BLACK HOLE

Mystery File Question

Is a black hole a star?

A black hole's gravity is so powerful that it bends light around it.

Wowser!

Some astronomers estimate that black holes have a life span of more than a *vigintillion* years! That's a one followed by sixty-three zeroes!

NO ESCAPE

The crew of the *Stella* had finished its long star tour. Kara turned the vessel toward the center of the Milky Way. Here, the stars were clustered so closely together that they looked like a solid disk of light.

"I just found our path home," Kara announced as she steered toward an empty space with no brightness at all.

"No!" Manolo shouted. Kara felt a huge tug of gravity. Just in time, she steered the *Stella* up and away from the strong force. They stared at the strange, empty spot. What could have such strong gravity but not be visible?

"It's a black hole," Captain Gamma explained. "Black holes form when enormous stars collapse. Their gravity is so strong that even *light* can't escape." But no nuclear fusion is going on inside.

Kara looked at her Star Reader. "Weird. This black hole has a mass over four *million* times that of the Sun, but its diameter is less than *forty* times the Sun's," she said.

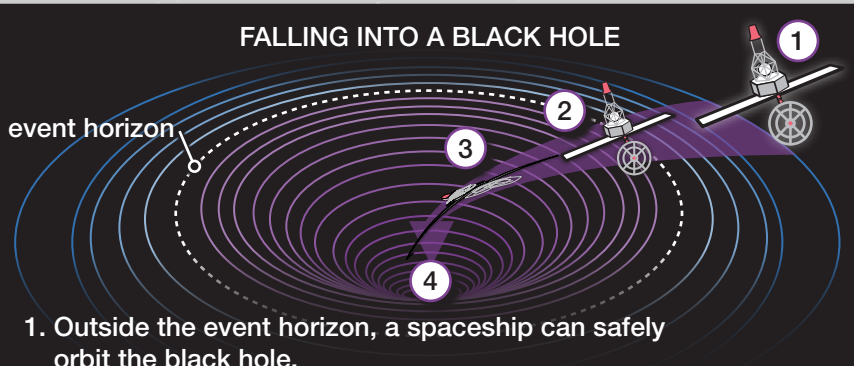
"It's too dangerous to get closer," Captain Gamma warned. "We'll just send a probe to investigate. Then let's head home."

Astronomers believe most galaxies have black holes at their centers.

LONG GONE

The crew of the *Stella* watched their space probe, the *Diver*, sail toward the center of the black hole. From the *Stella*, the *Diver* appeared to slow down and then freeze, as if time had stopped. From the probe, everything seemed normal. It continued to take readings, noting that the temperature was near absolute zero—the lowest possible temperature.

Then the enormous gravity of the black hole began stretching the *Diver*. It pulled the probe into a long, thin strand, like spaghetti. Then the probe disappeared into the blackness. All the crew of the *Stella* could do was wave goodbye.



1. Outside the event horizon, a spaceship can safely orbit the black hole.
2. Gravity holds light in one place. From far away, objects appear to stop moving.
3. Gravity pulls unevenly on objects, stretching them out. This process is called *spaghettification.*
4. Objects that get pulled into the black hole are crushed.

Mystery File Response Sheet

Key Question: *What makes a star a star?*

List the details you found in <u>every</u> *I.File* that your team read. Use the **I.Team Evidence** section of your *I.File Response Sheet*.

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Now decide whether each of the details you listed is also true for the *Mystery File.* Circle one answer for each detail: **T** = true **F** = false **?** = not sure

Did you circle **T** (true) for all the details? **Yes No**

Mystery File Question: *Is a black hole a star?* **Yes No**

Use evidence to answer the Mystery File Question. Write in complete sentences.

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Credits: background: courtesy of NASA/JPL/Space Science Institute