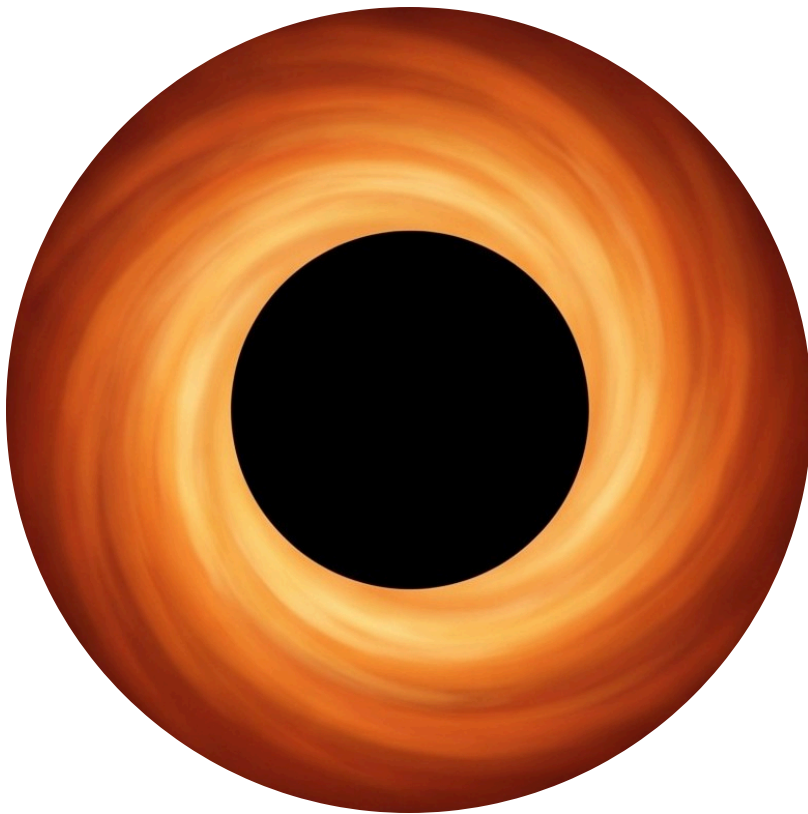


A Printable Scholar Space Book

How Big Is a Black Hole?

A zoom-out book of planets,
stars and black holes



This book belongs to _____

Earth and the Moon



The Moon
3,470 km wide



Earth
12,700 km wide

3.7× Earth is this many times as wide as the Moon.

Let's start close to home. Earth is almost 4 times as wide as the Moon. About 50 Moons could fit inside Earth.

Jupiter

Earth

12,700 km wide



Jupiter

140,000 km wide

11× Jupiter is this many times as wide as Earth.

Jupiter is the biggest planet in our solar system. It is 11 times as wide as Earth. More than 1,300 Earths could fit inside it.

A Red Dwarf Star



Jupiter

140,000 km wide



Proxima Centauri

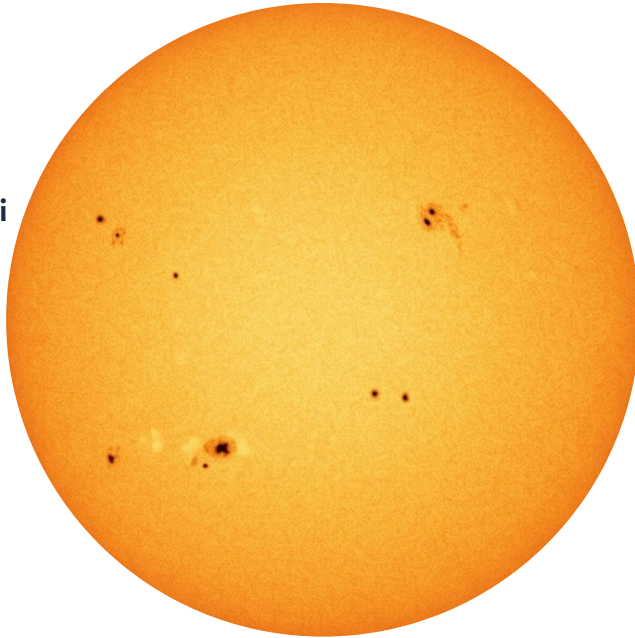
215,000 km wide

1.5× Proxima Centauri is this many times as wide as Jupiter.

