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[Main page](#)
[Contents](#)
[Featured content](#)
[Current events](#)
[Random article](#)
[Donate to Wikipedia](#)
[Wikipedia store](#)

Interaction

[Help](#)
[About Wikipedia](#)
[Community portal](#)
[Recent changes](#)
[Contact page](#)

Tools

[What links here](#)
[Related changes](#)
[Upload file](#)
[Special pages](#)
[Permanent link](#)
[Page information](#)
[Wikidata item](#)
[Cite this page](#)

Print/export

[Create a book](#)
[Download as PDF](#)
[Printable version](#)

Languages


[Deutsch](#)
[Español](#)
[Українська](#)

 [Edit links](#)

[Create account](#) [Log in](#)

Article [Talk](#)

[Read](#) [Edit](#) [View history](#)



Newell's algorithm

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Newell's Algorithm is a [3D computer graphics](#) procedure for elimination of [polygon](#) cycles in the depth sorting required in [hidden surface removal](#). It was proposed in 1972 by brothers [Martin Newell](#) and [Dick Newell](#), and Tom Sancha, while all three were working at [CADCentre](#).

In the depth sorting phase of hidden surface removal, if two polygons have no overlapping **extents** or extreme minimum and maximum values in the x, y, and z directions, then they can be easily sorted. If two polygons, Q and P, do have overlapping extents in the Z direction, then it is possible that cutting is necessary.

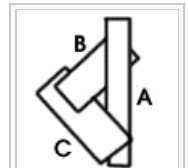
In that case Newell's algorithm tests the following:

1. Test for Z overlap; implied in the selection of the face Q from the sort list
2. The extreme coordinate values in X of the two faces do not overlap ([minimax](#) test in X)
3. The extreme coordinate values in Y of the two faces do not overlap (minimax test in Y)
4. All vertices of P lie deeper than the plane of Q
5. All vertices of Q lie closer to the viewpoint than the plane of P
6. The [rasterisation](#) of P and Q do not overlap

Note that the tests are given in order of increasing computational difficulty.

Note also that the polygons must be [planar](#).

If the tests are all false, then the polygons must be split. Splitting is accomplished by selecting one polygon and cutting it along the line of intersection with the other polygon. The above tests are again performed, and the algorithm continues until all polygons pass the above tests.



Cyclic polygons must be eliminated to correctly sort them by depth

References [\[edit\]](#)

- Sutherland, Ivan E.**; **Sproull, Robert F.**; Schumacker, Robert A. (1974), "A characterization of ten hidden-surface algorithms", *Computing Surveys* **6** (1): 1–55, doi:10.1145/356625.356626
- Newell, M. E.**; **Newell, R. G.**; Sancha, T. L. (1972), "A new approach to the shaded picture problem", *Proc. ACM National Conference*, pp. 443–450.

See also [\[edit\]](#)

- [Painter's algorithm](#)
- [Boolean operations on polygons](#)



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