

SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer)



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NASA's SPHEREx mission won't be the first space telescope to observe hundreds of millions of stars and galaxies when it launches no later than April 2025, but it will be the first to create a 3D map of the entire sky in 102 colors (each an individual wavelength of light) to help scientists answer big-picture questions about the origins of our universe, galaxies, and key ingredients for life in our galaxy, such as water. While this all-sky map can be used for a wide variety of science investigations.

The observatory will sweep across the sky, taking about 600 exposures each day that can be combined to create an all-sky mosaic. Every section of the sky will be imaged 102 times, each time using a different color filter that blocks all wavelengths except one. Combining those images, scientists can see the total emission from that section of the sky or look at an individual wavelength.

SPHEREx will measure the abundance of frozen water, carbon dioxide, and other essential ingredients for life as we know it along more than 9 million unique directions across the Milky Way galaxy. This information will help scientists better understand how available these key molecules are to forming planets. Research indicates that most of the water in our galaxy is in the form of ice rather than gas, frozen to the surface of small dust grains. In dense clouds where stars form, these icy dust grains can become part of newly forming planets, with the potential to create oceans like the ones on Earth.

The SPHEREx observatory is built to survey the entire sky in infrared light. Standing 8.5 feet (2.6 meters) tall, its most prominent feature is a set of cone-shaped photon shields that measures 5.6 feet (1.7 meters) tall and 10.5 feet (3.2 meters) in diameter. The three concentric shields surround the telescope, which uses three mirrors to collect light from cosmic sources and feed it to the detectors. The shields protect this hardware from light and heat from the Sun and Earth.

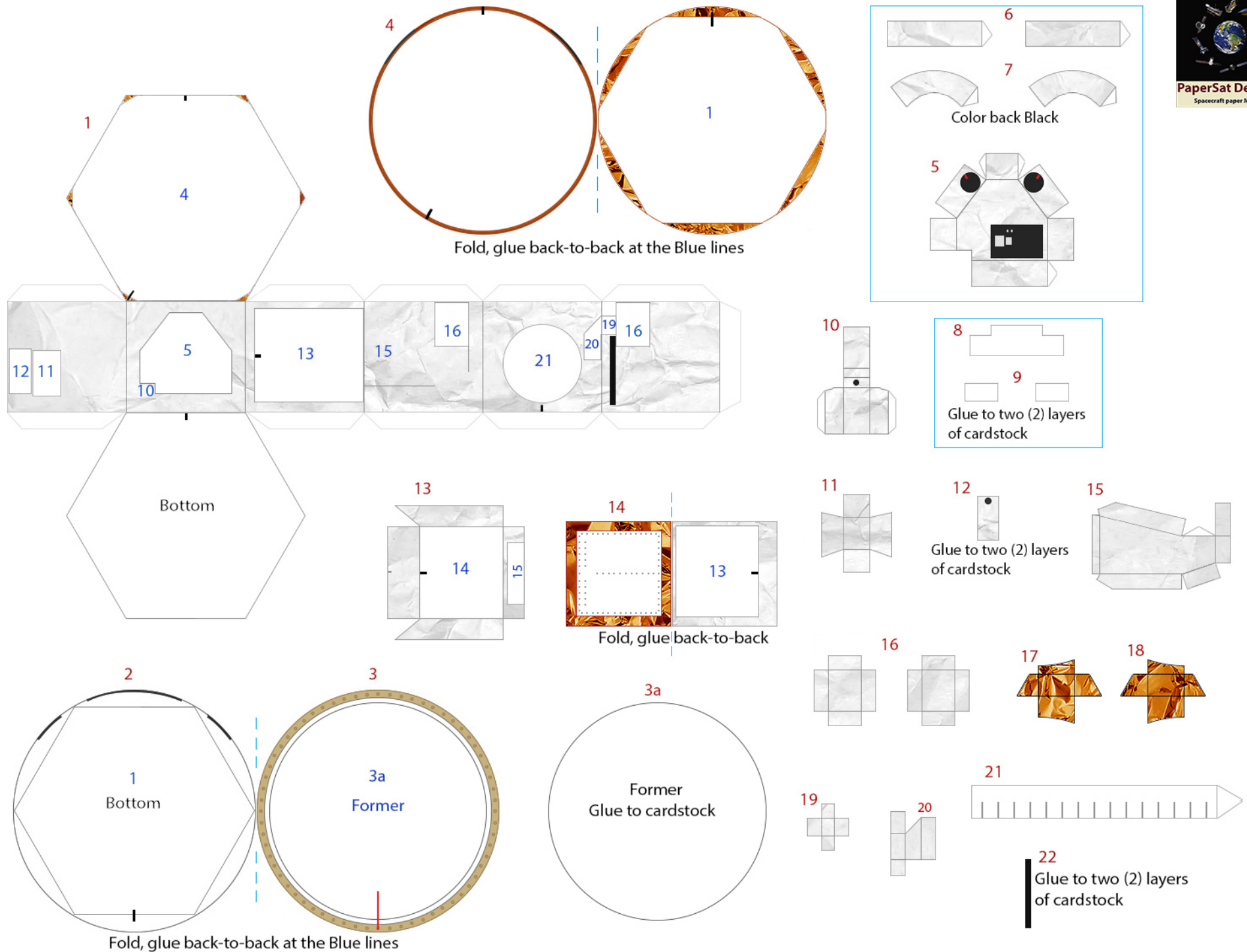
Many space telescopes, including NASA's Hubble and James Webb, can provide high-resolution, in-depth spectroscopy of individual objects or small sections of space. Other space telescopes, like NASA's retired Wide-field Infrared Survey Explorer (WISE), were designed to take images of the whole sky. SPHEREx combines these abilities to apply spectroscopy to the entire sky.