Red dwarfs are the smallest stars, and there are more of them than any other kind. Proxima Centauri is the closest star to our Sun. It is only about 1.5 times as wide as Jupiter! Red dwarfs burn slowly. They can shine for trillions of years.

The Sun

Proxima Centauri
215,000 km wide



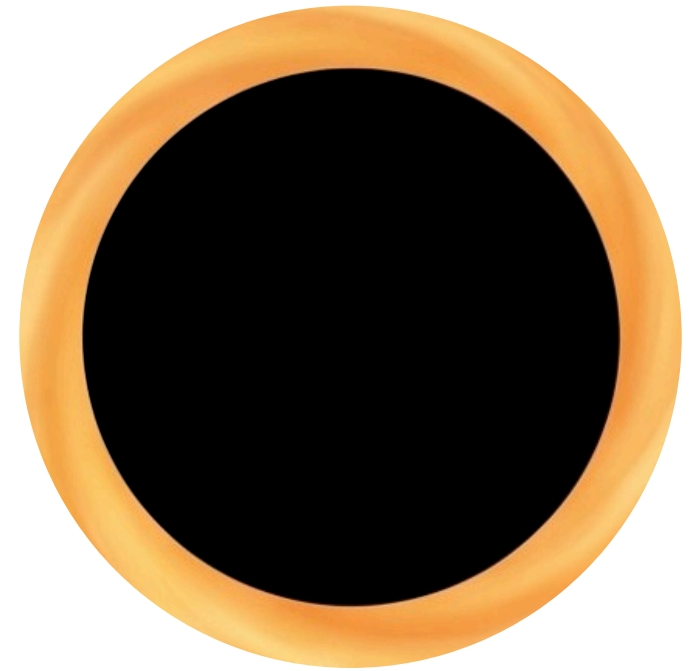
The Sun
1.4 million km wide

6.5× The Sun is this many times as wide as Proxima Centauri.

Our Sun is a much bigger star. It is about 6.5 times as wide as Proxima Centauri and 109 times as wide as Earth. More than a million Earths could fit inside the Sun.

Sagittarius A*

The Sun
1.4 million km wide



Sagittarius A*
25 million km wide

18× Sagittarius A* is this many times as wide as the Sun.

Say it “A-star.” This is the giant black hole in the middle of our galaxy, the Milky Way. It has as much mass as about 4 million Suns. The black part is about 18 times as wide as the Sun. Nothing that falls in can get out, not even light.

