

Welcome to the Supercharged Science

Astronomy Teleclass Webinar!

You can fill out this worksheet as a review exercise at the end of the class to see where your strengths are.

What we're going to cover today:

- Planets
- Stars
- Comets
- Asteroids
- Moons
- Missions
- Supernova
- Pulsars and Neutron Stars
- Black Holes
- Gravitational Lensing
- Gravity & Spacetime
- Famous Astrophysicists

Write down two things you really want to know about astronomy.

1. _____

2. _____

Do this NOW: Write down WHY you want to learn about the things you mentioned above. What will it give you, or provide you with, or make possible for you if you now understand these things that you wanted to learn?

IMPORTANT: During class, you can either fill out the worksheet, OR if that's too stressful or a hassle, just set it aside and fill it out after class is over so you can enjoy watching the class.

Answer key is on the last page, so put it in a place where you won't be tempted to peek at the answers until after you've given it your best shot.

Material List:

- Two balls, one larger than the other (like a tennis ball and basketball, or a bouncy ball and a racquetball)

During the Lesson:

You can look over the worksheet so you know what to listen for as you go through the class with me, or you can go through it along with me during class. OR... flip it over and forget about it and just enjoy the class. When class is over, flip it back over and fill it out and be amazed at how much you've picked up and learned!

1. _____ is the closest, but not the hottest planet. The side facing the Sun gets to _____, and the side facing away from the Sun gets to _____.

2. _____ is the brightest thing in the sky, other than the Sun and Moon.

3. Venus has a surface temperature of _____

4. One day is longer than a year on _____.

Not only that, it rotates _____.

5. _____ gives Mars its red color.

6. Mars has both _____ ice and _____ ice.

7. Mars's moons are named after _____ and _____

8. If the Earth was the size of a marble, Jupiter would be the size of a _____.

9. Jupiter can fit nearly _____ Earths inside.

Jupiter is so large that all of the _____ in the solar system could fit inside of it.

10. If you added more mass to _____ it would get smaller because it's a big ball of _____.

11. Jupiter is made out of _____ and _____.
12. Saturn is surrounded by rings made mostly of _____ moving at _____
13. Inside Saturn's rings are _____.
14. The planet _____ rolls around the Sun while tipped on its side.
15. Cold _____ is what gives Uranus its blue-green color.
16. Uranus has _____ moons.
17. Neptune is a giant ball of gas, which is also known as _____.
18. _____ is the coldest planet in our solar system.
19. Pluto and _____ are a pair of objects because they both rotate around a point
outside of each.
20. Charon and Pluto are also orbited by _____ and _____ and Kerberos
and Styx.
21. Pluto is now part of the _____ Belt.
22. The five dwarf planets in our solar system are: _____, Makemake, Haumea,
Pluto, and Ceres.

23. The solar system includes eight planets, their _____, one _____ at the center, and smaller objects such as _____ and _____.
24. Mercury, Venus, Earth and Mars are _____ terrestrial planets, Jupiter and Saturn are _____ giants and Uranus and Neptune are _____ giants.
25. A comet is a dirty _____
26. Comets orbit the _____
27. The Sun is 75% _____ and 25% _____.
28. The core temperature of the Sun is _____.
29. The Sun rotates once every _____ at its equator and _____ at the poles.
30. When a star like our sun runs out of fuel, it can no longer keep the fusion reaction going in _____ inside, so the star collapses down into a _____.
31. When stars use up their fuel they can explode like gigantic bombs called _____

32. If the star is more than three times the mass of our sun, a _____ forms.

33. A magnetar is a special type of _____ star.

34. A black hole is an object that has an _____ greater than the speed of light.

What I didn't know about astronomy until class today was:

Vocabulary Words:

Black holes are the leftovers of a BIG supernova. When a star explodes, it collapses down into a white dwarf or a neutron star. However, if the star is large enough, there is nothing to keep it from collapsing, so it continues to collapse forever. It becomes so small and dense that the gravitational pull is so great that light itself can't escape.

Galaxies are stars that are pulled and held together by gravity.

Globular clusters are massive groups of stars held together by gravity, using housing between tens of thousands to millions of stars (think New York City).

