

SWIFT



Gamma-ray bursts (GRBs) are the most powerful explosions the Universe has seen since the Big Bang. They occur approximately once per day and are brief, but intense, flashes of gamma radiation. They come from all different directions of the sky and last from a few milliseconds to a few hundred seconds. So far scientists do not know what causes them. Do they signal the birth of a black hole in a massive stellar explosion? Are they the product of the collision of two neutron stars? Or is it some other exotic phenomenon that causes these bursts?

With Swift, a NASA mission with international participation, scientists have a tool dedicated to answering these questions and solving the gamma-ray burst mystery. Its three instruments give scientists the ability to scrutinize gamma-ray bursts like never before. Within seconds of detecting a burst, Swift relays its location to ground stations, allowing both ground-based and space-based telescopes around the world the opportunity to observe the burst's afterglow. Swift is part of NASA's medium explorer (MIDEX) program and was launched into a low-Earth orbit on a Delta 7320 rocket on November 20, 2004.

Swift is a multi-wavelength space observatory dedicated to the study of gamma-ray bursts. Its three instruments work together to observe GRBs and their afterglows in the gamma-ray, X-ray, ultraviolet, and optical wavebands.

Based on continuous scans of the area of the sky with one of the instrument's monitors, Swift uses momentum wheels to autonomously slew into the direction of possible GRBs. The name "Swift" is not a mission-related acronym, but rather a reference to the instrument's rapid slew capability, and the nimble bird of the same name. All of Swift's discoveries are transmitted to the ground and those data are available to other observatories which join Swift in observing the GRBs.

