Zero Waste Nearodesic Domes
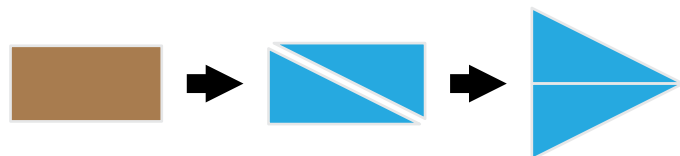## Edmund Harriss
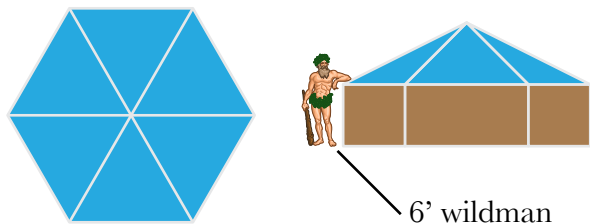http://www.mathematicians.org.uk/eoh
http://maxwelldemon.com

Buckminster Fuller was an architect with a sense of mathematics. He recognised that simple forms would often have the strength and other properties required. As a result he promoted many structures from mathematics that have been found to be excellent for construction; most notably the Oct-Tet truss and the geodesic dome. The geodesic dome in particular was taken up by the environmental movement for simple housing. The problem is it requires a fair amount of skill to build and if the faces are made with sheet material, leaves quite a bit of waste.

Vinay Gupta took these problems head on and created the **Hexayurt**. His starting point was the 8'x4' rectangle. A standard size for building materials, for example plywood. In particular he introduced the triangle made from a 2x1 rectangle cut along the diagonal:
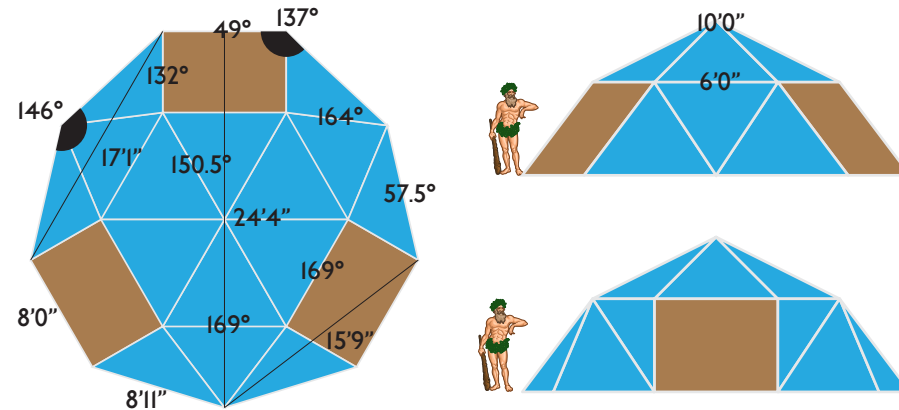
Six of these triangles come together to form a pyramid. The pyramid of six triangles is placed on top of a hexagon of 2x1 rectangles to form the hexayurt (for more details see www.hexayurt.com):
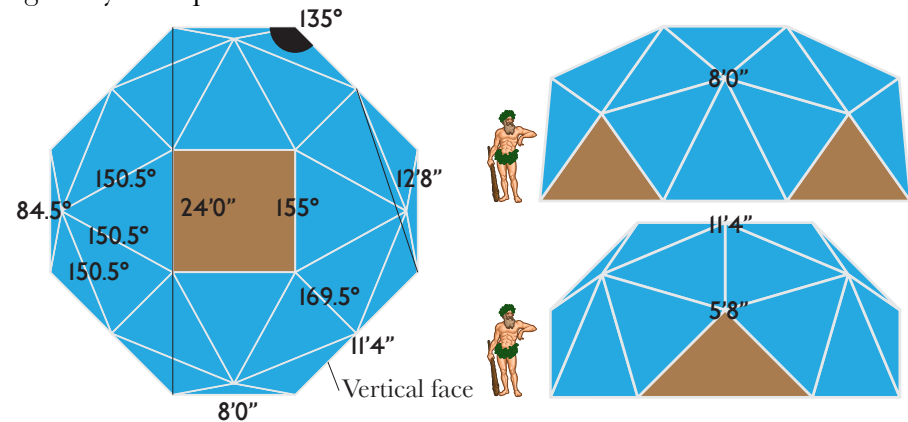
6' wildman

This triangle and rectangle combination can be used to make larger buildings. Here are two:

For the first (the **Tri-dome**) the standard roof (six triangles put together) is lifted higher with squares (2 rectangles together) on 3 of the sides joined by half-roofs:

49° 137° 132° 146° 164° 17'1" 150.5° 57.5° 24'4" 169° 8'0" 169° 15'9" 8'11"

10'0" 6'0"

For the second (the **Quad-dome**) four standard roofs are made and leant together around a square. The remaining holes are filled, with a square on top and four squares cut accross the middle round the side. The diagonally cut squares are vertical:

135° 150.5° 12'8" 84.5° 150.5° 24'0" 155° 150.5° 169.5° 11'4" 8'0" Vertical face

8'0" 11'4" 5'8"

	Height	Floor area	Angles of walls
Hexayurt	8'	111 sq.ft.	90
Tri-dome	10'0"	458 sq.ft.	49, 57.5
Quad-dome	11' 4"	448 sq.ft.	84.7, 90

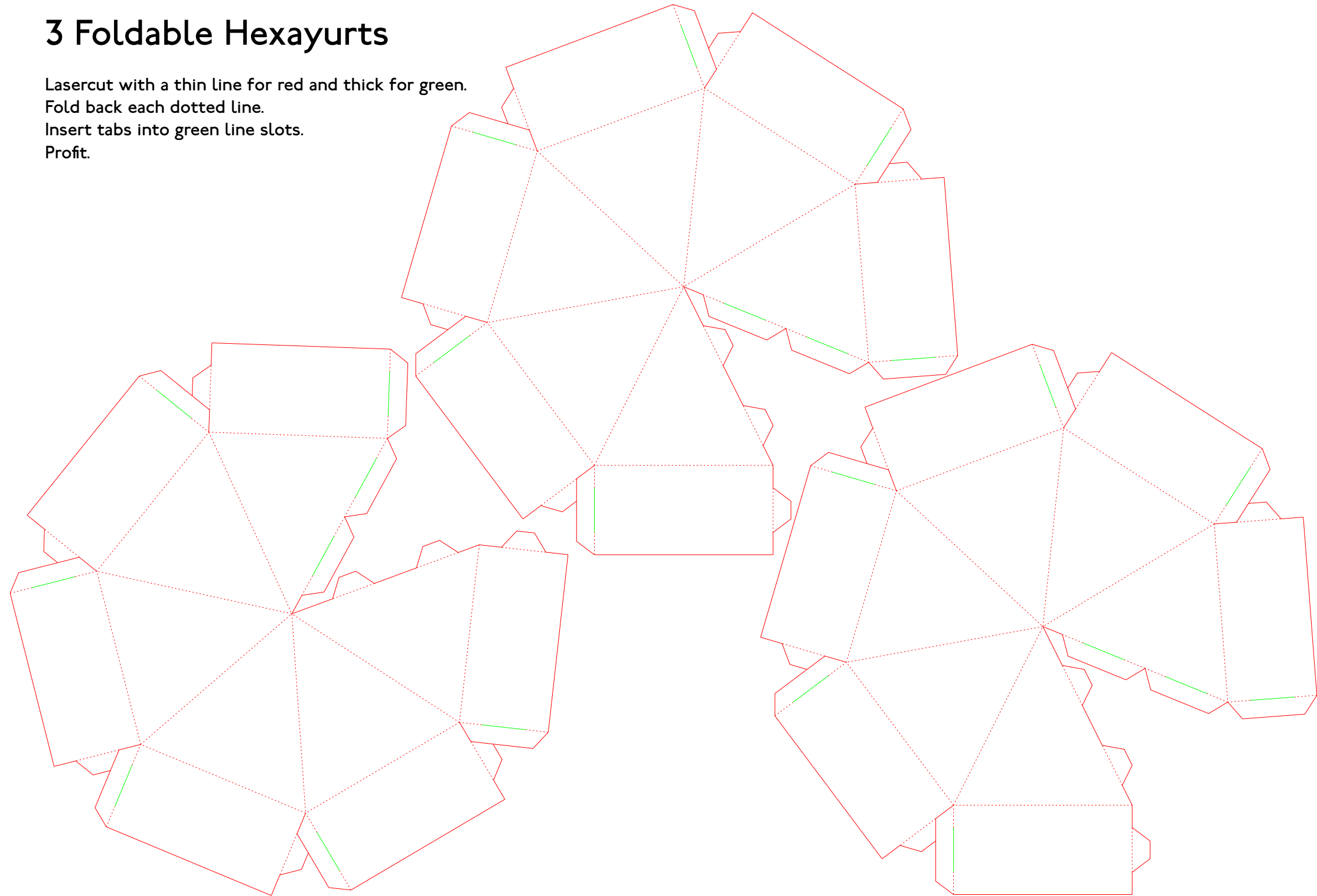## The Hexayurt

The Hexayurt Family

3 Foldable Hexayurts

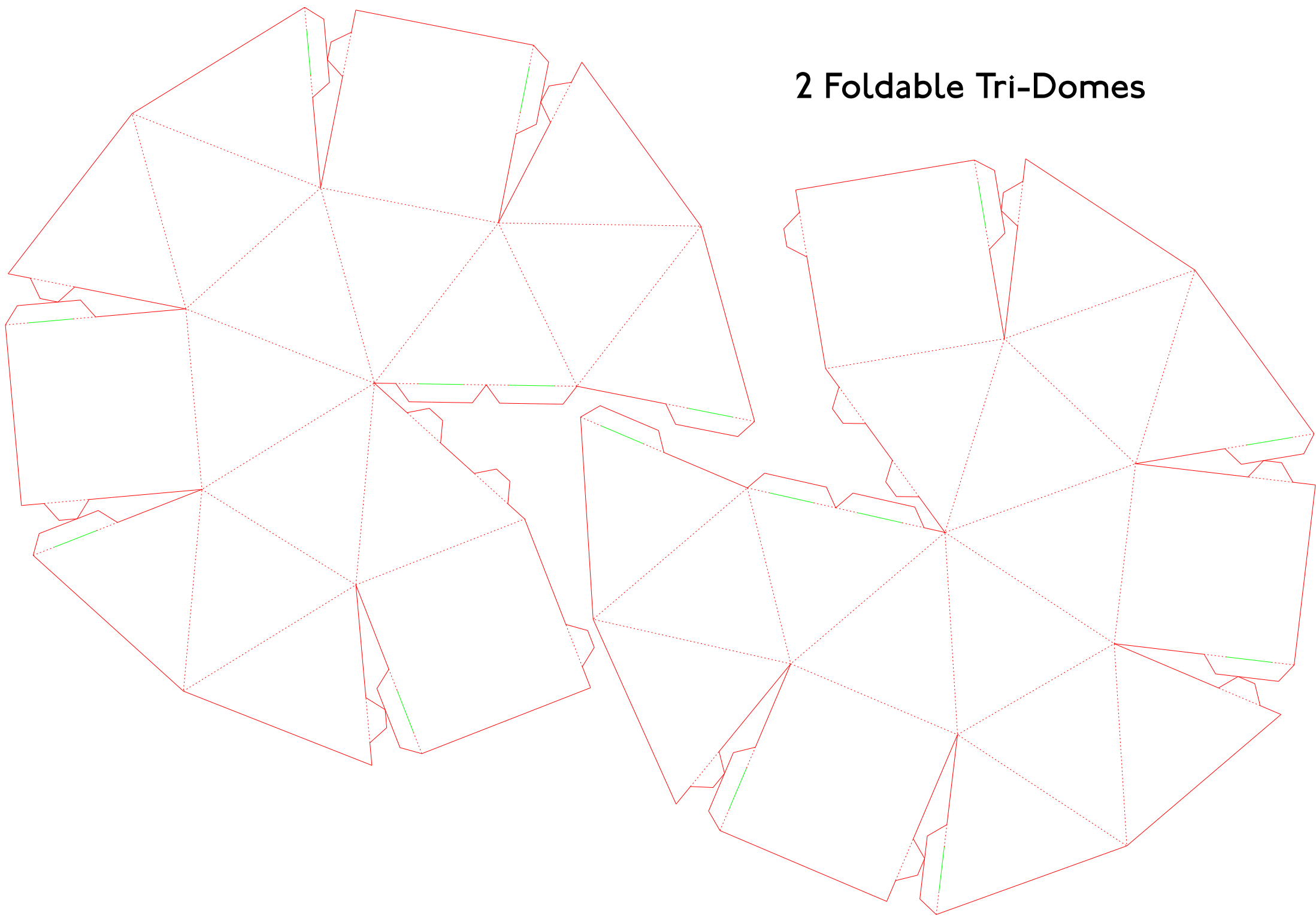Lasercut with a thin line for red and thick for green.
Fold back each dotted line.
Insert tabs into green line slots.
Profit.

2 Foldable Tri-Domes

Foldable Quad-dome