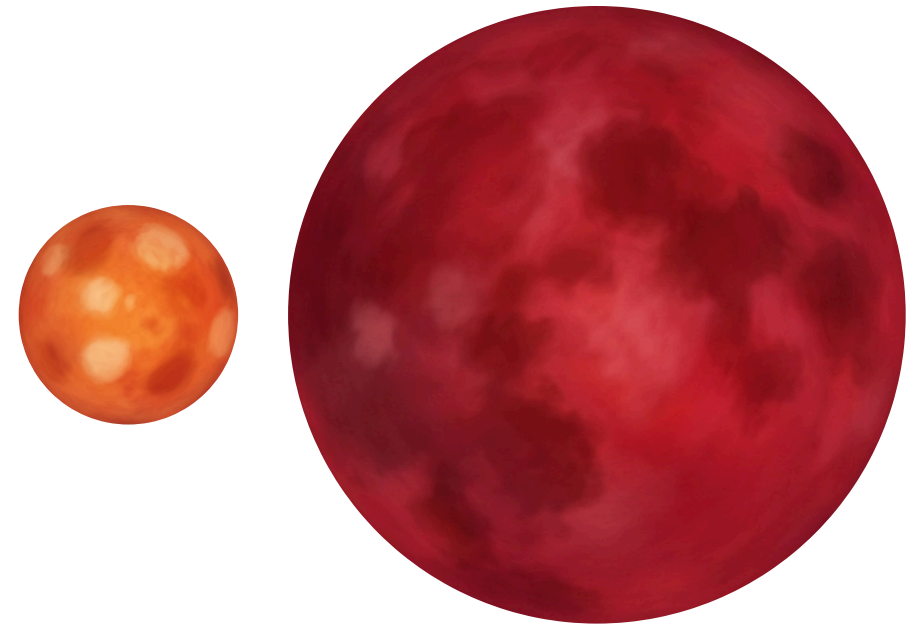
Betelgeuse



42× Betelgeuse is this many times as wide as Sagittarius A*.

Betelgeuse is a red supergiant star. It is so big that it will not fit on this page! It is about 40 times as wide as Sagittarius A*. Yes, a giant star can be wider than a giant black hole. One day Betelgeuse will blow up in a huge explosion called a supernova.

Stephenson 2-18



Betelgeuse
1.1 billion km wide

Stephenson 2-18
3 billion km wide

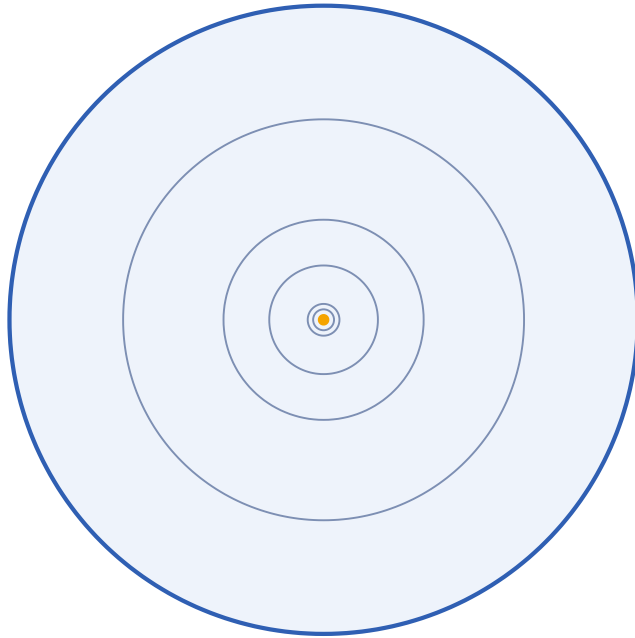
2.8× Stephenson 2-18 is this many times as wide as Betelgeuse.

This may be the biggest star ever found. It is almost 3 times as wide as Betelgeuse and about 2,000 times as wide as the Sun. If it sat where the Sun is, it would reach about as far as Saturn. It is very far away, so scientists are still working out its exact size.