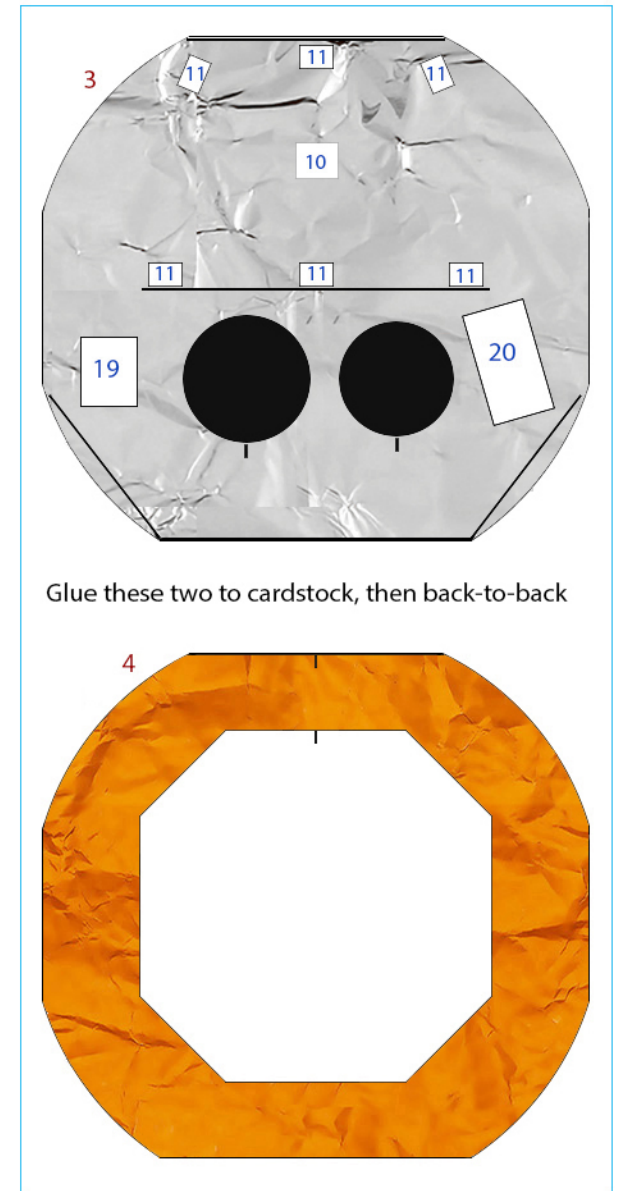
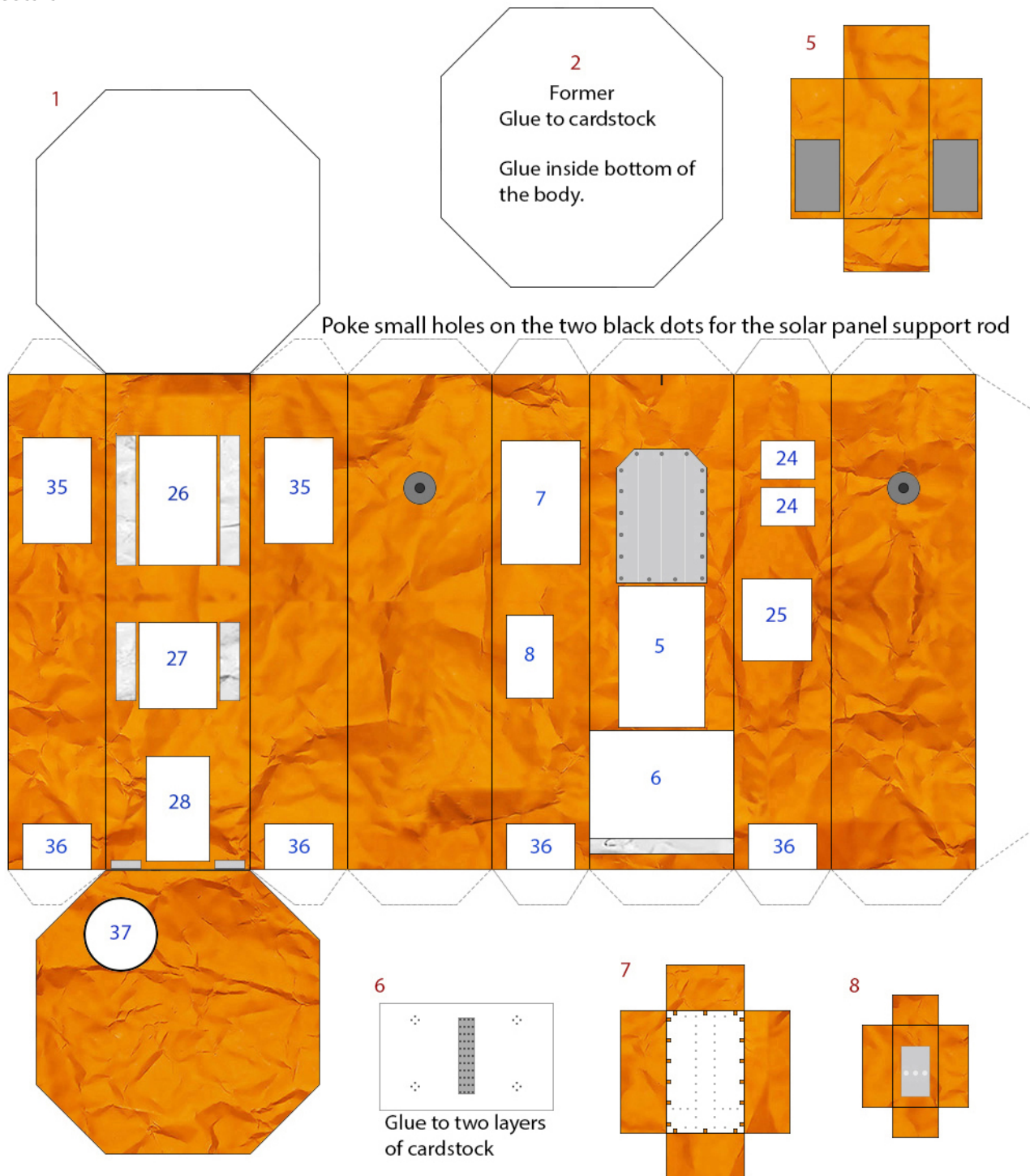
In the time between GRB events, Swift is available for other scientific investigations, and scientists from universities and other organizations can submit proposals for observations.

