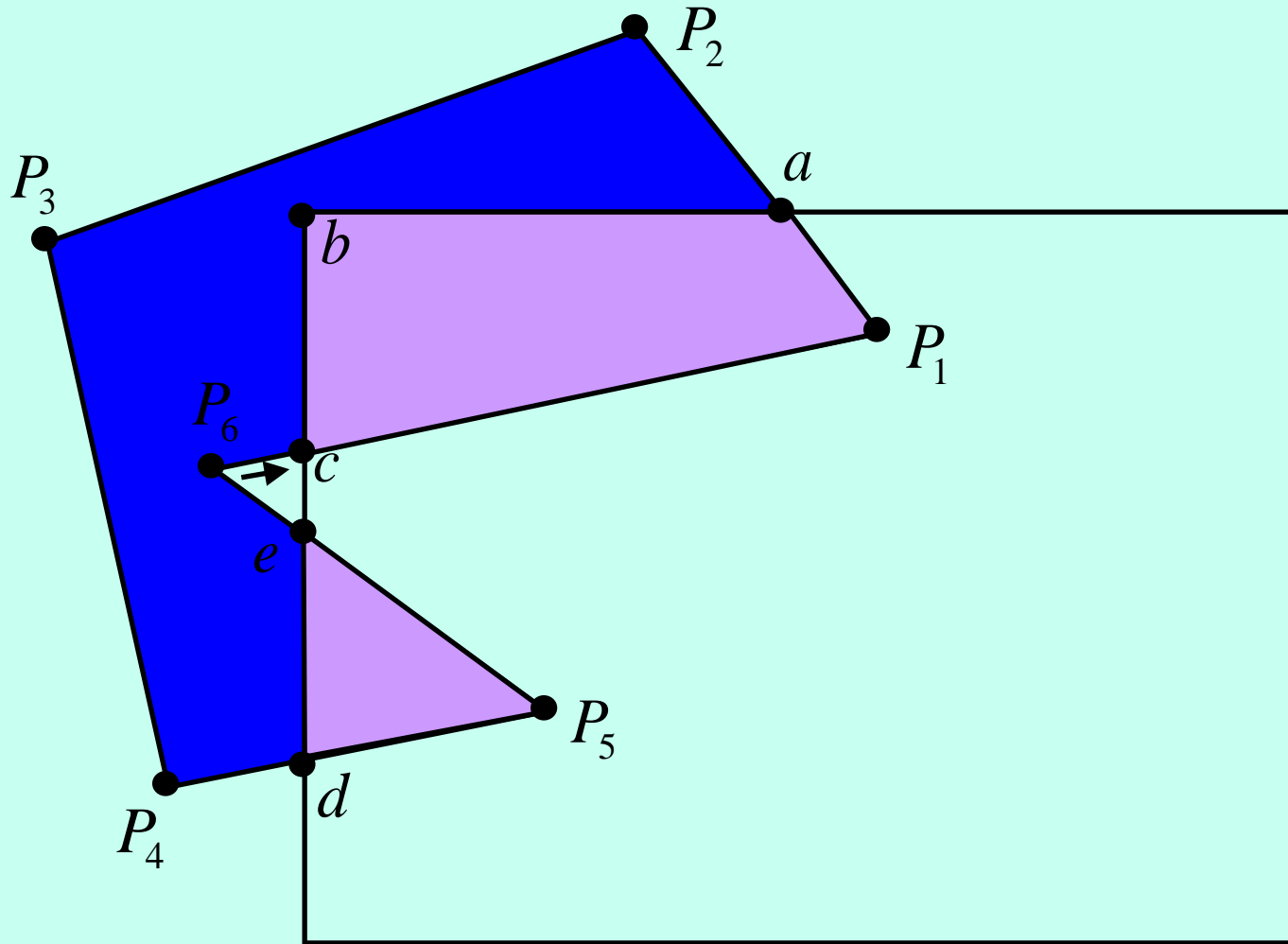
Weiler-Atherton Algorithm



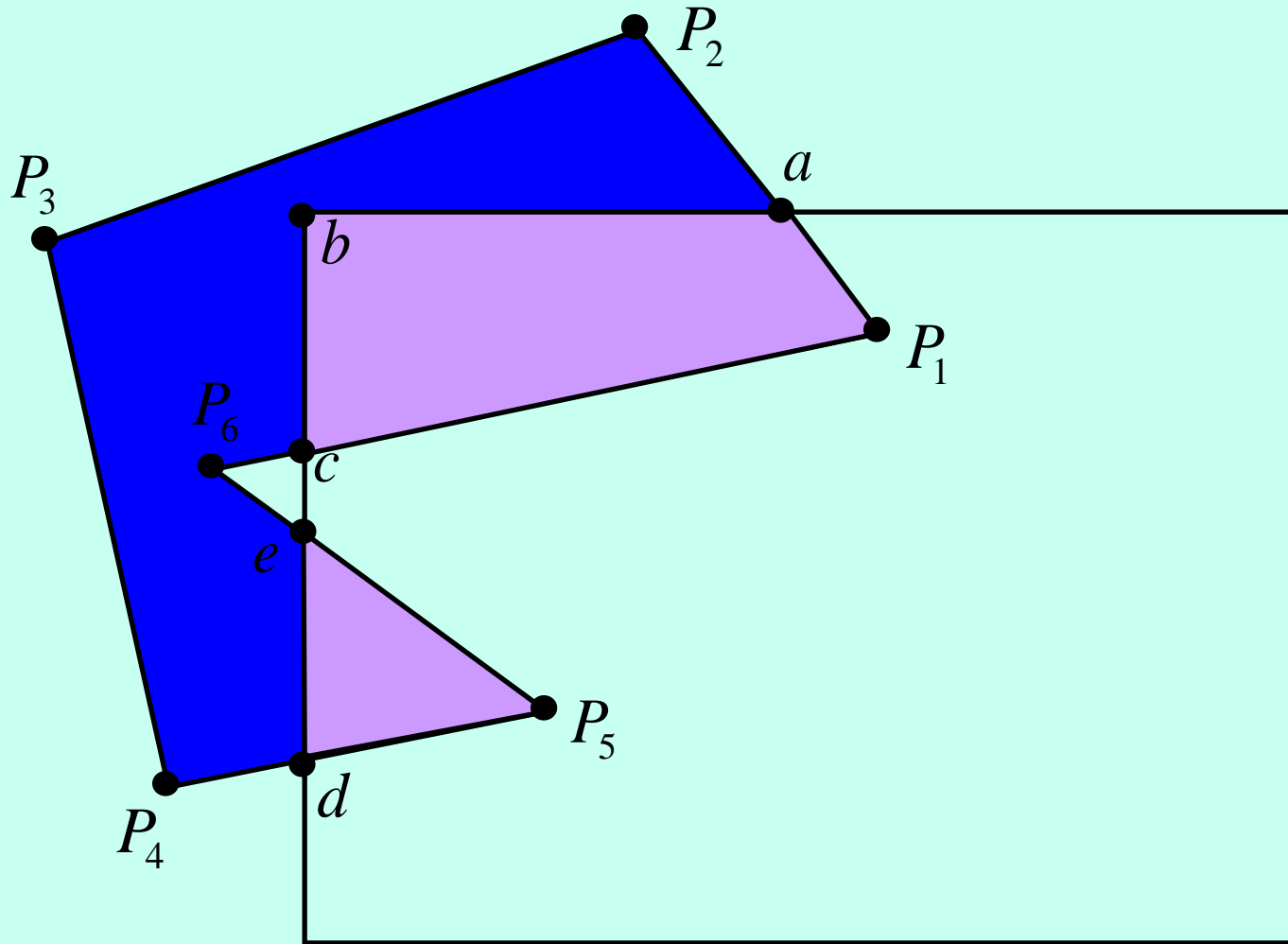
