Galaxies:

A galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity. scientists think there could be as many as *one hundred billion* galaxies in the universe.

Wide range of sizes,  from dwarf galaxies containing as few as 100 million stars to giant galaxies with more than a trillion stars.

They have curved arms that make it look like a pinwheel. Other galaxies are smooth and oval shaped. They’re called elliptical galaxies. And there are also galaxies that aren’t spirals or ovals. They have irregular shapes and look like blobs. The light that we see from each of these galaxies comes from the stars inside it.

1.Elliptical: These are the galaxies which are nearly circular to very elongated. They possess comparatively little gas and dust, contain older stars and are not actively forming stars anymore. The largest and rarest of these, called giant ellipticals, are about 300,000 light-years across. Astronomers theorize that these are formed by the mergers of smaller galaxies. Much more common are dwarf ellipticals, which are only a few thousand light-years wide.

2.spiral: Spiral galaxies appear as flat, blue-white disks of stars, gas and dust with yellowish bulges in their centers. These galaxies are divided into two groups: normal spirals and barred spirals. In barred spirals, the bar of stars runs through the central bulge. The arms of barred spirals usually start at the end of the bar instead of from the bulge. Spirals are actively forming stars and comprise a large fraction of all the galaxies in the local universe.

3.irregular: Irregular galaxies, which have very little dust, are neither disk-like nor elliptical. Astronomers often see irregular galaxies as they peer deeply into the universe, which is equivalent to looking back in time. These galaxies are abundant in the early universe, before spirals and ellipticals developed.

Aside from these three classic categories, astronomers have also identified many unusually shaped galaxies that seem to be in a transitory phase of galactic development. These include those in the process of colliding or interacting, and those with active nuclei ejecting jets of gas.

Source: <https://hubblesite.org/> , <https://spaceplace.nasa.gov/>,

Nebula:

A nebula is **an enormous cloud of dust and gas occupying the space between stars and acting as a nursery for new stars**.

5 major types:

1. Emission Nebula:
2. Reflection Nebula:
3. Dark Nebula:
4. Planetary Nebula:
5. Supernova Remnant:

Source: <http://www.seasky.org/celestial-objects/nebulae.html#:~:text=Nebulae%20have%20been%20divided%20into,planetary%20nebulae%2C%20and%20supernova%20remnants>.

Stars:

A **star** is an [astronomical object](https://en.wikipedia.org/wiki/Astronomical_object) comprising a luminous [spheroid](https://en.wikipedia.org/wiki/Spheroid) of [plasma](https://en.wikipedia.org/wiki/Plasma_(physics)) held together by its [gravity](https://en.wikipedia.org/wiki/Gravity).

Mainly 6 types:

1. Main Sequence Stars:
2. Red Giants:
3. White Dwarfs:
4. Brown Dwarfs
5. Variable Stars:
6. Binary Stars:

Source: <http://www.seasky.org/celestial-objects/stars.html>

Supernova:

A **supernova** is the biggest explosion that humans have ever seen. Each blast is the extremely bright, super-powerful explosion of a star.

One type of supernova is caused by the “last hurrah” of a dying massive star. This happens when a star at least five times the mass of our sun goes out with a fantastic bang!

**supernovas**, any of a class of violently exploding [stars](https://www.britannica.com/science/star-astronomy) whose [luminosity](https://www.britannica.com/science/luminosity) after eruption suddenly increases many millions of times its normal level.

Black hole:

A black hole is **a region of spacetime where gravity is so strong that nothing — no particles or even electromagnetic radiation such as light — can escape from it**.

4 main types:

1. Stellar: A **stellar black hole** (or **stellar-mass black hole**) is a [black hole](https://en.wikipedia.org/wiki/Black_hole) formed by the [gravitational collapse](https://en.wikipedia.org/wiki/Gravitational_collapse) of a [star](https://en.wikipedia.org/wiki/Star).[[1]](https://en.wikipedia.org/wiki/Stellar_black_hole#cite_note-CMS1999-1) They have masses ranging from about 5 to several tens of [solar masses](https://en.wikipedia.org/wiki/Solar_mass).[[2]](https://en.wikipedia.org/wiki/Stellar_black_hole#cite_note-2) The process is observed as a [hypernova](https://en.wikipedia.org/wiki/Hypernova) explosion[[3]](https://en.wikipedia.org/wiki/Stellar_black_hole#cite_note-hubblesite.org-3) or as a [gamma ray burst](https://en.wikipedia.org/wiki/Gamma_ray_burst).[[3]](https://en.wikipedia.org/wiki/Stellar_black_hole#cite_note-hubblesite.org-3) These black holes are also referred to as [collapsars](https://en.wikipedia.org/wiki/Collapsar). Stellar [**black holes**](https://astronomy.swin.edu.au/cosmos/B/Black+Hole), with masses less than about 100 times that of the [**Sun**](https://astronomy.swin.edu.au/cosmos/S/Sun), comprise one of the possible [**evolutionary endpoints**](https://astronomy.swin.edu.au/cosmos/cosmos/S/stellar+evolution) of high [**mass**](https://astronomy.swin.edu.au/cosmos/M/Mass) [**stars**](https://astronomy.swin.edu.au/cosmos/S/Star). Once the core of the star has completely burned to iron, energy production stops and the core rapidly [**collapses**](https://astronomy.swin.edu.au/cosmos/cosmos/C/core-collapse) resulting in a [**supernova**](https://astronomy.swin.edu.au/cosmos/cosmos/C/core-collapse+supernovae) explosion.
2. Intermediate: An **intermediate-mass black hole** (**IMBH**) is a class of [black hole](https://en.wikipedia.org/wiki/Black_hole) with mass in the range 102–105 [solar masses](https://en.wikipedia.org/wiki/Solar_mass): significantly more than [stellar black holes](https://en.wikipedia.org/wiki/Stellar_black_hole) but less than the 105–109 solar mass [supermassive black holes](https://en.wikipedia.org/wiki/Supermassive_black_hole).[[](https://en.wikipedia.org/wiki/Intermediate-mass_black_hole#cite_note-2) Intermediate-mass black holes are thought to form **when multiple stellar-mass black holes undergo a series of mergers with one another**. These mergers frequently happen in crowded areas of galaxies.
3. Supermassive: A **supermassive black hole** (**SMBH** or sometimes **SBH**)[[4]](https://en.wikipedia.org/wiki/Supermassive_black_hole#cite_note-4) is the largest type of [black hole](https://en.wikipedia.org/wiki/Black_hole), with its [mass](https://en.wikipedia.org/wiki/Mass) being [on the order of](https://en.wikipedia.org/wiki/On_the_order_of) millions to billions of times the mass of the [Sun](https://en.wikipedia.org/wiki/Sun) ([M☉](https://en.wikipedia.org/wiki/Solar_mass)).  As the name suggests, supermassive black holes (SMBHs) are gigantic. The smallest ones are millions of times more massive than the sun, and the biggest ones — found in the centers of huge galaxies — reach hundreds of billions of solar masses
4. Miniature: **Micro black holes**, also called **quantum mechanical black holes** or **mini black holes**, are hypothetical tiny [black holes](https://en.wikipedia.org/wiki/Black_holes), for which [quantum mechanical](https://en.wikipedia.org/wiki/Quantum_mechanics) effects play an important role.[[1]](https://en.wikipedia.org/wiki/Micro_black_hole#cite_note-carr-1) The concept that black holes may exist that are smaller than [stellar mass](https://en.wikipedia.org/wiki/Stellar_mass) was introduced in 1971 by [Stephen Hawking](https://en.wikipedia.org/wiki/Stephen_Hawking).[[2]](https://en.wikipedia.org/wiki/Micro_black_hole#cite_note-verylowmass-2)

Pulsars: Pulsars are spherical, compact objects that are about the size of a large city but contain more mass than the sun. Scientists are using pulsars to study extreme states of matter, search for planets beyond Earth's solar system and measure cosmic distances.

**pulsar**, in full **pulsating radio star**, any of a class of [cosmic](https://www.britannica.com/dictionary/cosmic) objects, the first of which were discovered through their extremely regular pulses of radio waves

source: <https://www.britannica.com/science/pulsar> , <https://www.space.com/32661-pulsars.html>,

Magnetars: A **magnetar** is a type of [neutron star](https://en.wikipedia.org/wiki/Neutron_star) believed to have an extremely powerful [magnetic field](https://en.wikipedia.org/wiki/Magnetic_field) (∼109 to 1011 [T](https://en.wikipedia.org/wiki/Tesla_(unit)), ∼1013 to 1015 [G](https://en.wikipedia.org/wiki/Gauss_(unit))).[[1]](https://en.wikipedia.org/wiki/Magnetar#cite_note-1) The magnetic-field decay powers the emission of high-[energy](https://en.wikipedia.org/wiki/Photon_energy) [electromagnetic radiation](https://en.wikipedia.org/wiki/Electromagnetic_radiation), particularly [X-rays](https://en.wikipedia.org/wiki/X-ray) and [gamma rays](https://en.wikipedia.org/wiki/Gamma_ray).[[2](https://en.wikipedia.org/wiki/Magnetar#cite_note-Ward-2)