

IXPE (Imaging X-ray Polarimetry Explorer)



The Imaging X-ray Polarimetry Explorer (IXPE) is a space observatory built to discover the secrets of some of the most extreme cosmic objects – the remnants of supernova explosions, neutron stars, powerful particle streams ejected by feeding black holes, and more.

IXPE is the first mission to study the polarization of X-rays from many different types of celestial objects. Measuring the polarization of X-rays traces the story of where this light came from, including the geometry and inner workings of its source.

X-rays are a high-energy form of light that is invisible to human eyes. Like all light, X-rays are electromagnetic waves that oscillate, or vibrate, in different directions as they travel through space. The light from the Sun or a lamp, for example, is a chaotic mix of waves vibrating in all directions. Polarized light is more organized, with electric fields vibrating in just one direction — like the reflective glare created by sunlight bouncing off a lake or ocean.

IXPE builds on the discoveries of NASA's Chandra X-ray Observatory and other space telescopes by measuring the amount and direction of polarization of X-ray light. IXPE's polarization measurements will help scientists answer questions such as:

- How do black holes spin?
- Was the black hole at center of the Milky Way actively feeding on surrounding material in the past?
- How do pulsars shine so brightly in X-rays?
- What powers the jets of energetic particles that are ejected from the region around the supermassive black holes at the centers of galaxies?

The Imaging X-Ray Polarimetry Explorer carries three identical telescopes. Each telescope includes a set of cylindrical mirrors, or optics, and a sensitive detector. The mirrors collect X-rays from celestial objects and focus them onto the detectors, which make an image of the incoming X-rays and measure the polarization. All three mirror sets are separated from their corresponding detectors by a deployable 12-foot (3.7-meter) boom.

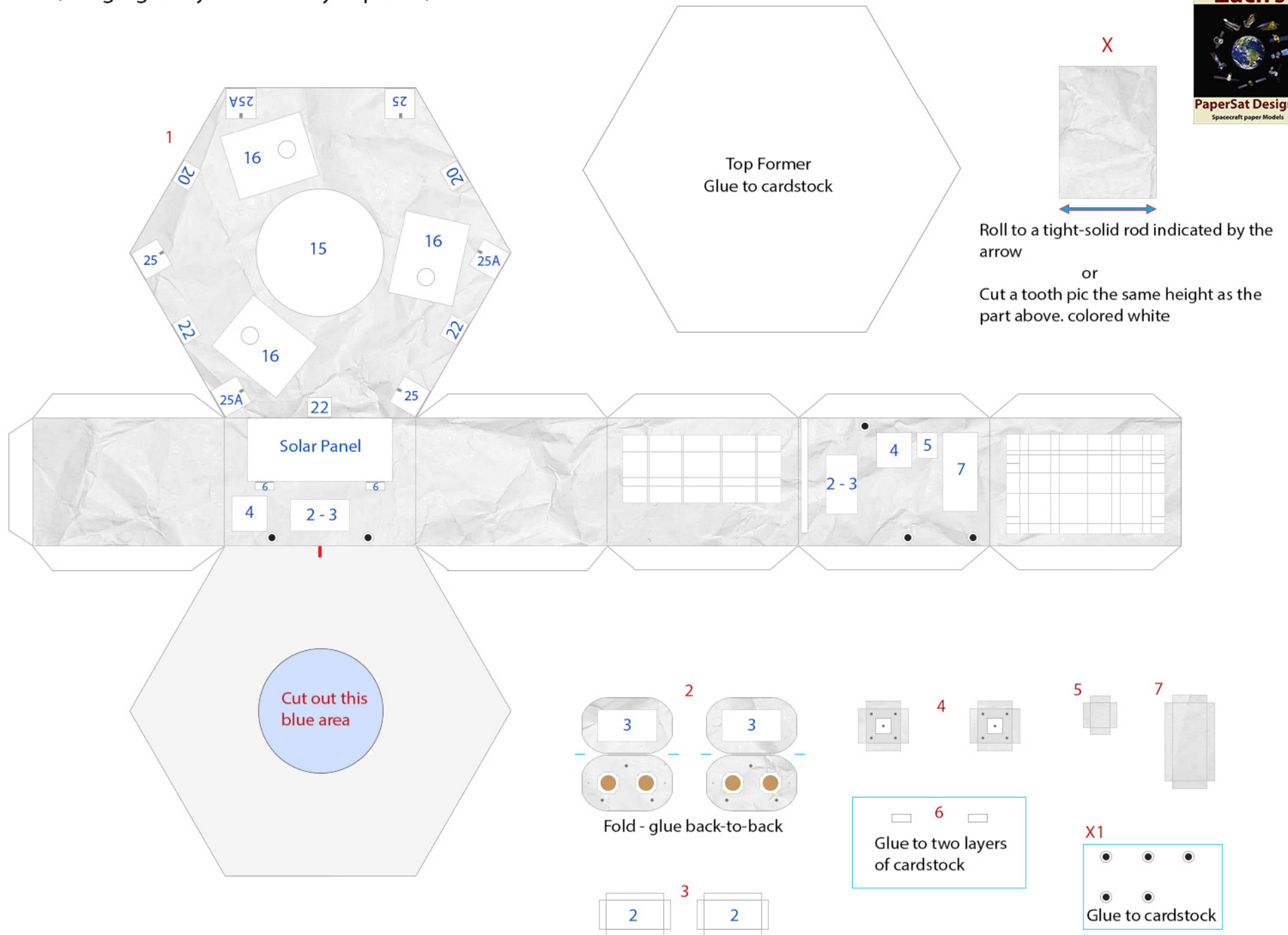
For the first time, astronomers have measured and mapped polarized X-rays from the remains of an exploded star, using NASA's Imaging X-ray Polarimetry Explorer (IXPE). The findings, which come from observations of a stellar remnant called Cassiopeia A, shed new light on the nature of young supernova remnants, which accelerate particles close to the speed of light.

