Signals Into Sight

Use key ideas and details to restate information accurately.

ELA.10.R.3.2 "Paraphrase content from grade-level texts."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline one sentence in each paragraph that states an important idea. Circle two details in each paragraph that you could use to explain that idea in your own words.

Imaging the Unseen

1 In April 2019, scientists released the first image of a black hole, an object whose gravity is so strong that light cannot escape. The picture showed a bright ring surrounding a dark center in galaxy Messier 87, about 55 million light-years from Earth. No single telescope could make this image alone. The Event Horizon Telescope linked radio observatories around the world, effectively creating an Earth-sized instrument. Researchers combined enormous amounts of data and used computer methods to produce the image. The result supported predictions from Einstein's theory of general relativity.

2 Creating the image required careful timing. Each observatory recorded radio waves from the same distant target during several nights in 2017. Because the sites were separated by oceans and continents, they used atomic clocks to label their measurements precisely. Hard drives carrying the recordings were shipped to processing centers, since the files were too large to send quickly over the internet. At the centers, scientists compared signals from different locations and removed some interference. The team still did not photograph the black hole in the ordinary sense. Instead, it reconstructed an image from the radio-wave data collected by the network.

3 The image mattered beyond its striking appearance. It gave scientists a new way to test ideas about gravity under extreme conditions near a black hole. It also showed that researchers in many countries could coordinate instruments, data, and analysis for one difficult question. In 2022, the same global network released an image of Sagittarius A*, the black hole at the center of the Milky Way. That target was harder to image because its material changes more quickly. Together, these achievements demonstrate how indirect evidence and international cooperation can reveal objects humans cannot visit or see with ordinary light.

2 ANSWER WITH EVIDENCE

Use the passage

1. In one sentence, paraphrase why scientists needed a worldwide network of observatories to create the image in paragraph 1.

2. In 20 to 30 words, paraphrase how the team turned observations into an image in paragraph 2.

3. Paraphrase why Sagittarius A* was more difficult to image than the black hole in Messier 87.

4. In one sentence, paraphrase the broader lesson about science in the final sentence of the passage.

3 YOUR TURN

Your own words

Write a 45 to 60 word paraphrase of the entire passage. Include how the image was created and why the project mattered, but do not copy any full sentence from the passage.

ANSWER KEY

Signals Into Sight

GRADE 10 · ELA.10.R.3.2

PART 1 · READ AND MARK

Underline one sentence in each paragraph that states an important idea. Circle two details in each paragraph that you could use to explain that idea in your own words. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In one sentence, paraphrase why scientists needed a worldwide network of observatories to create the image in paragraph 1.	**A worldwide network was needed because no single telescope could collect enough radio information to create the black hole image.**
2	In 20 to 30 words, paraphrase how the team turned observations into an image in paragraph 2.	**Observatories timed and recorded radio signals, then processing centers compared the data and reduced interference to build an image rather than take a regular photograph.**
3	Paraphrase why Sagittarius A* was more difficult to image than the black hole in Messier 87.	**Sagittarius A* was harder to image because the material around it changes more quickly.**
4	In one sentence, paraphrase the broader lesson about science in the final sentence of the passage.	**The projects show that combined evidence and international teamwork can investigate distant objects that cannot be seen directly with ordinary light.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In 2019, a worldwide group of radio observatories combined their measurements to create an image of the black hole in Messier 87. Scientists used precisely timed data and computer processing because no one telescope could do the job. The project tested ideas about gravity and proved that global teamwork can study distant objects.

Accept accurate restatements that use substantially different wording from the passage while preserving the main ideas and relationships. For the open response, require both the image-making process and the scientific importance, within the stated word range.