The Solar System



Stephenson 2-18
3 billion km wide

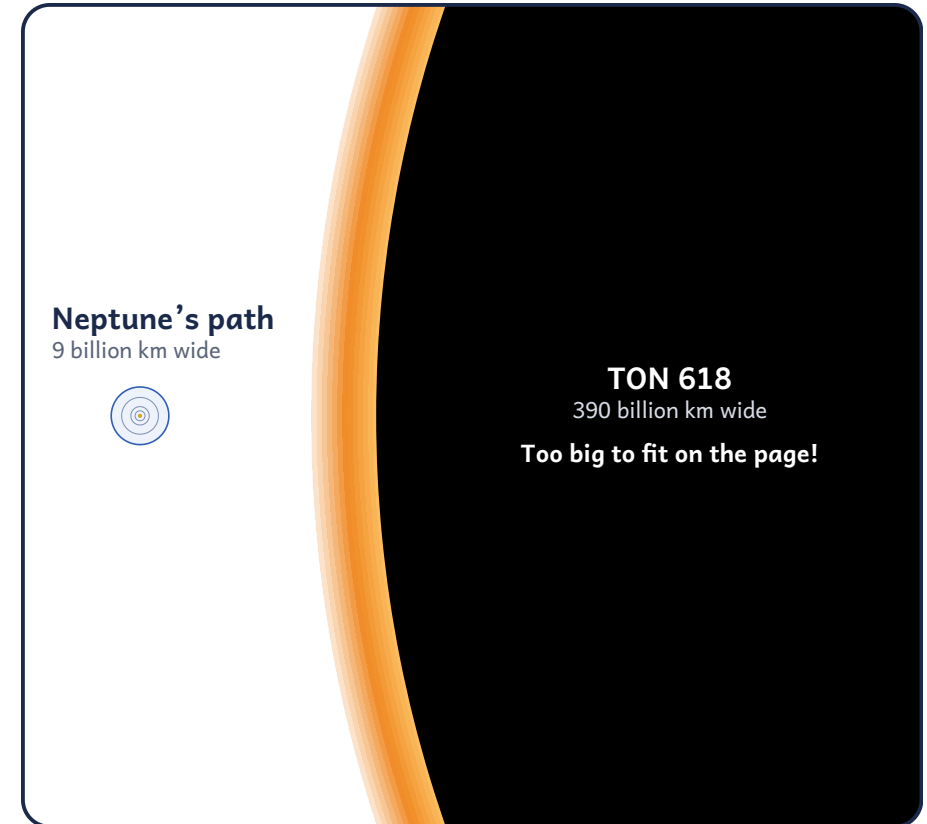


Neptune's path
9 billion km wide

3× Neptune's path is this many times as wide as Stephenson 2-18.

Now look at the path Neptune takes around the Sun. Neptune is the farthest planet. Its path is 3 times as wide as Stephenson 2-18. That is about 9 billion kilometers across. Light from the Sun takes more than 4 hours to get to Neptune.

TON 618



Neptune's path
9 billion km wide

TON 618
390 billion km wide
Too big to fit on the page!

43× TON 618 is this many times as wide as Neptune's path.

TON 618 is one of the biggest black holes ever found. Its mass may be as much as 66 billion Suns. That would make it about 40 times as wide as Neptune's path. Our whole solar system is the tiny set of rings on the left! Light needs about two weeks to cross this black hole.

The Line-Up

Smallest to biggest. The number is how wide each one is.



The Moon

Earth's moon

3,470 km

2,160 miles



Earth

Our planet

12,700 km

7,920 miles



Jupiter

The biggest planet

140,000 km

86,900 miles



Proxima Centauri

A red dwarf star

215,000 km

133,000 miles



The Sun

Our star

1.4 million km

865,000 miles



Sagittarius A*

The black hole in the middle of our galaxy

25 million km

16 million miles



Betelgeuse

A red supergiant star

1.1 billion km

660 million miles



Stephenson 2-18

Maybe the biggest star known

3 billion km

1.9 billion miles



Neptune's path

The path of the farthest planet

9 billion km

5.6 billion miles



TON 618

One of the biggest black holes known

390 billion km

240 billion miles

The little pictures here are all drawn the same size. Black hole sizes are the width of the black part, where nothing can get out.

Which Is Bigger?

Circle the bigger one in each pair. Look back in the book if you need to.

1



Jupiter

or



Proxima Centauri

2



Sagittarius A*

or



The Sun

3



Betelgeuse

or



Sagittarius A*

4



Stephenson 2-18

or



Neptune's path

5



Earth

or



The Moon

6



TON 618

or



Stephenson 2-18

Answers: 1. Proxima Centauri • 2. Sagittarius A* • 3. Betelgeuse • 4. Neptune's path • 5. Earth • 6. TON 618

Sizes of faraway stars and black holes are scientists' best measurements so far. They may change as we learn more.