Not only did we obtain information on X-ray polarization properties for the first time for these sources, but we also know how these change in different regions of the supernova.

IXPE launched Dec. 9 on a Falcon 9 rocket from NASA's Kennedy Space Center in Florida.

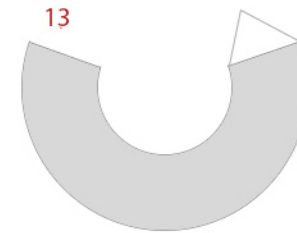
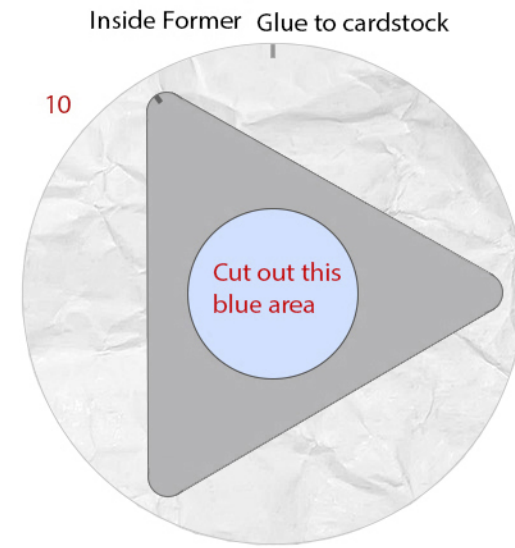
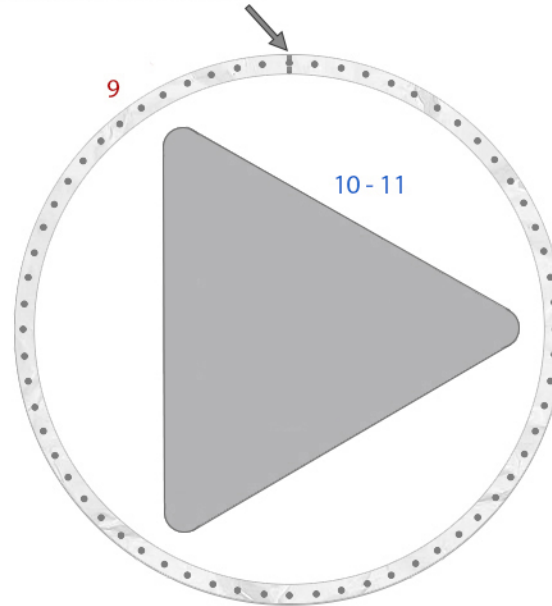
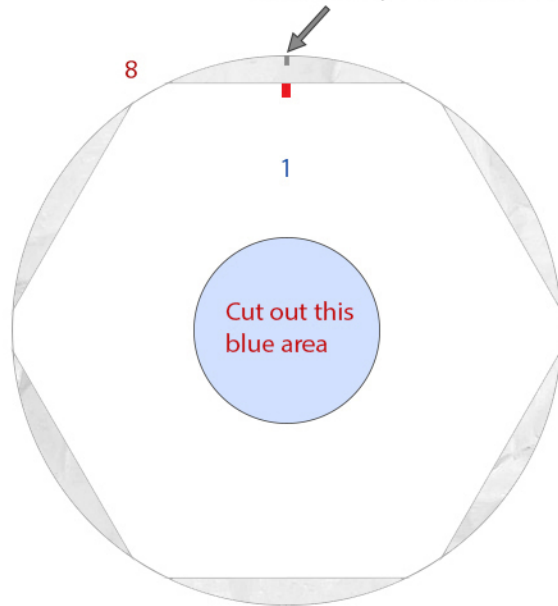