By 2019, after almost 15 years of operation, Swift had detected more than 1,400 gamma-ray bursts. The most distant of these, GRB 090429B, detected on April 29, 2009, exploded about 13 billion light-years from Earth. One event, GRB 080319B, detected on March 19, 2008, was so powerful that it could have been observed with the naked eye, even though it was 7.5 billion light-years away. Swift also recorded for the first time the precise location of a relatively short-lived gamma-ray burst, GRB 050509B, detected on May 9, 2005. On the basis of its position, this event was shown to have arisen in a relatively nearby galaxy (2.7 billion light-years away), which meant that the luminosity of the event was approximately a thousand times less than those of long-lived gamma-ray bursts detected from distant galaxies. Some astronomers thought that short bursts arose from the merger of compact objects—for example, when two neutron stars coalesced and produced jets of high-energy particles and radiation. Swift also made the first observation of a supernova in the act of exploding.

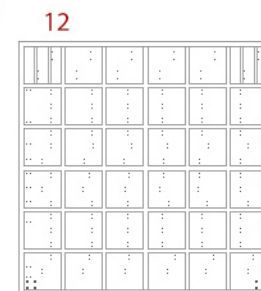
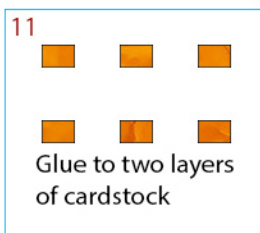
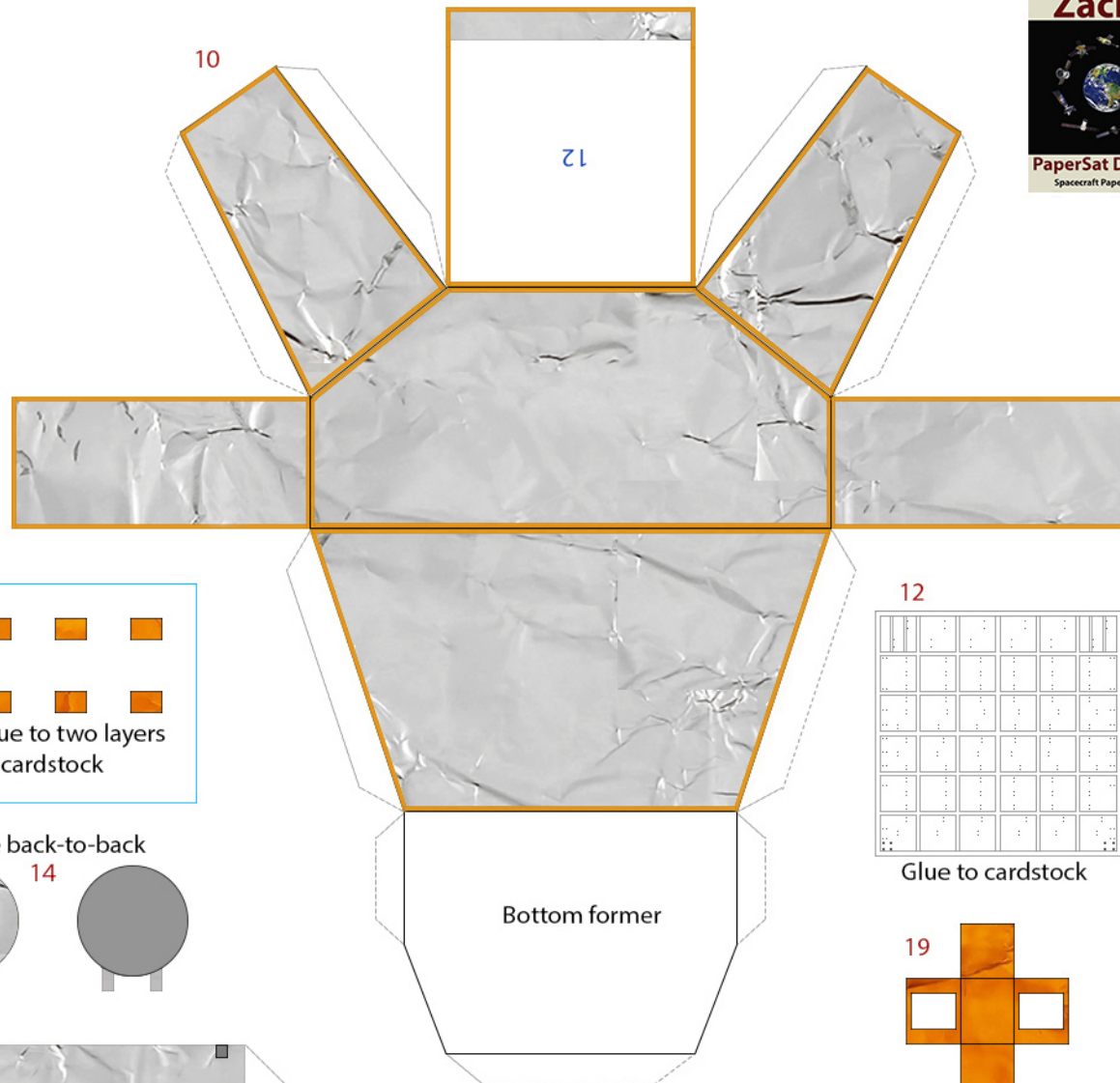
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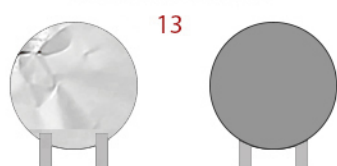