By combining observations from telescopes that target specific parts of the sky with SPHEREx's big-picture view, scientists will get a more complete and more colorful perspective of the universe.

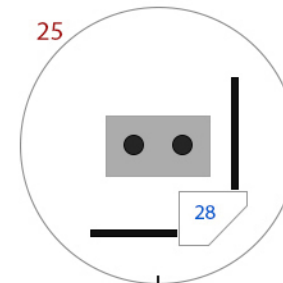
SPHEREx launched on 11 March, 2025 on a Falcon 9 Block 5 rocket alongside the PUNCH microsattellites from Vandenberg Space Force Base.



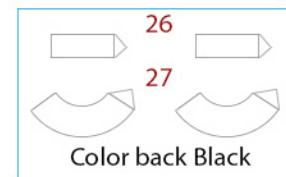
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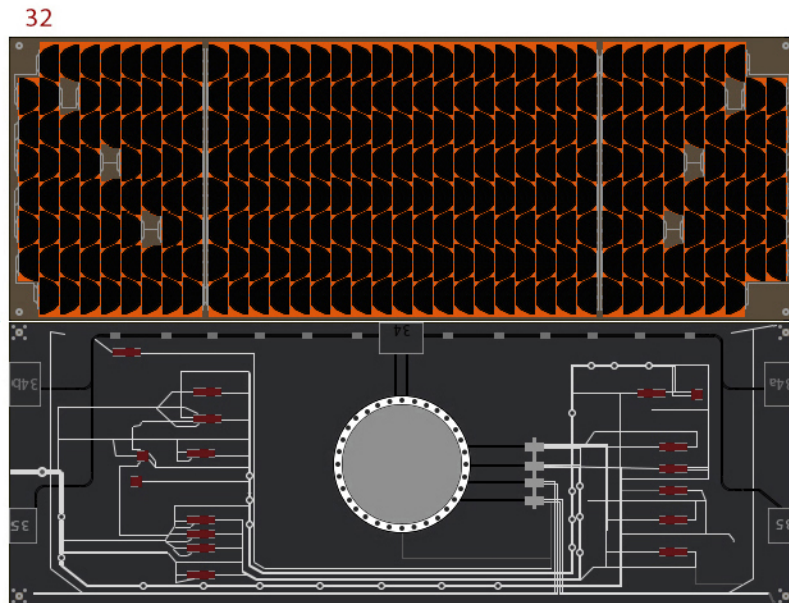
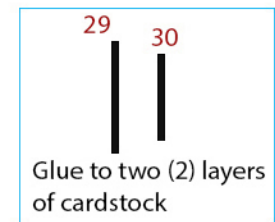