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Glue these back-to-back matching the two grey markers - indicated by the arrows - then cut out the blue circles.

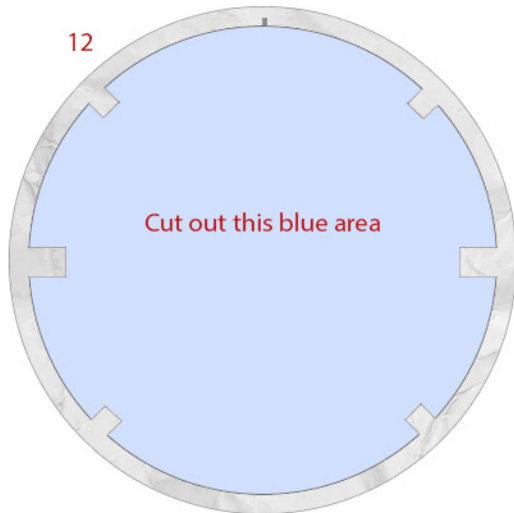


Roll to a cone with color inside

11



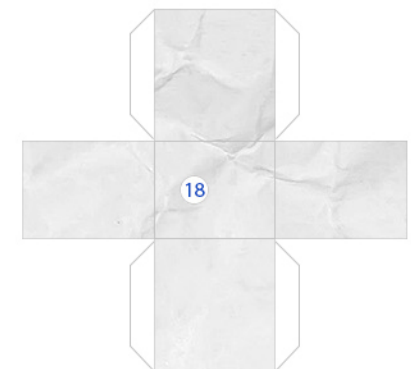
