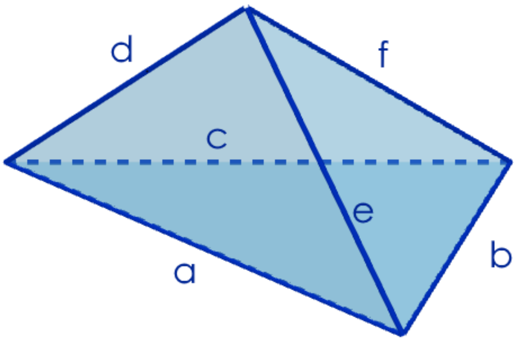


Let the perimeter of each of the four faces of the tetrahedron be P.

This gives us Equations (1) to (4):

$$a + b + c = P \qquad (1)$$
$$a + d + e = P \qquad (2)$$
$$b + e + f = P \qquad (3)$$
$$c + d + f = P \qquad (4)$$

Adding Equations (1) to (4), we get:

$$2a + 2b + 2c + 2d + 2e + 2f = 4P \qquad (5)$$
$$a + b + c + d + e + f = 2P \qquad (6)$$

Subtracting Equations (1) to (4) from (6), we get Equations (7) to (10) respectively:

$$d + e + f = P \qquad (7)$$
$$b + c + f = P \qquad (8)$$
$$a + c + d = P \qquad (9)$$
$$a + b + e = P \qquad (10)$$

By comparing Equations (1) and (8), we get:

$$a = f$$

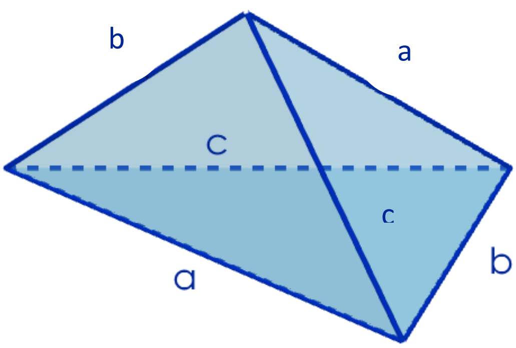
By comparing Equations (1) and (9), we get:

$$b = d$$

By comparing Equations (1) and (10), we get:

$$c = e$$

This means that if the four faces have the same perimeter, it follows that $a = f$, $b = d$ and $c = e$.



These three relationships allow us to redraw the above tetrahedron as follows:

As this diagram shows, each of the four faces of the tetrahedron has sides a, b and c, so they are congruent triangles. This means that all four triangles that make up the faces of a tetrahedron must be congruent if the four faces have the same perimeter.