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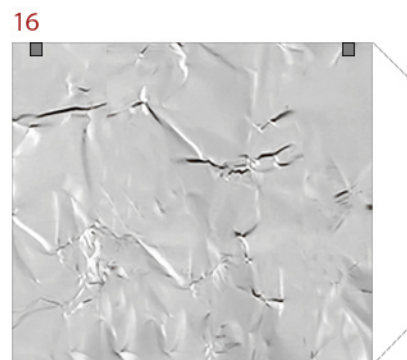
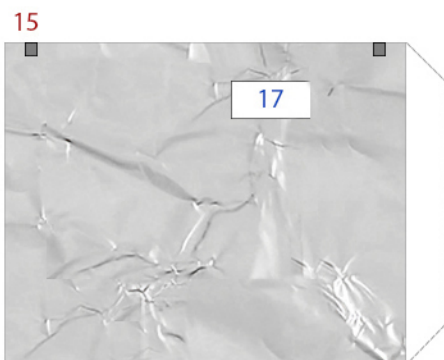
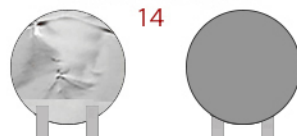


Glue to cardstock

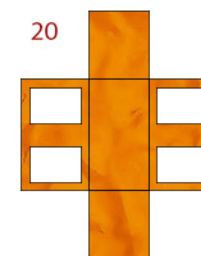
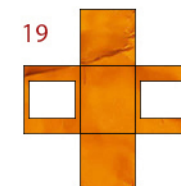
Glue back-to-back