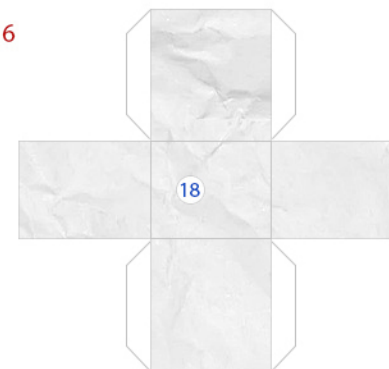
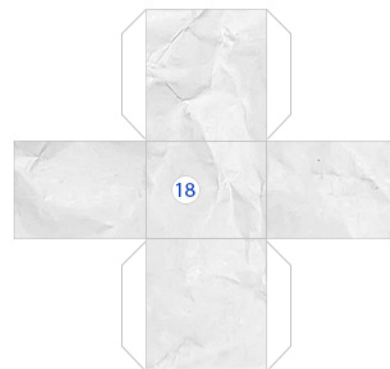
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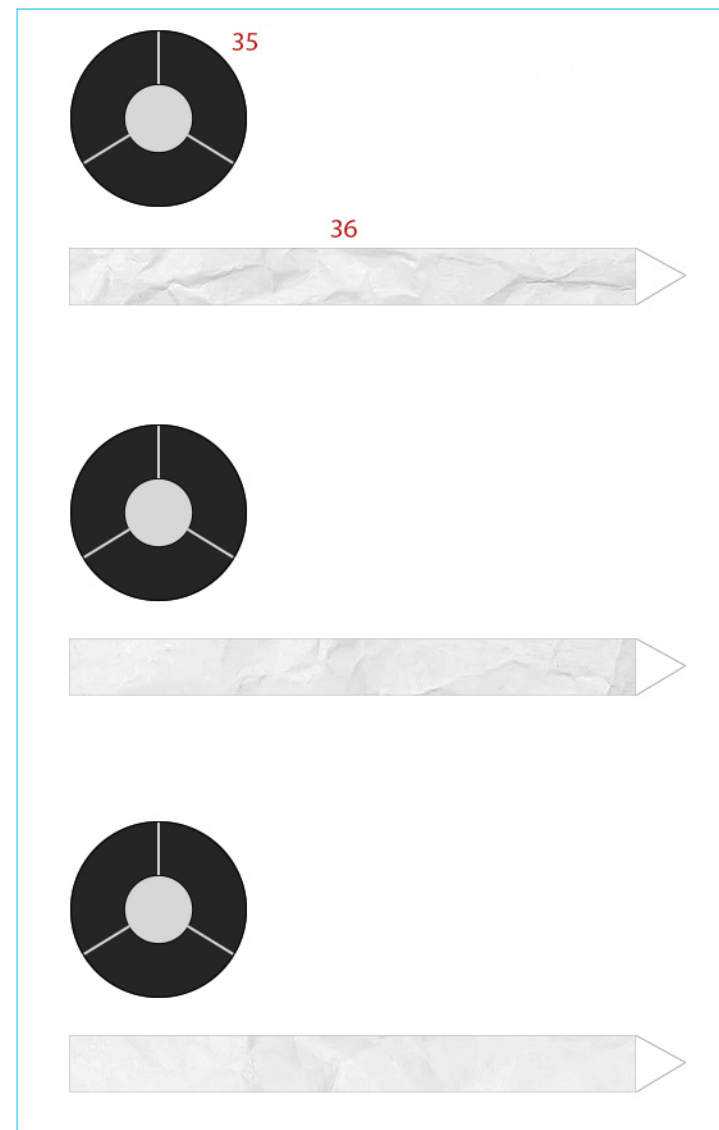
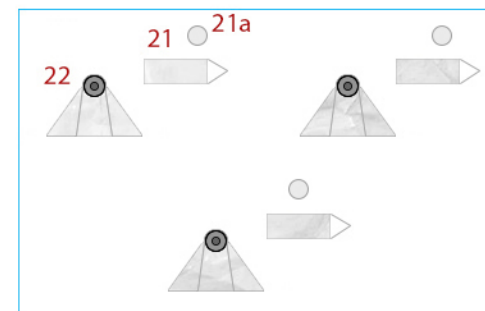
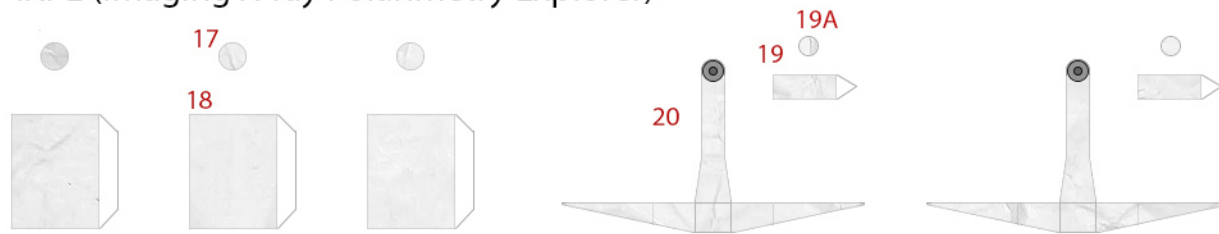
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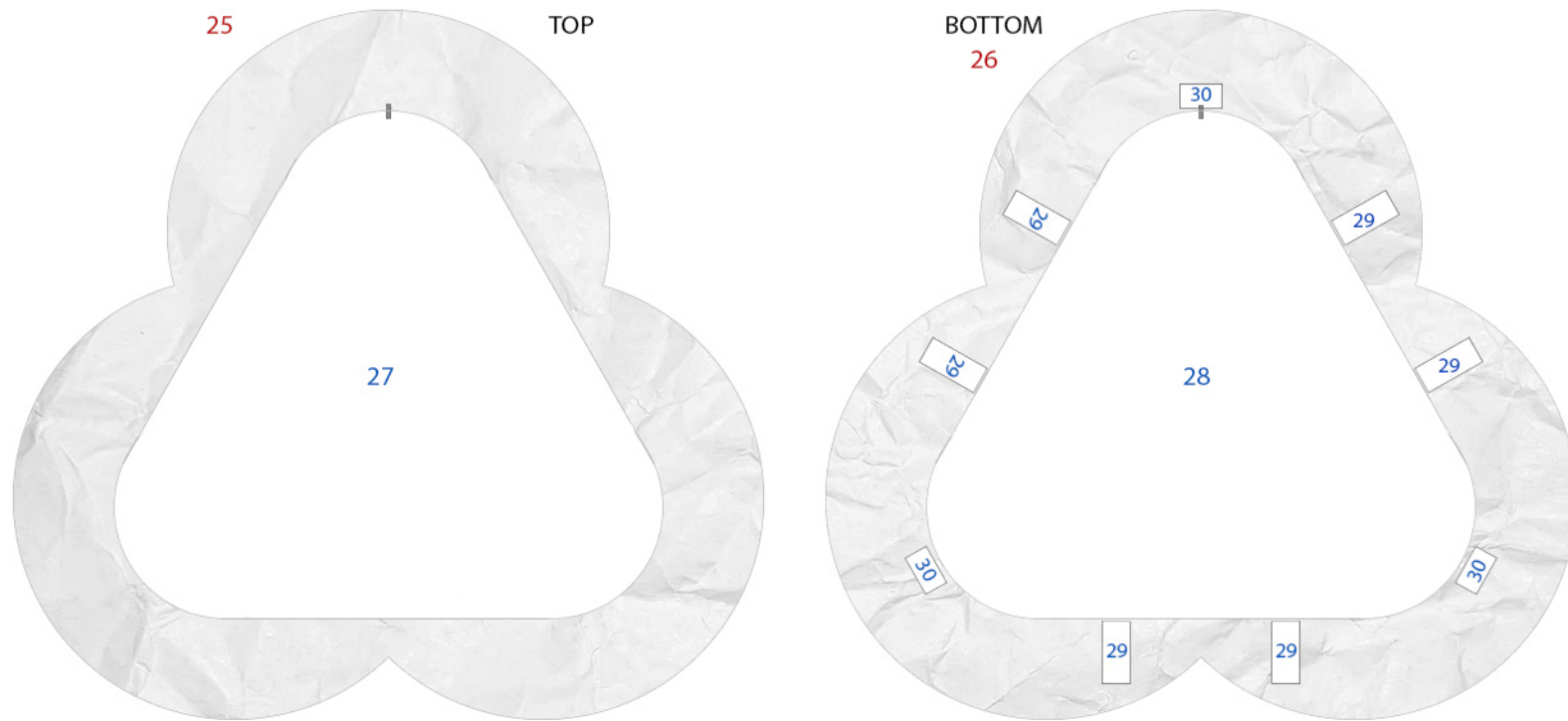
