



A Heronian 2-simplex (triangle) is a triangle with both integer sides and integer area. A Heronian  $n$ -simplex is an  $n$ -simplex with integer volume and where all sides are Heronian  $(n - 1)$ -simplices.

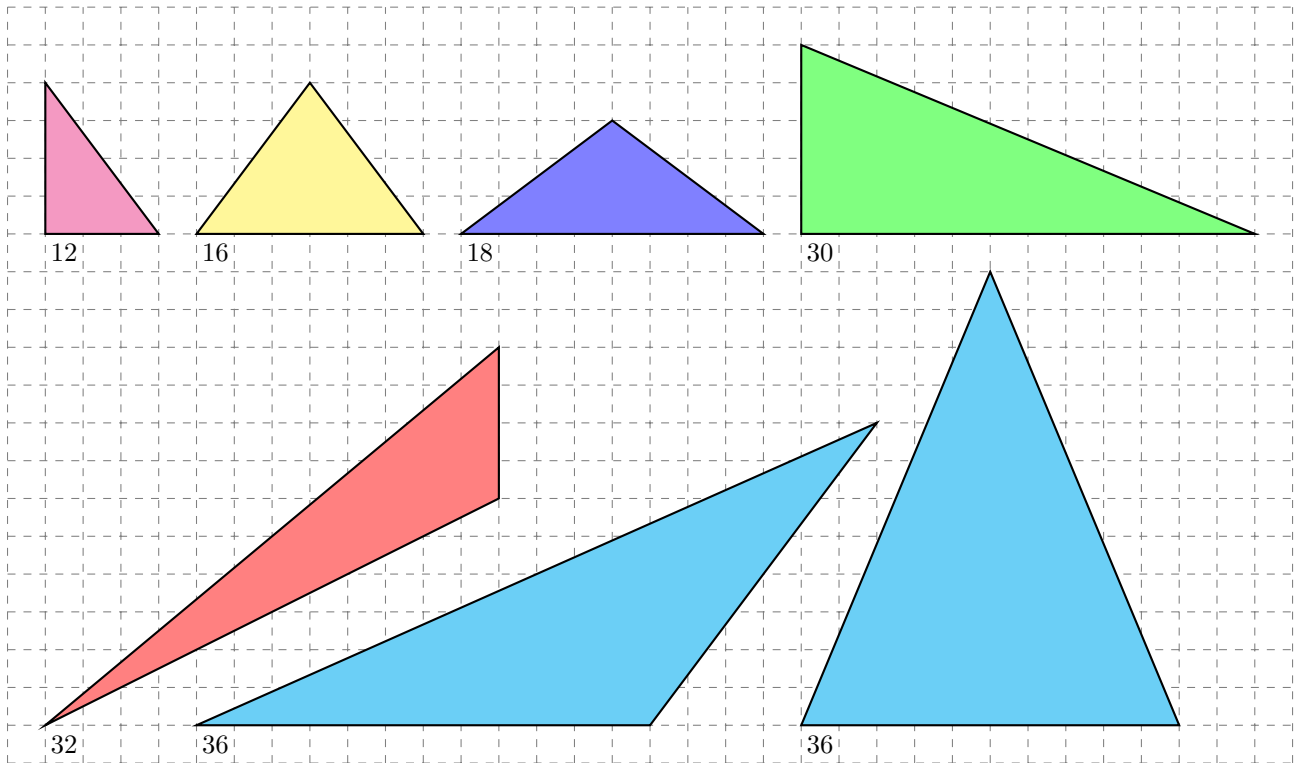


Figure 1: The seven smallest primitive Heronian triangles as measured by perimeter.

**Question.** Do Heronian  $n$ -simplices exist for all integers  $n$ ?

**Related.**

1. Do infinitely many primitive Heronian  $n$ -simplices exist for each  $n$ ?
2. What is the smallest Heronian  $n$ -simplex for each  $n$  as measured by volume? As measured by largest side? As measured by sum of sides? As measured by “surface area” (sum of volume of  $(n - 1)$ -degree facets)?
3. Are all Heronian  $n$ -simplices lattice simplices?
4. What if the definition is relaxed so that only the volume and the edges must be integers?

**References.**

<https://www.jstor.org/stable/2695390>  
<https://oeis.org/A272388>  
[https://en.wikipedia.org/wiki/Heronian\\_tetrahedron](https://en.wikipedia.org/wiki/Heronian_tetrahedron)  
<https://en.wikipedia.org/wiki/Simplex>