Fits inside the ring (Part 24) above

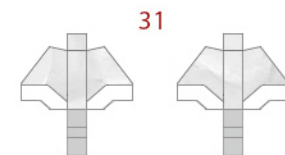
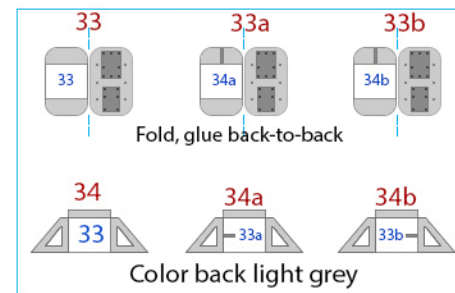


28

Glue to two (2) layers
of cardstock



Fold, GLue back-to-back



SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer)



Cut out the white area

37



Color back Black



Bottom inside former
Glue to cardstock



TOP inside former
glue to cardstock
Cut out the white area

40

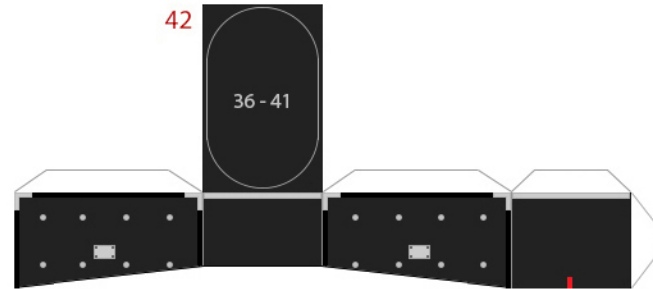


Color back Black

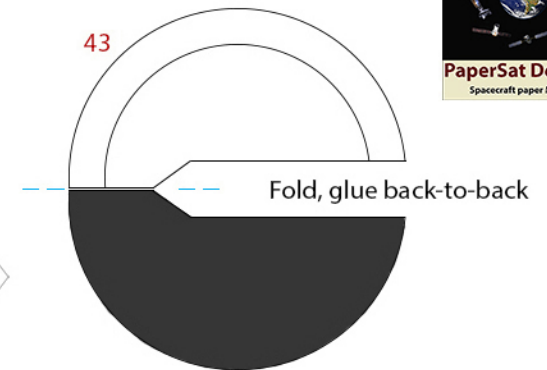


Bottom inside former
Glue to cardstock

42

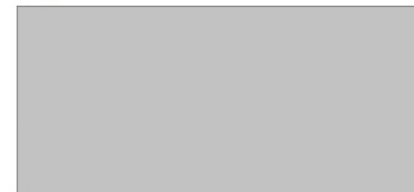


43



Fold, glue back-to-back

44