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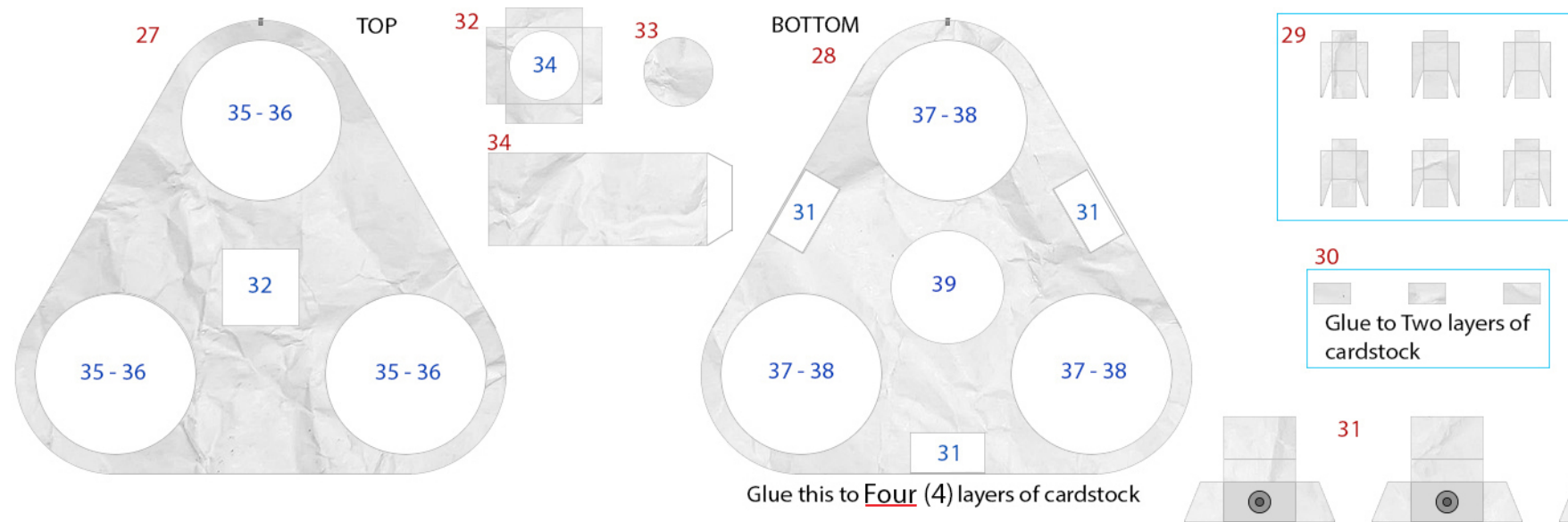
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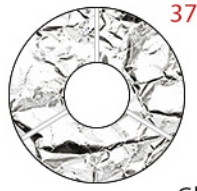
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Glue both to cardstock, then back-to-back