Gravitational lensing is one way we can "see" a black hole. When light leaves a star, it continues in a straight line until yanked on by the gravity of a black hole, which bends the light and change its course and shows up as streaks or multiple, distorted images on your photograph.

The **Kuiper Belt** is an icy region that extends from just beyond Neptune (from 3.7 billion miles to 7.4 billion miles from the sun). This is where most comets and asteroids from our solar system hang out.

Neutron stars with HUGE magnetic fields are known as **magnetars**.

Neutron stars are formed from stars that go supernova, but aren't big and fat enough to turn into a black hole.

The **Oort Cloud** lies just beyond the Kuiper belt, housing an estimated 1 trillion comets.

The visible surface of the **sun** is called the **photosphere**, and is made mostly of that bubbles up hot and cold regions of gas.

Dying stars blow off shells of heated gas that glow in beautiful patterns called **planetary nebula**.

Pulsars are a type of neutron star that spins very fast, spews jets of high-energy x-ray particles out the poles, and has large magnetic fields. Our **solar system** includes **rocky terrestrial planets** (Mercury, Venus, Earth, and Mars), **gas giants** (Jupiter and Saturn), **ice giants** (Uranus and Neptune), and assorted chunks of ice and dust that make up various **comets** (dusty snowballs) and asteroids (chunks of rock).

Stars are made up of very hot gases, mostly hydrogen and helium. Energy is generated by burning hydrogen and creating helium using the **nuclear fusion** process.

There are many different types of **stars**. Blue giant stars are big and massive while red dwarf stars smaller than the earth. Our sun is a main-sequence range yellow star. The **Hertzsprung-Russell (HR) diagram** explains the different brightness, temperature, and classes of stars, and shows how the brightness of a star depends on its temperature.

Answer Key

1. Mercury is the closest, but not the hottest planet. The side facing the Sun gets to 800°F, and the side facing away from the Sun gets to -280°F.
2. Venus is the brightest thing in the sky, other than the Sun and Moon.
3. Venus has a surface temperature of 863°F.
4. One day is longer than a year on Venus. Not only that, it rotates in the opposite direction .
5. Iron oxide (rust) gives Mars its red color.
6. Mars has both water ice and dry ice.
7. Mars's moons are named after Fear/Panic and Dread/Terror.
8. If the Earth was the size of a marble, Jupiter would be the size of a soccer ball.
9. Jupiter can fit nearly 1300 Earths inside. Jupiter is so large that all of the planets in the solar system could fit inside of it.
10. If you added more mass to Jupiter it would get smaller because it's a big ball of gas.
11. Jupiter is made out of hydrogen and helium.
12. Saturn is surrounded by rings made mostly of ice moving at 75,000 mph.
13. Inside Saturn's rings are shepherd moons.
14. The planet Uranus rolls around the Sun while tipped on its side.
15. Cold methane is what gives Uranus its blue-green color.
16. Uranus has 27 moons.
17. Neptune is a giant ball of gas, which is also known as an ice giant.
18. Neptune is the coldest planet in our solar system.
19. Pluto and Charon are a pair of objects because they both rotate around a point outside of each.
20. Charon and Pluto are also orbited by Hydra and Nix and Kerberos and Styx.
21. Pluto is now part of the Kuiper Belt.
22. The five dwarf planets in our solar system are: Eris, Makemake, Haumea, Pluto, and Ceres.
23. The solar system includes eight planets, their moons, one Sun at the center, and smaller objects such as comets and asteroids.
24. Mercury, Venus, Earth and Mars are rocky terrestrial planets, Jupiter and Saturn are gas giants and Uranus and Neptune are ice giants.
25. A comet is a dirty snowball.
26. Comets orbit the sun.
27. The Sun is 75% hydrogen and 25% helium.
28. The core temperature of the Sun is 15 million °C.
29. The Sun rotates once every 27 days at its equator and 31 days at the poles.
30. When a star like our sun runs out of fuel, it can no longer keep the fusion reaction going in inside, so the star collapses down into a white dwarf star.
31. When stars use up their fuel they can explode like gigantic bombs called supernovas.
32. If the star is more than three times the mass of our sun, a black hole forms.
33. A magnetar is a special type of neutron star.
34. A black hole is an object that has an escape velocity greater than the speed of light.