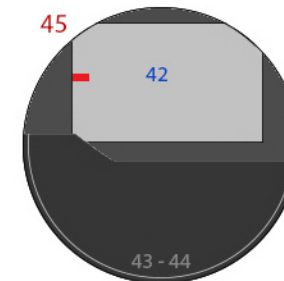


Color back Black

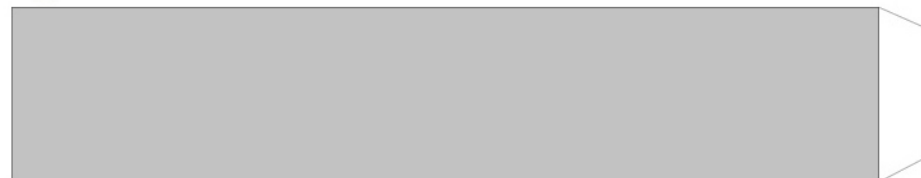


Inside TOP former
glue to cardstock

45

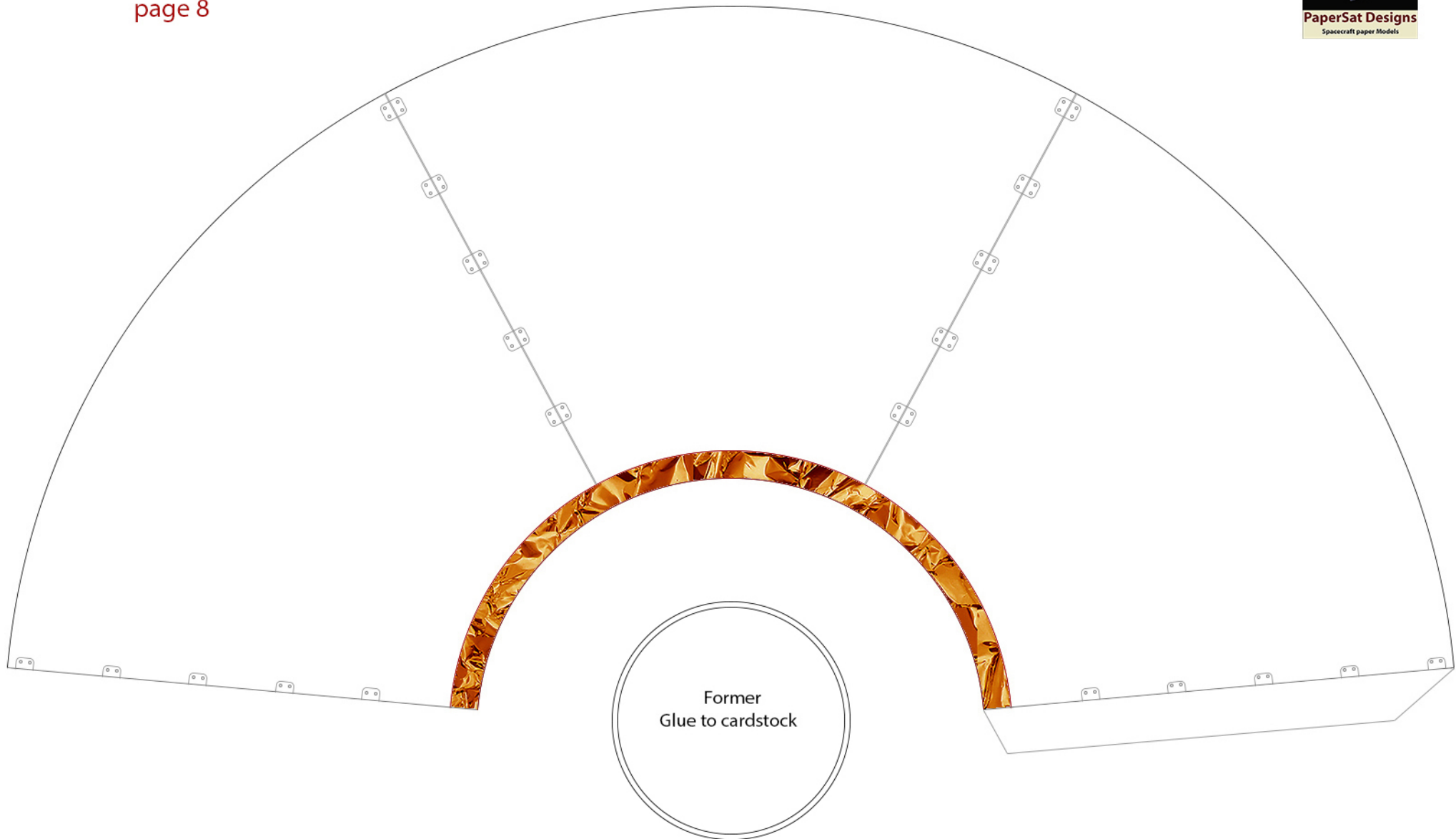


46



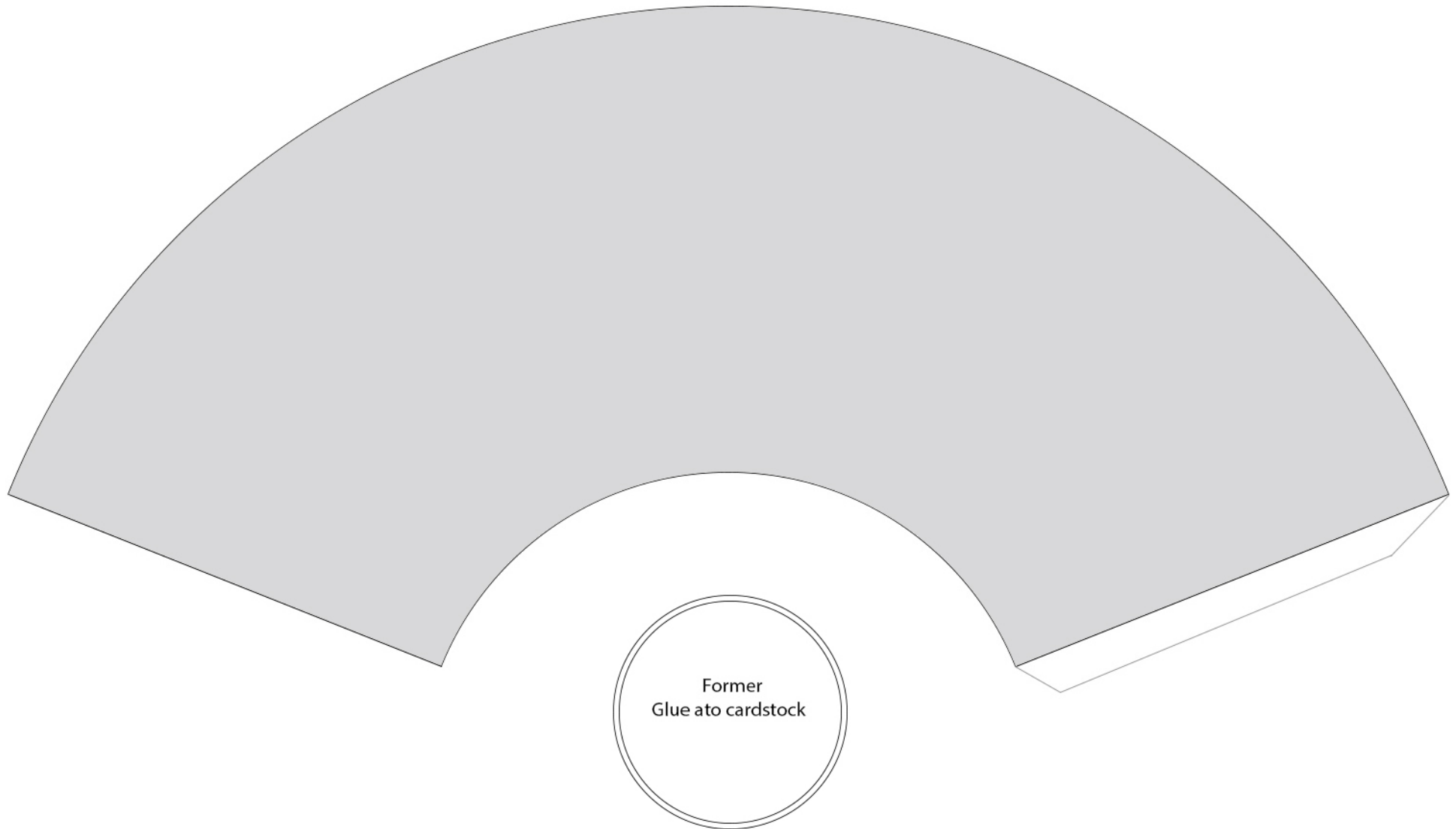
Print the BACK of this outer shield
light grey using the color template on
page 8