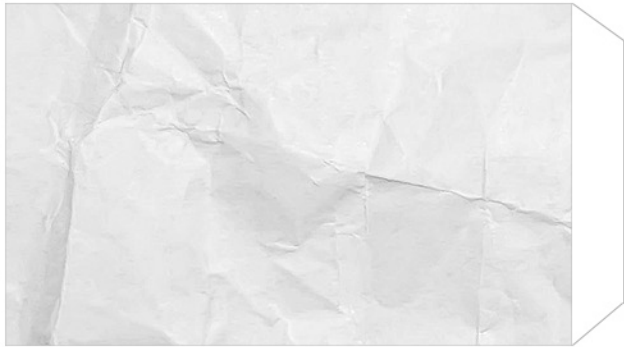


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Glue these to cardstock

38



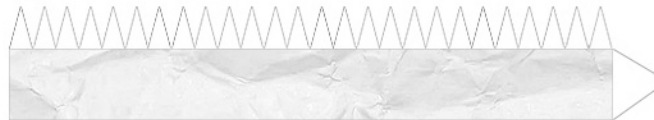
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41



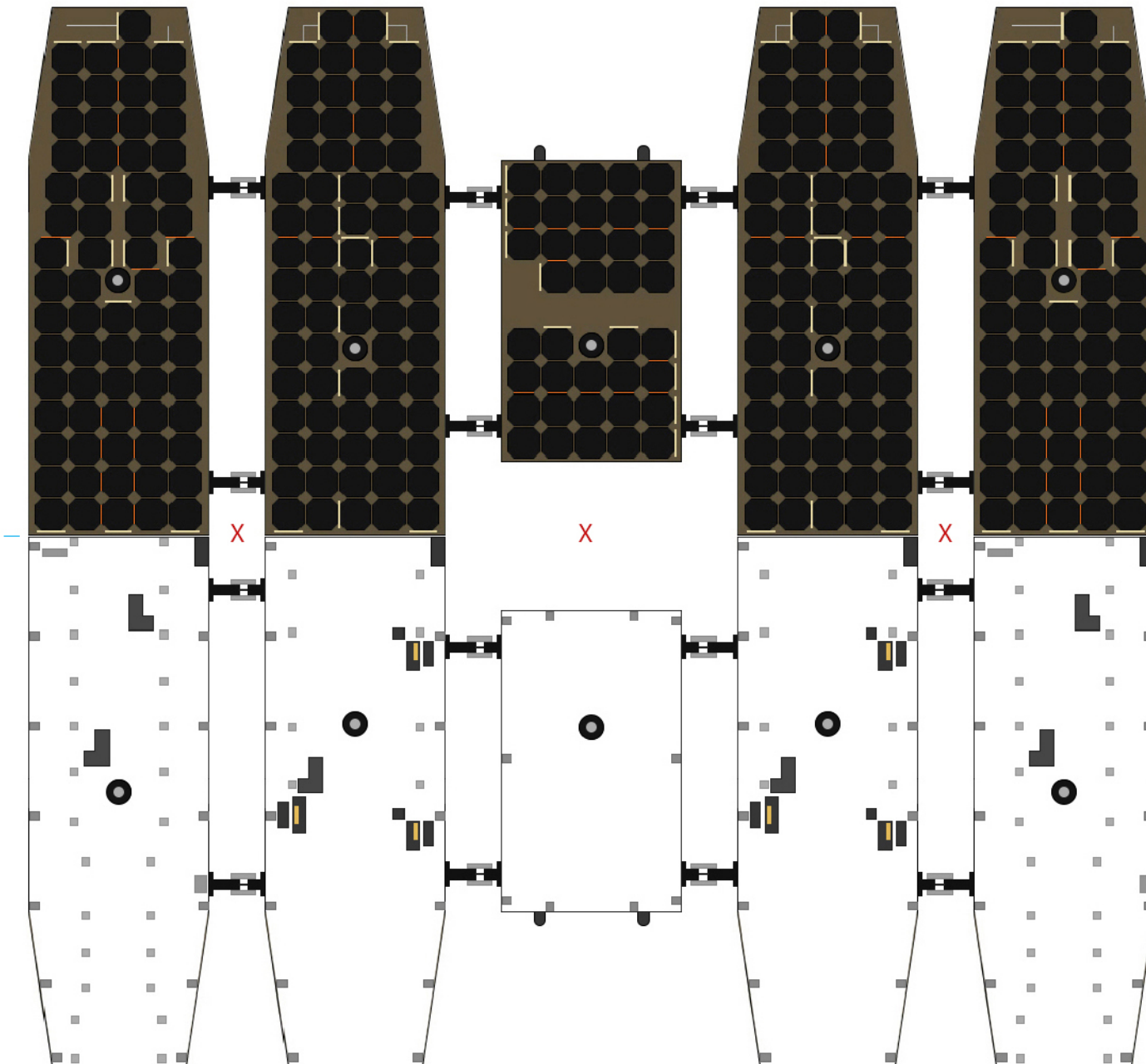
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Former-glue to
cardstock

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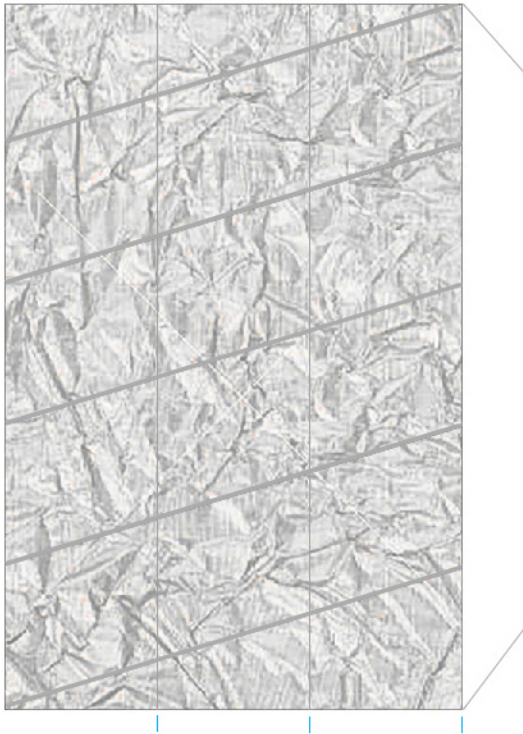