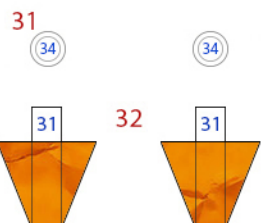
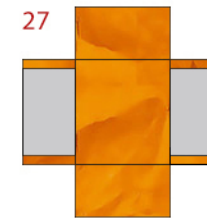
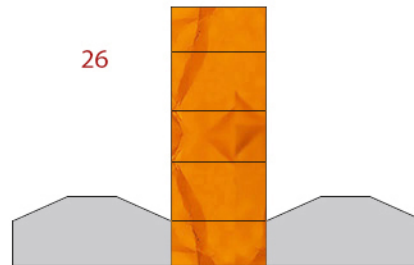
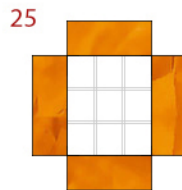
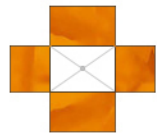
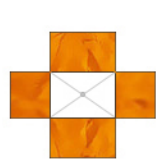
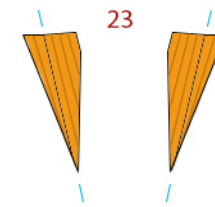
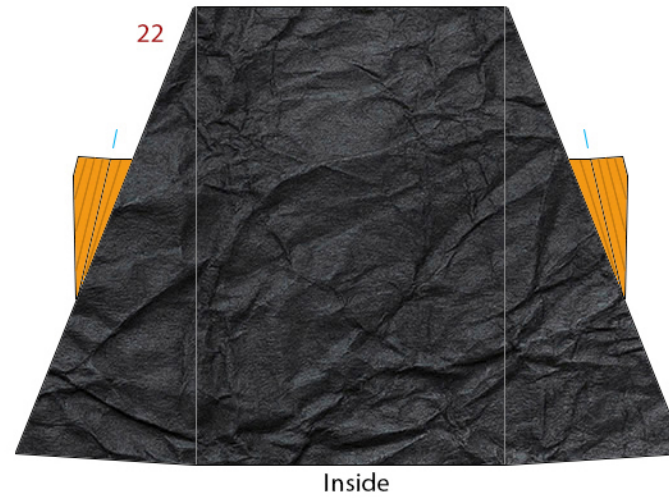
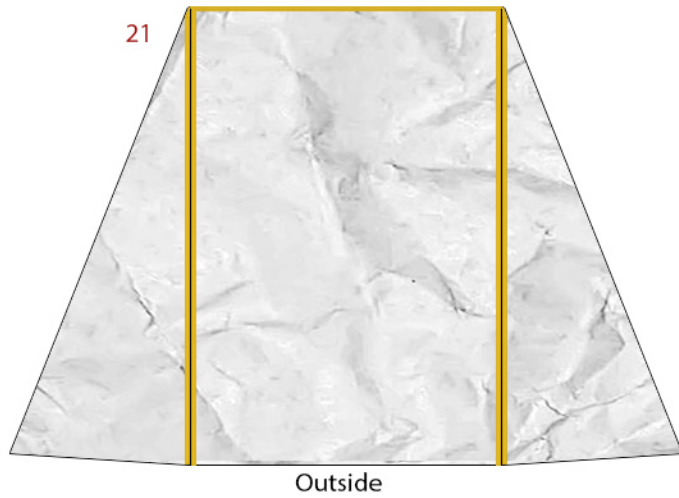
Glue back-to-back



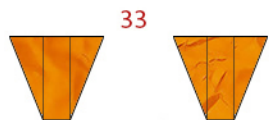
Color backside of both of these Black



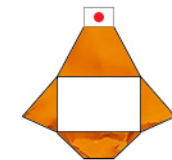
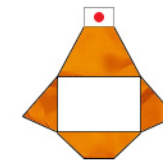
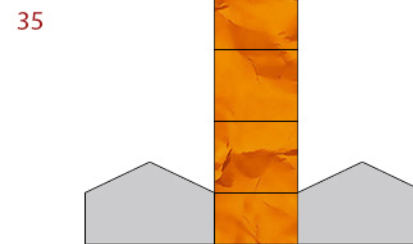
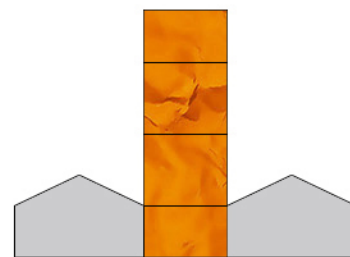
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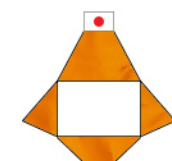
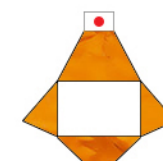
Outside



Inside



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Cut a thin music wire or similar material the same length as the line below for the solar array support rod.

Cut out the blue areas in the middle, score-fold and glue back-to-back.