Outer Shield



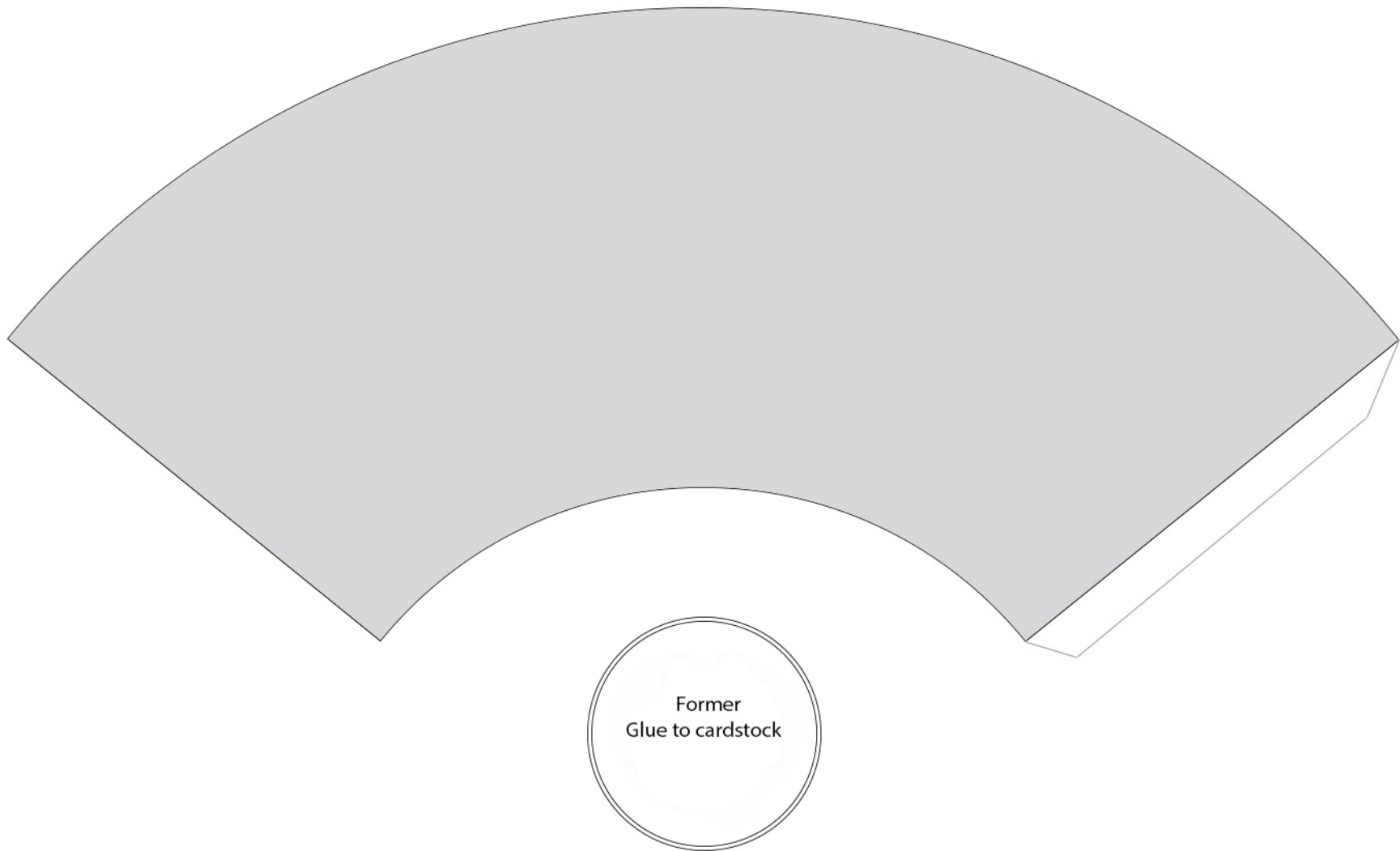
Print the BACK of this middle shield
light grey using the color template
on page 8

Middle Shield



Print the BACK of this inner shield light
grey using the color template on page 8

Inner Shield



Use this to print the color onto the back of the
outter, midldle and inner shields