Cut out the three areas
marked with a red X

Score, fold back-to-back

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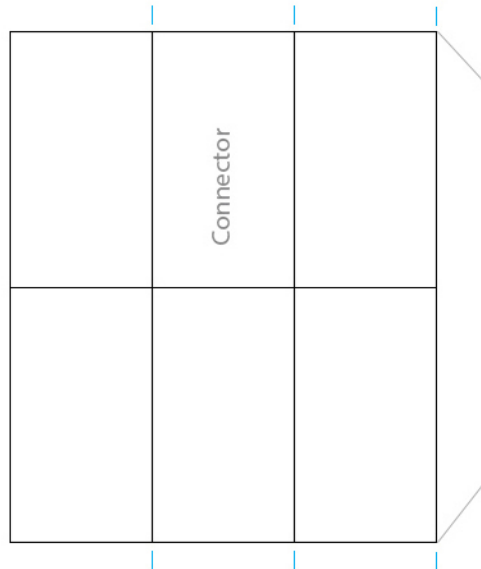
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45



two- part boom

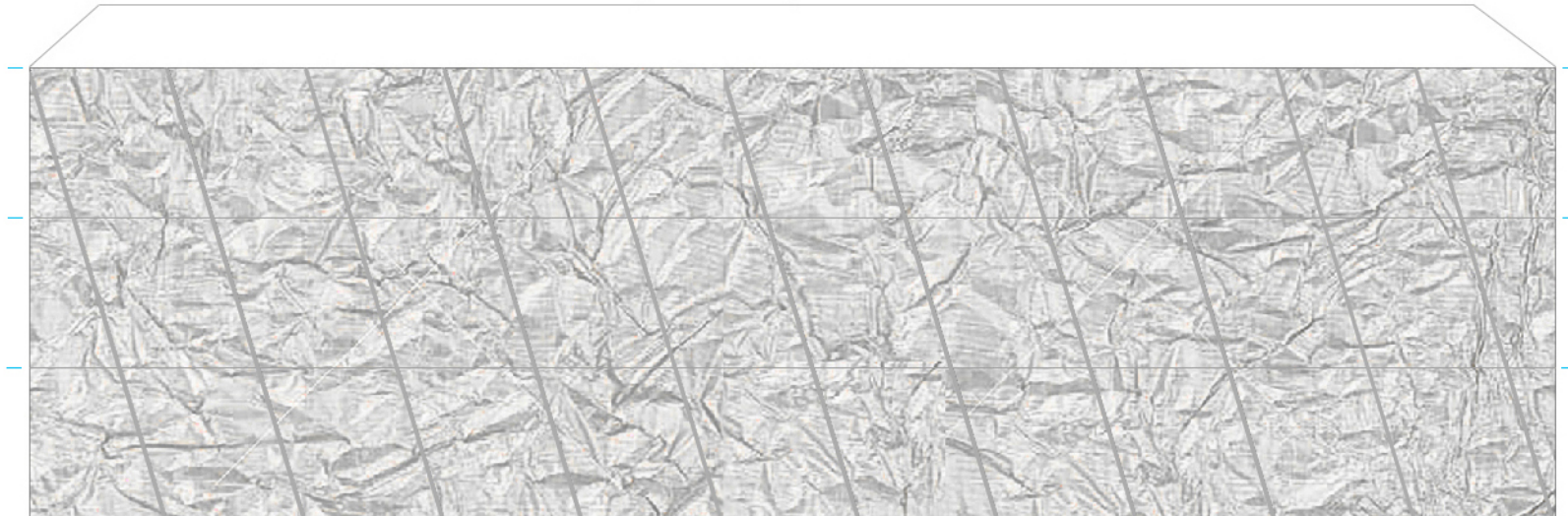


Score, fold at the blue lines

Optional one part boom

Can use this instead of the two-piece version on the previous page

44



Score, fold at the blue lines