Weiler-Atherton Algorithm



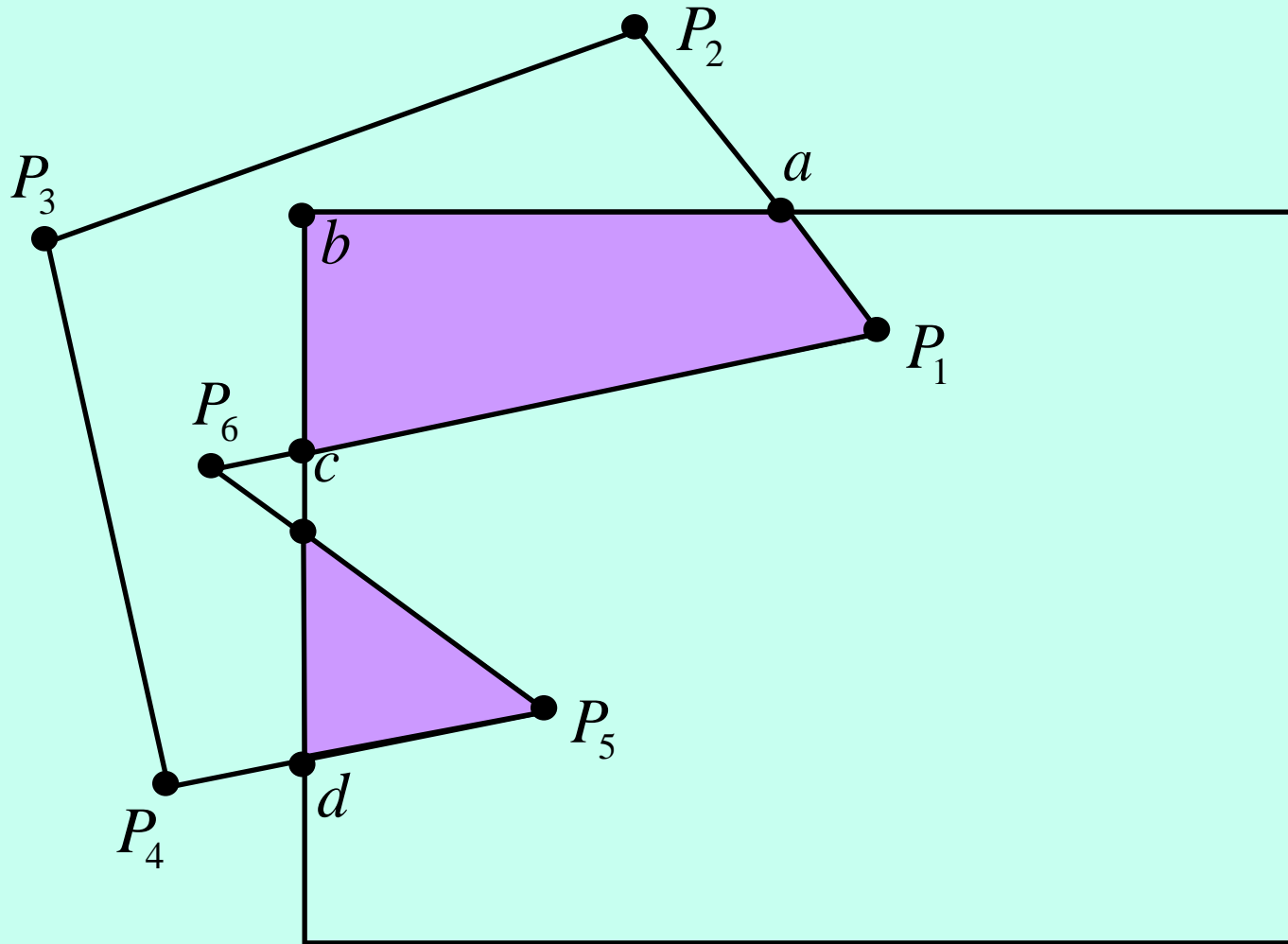
Weiler-Atherton Algorithm



Weiler-Atherton Algorithm



Weiler-Atherton Algorithm



Weiler-Atherton Algorithm

