

GREAT World Wide STAR COUNT

A Windows to the Universe
Citizen Science Event
windows2universe.org/starcount

Steps:

WHAT do I need?

- * Pen or pencil
- * Red-light or "night-vision" flashlight
- * GPS unit, access to the Internet or topographic map
- * Printed Activity Guide with report form

HOW do I make a "night-vision" flashlight?

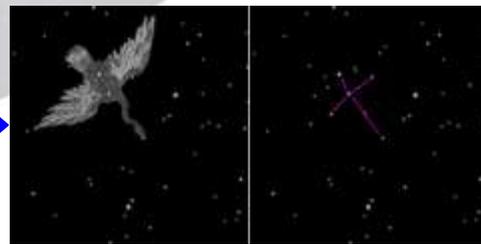
- * Cover the end (lens) of a flashlight with red cellophane or a brown paper bag
- * Secure it with tape or a rubber band

WHEN do I observe?

- * Any of the night(s) listed on <http://starcount.org>
- * About an hour after sunset (usually between 7:00 and 9:00 pm local time)

WHAT do I observe?

- * Find your constellation:
 - If you live in the Northern Hemisphere, you will observe the stars in Cygnus, the Swan, which includes the Northern Cross asterism
 - If you live in the Southern Hemisphere, you will observe the stars in Sagittarius, the Archer, which includes the Teapot asterism
- * Match your nighttime sky to the magnitude charts on pages 2 & 3



WHERE do I observe?

- * Anywhere outside where you can determine the latitude and longitude (for help visit www.windows.ucar.edu/starcount/latlon.html)
- * Optional: Report more than one observation by moving to a new location at least 1 km

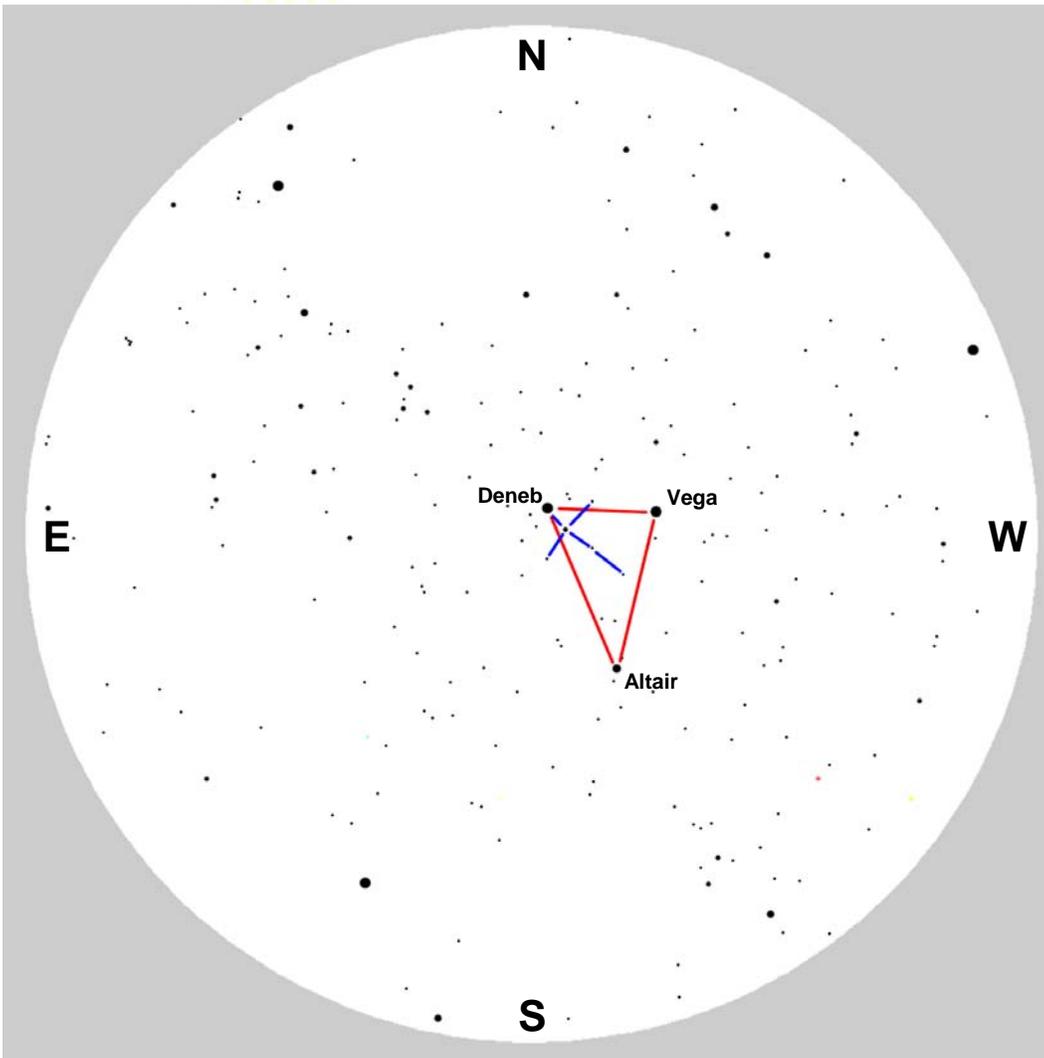
Don't Forget!

Give your eyes about 15 minutes to adapt to the nighttime darkness.

Stay Safe!

- * Use good judgment when outside at night and wear appropriate clothing
- * Young children should be supervised

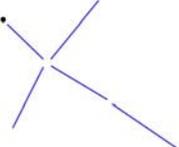
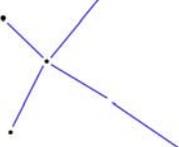
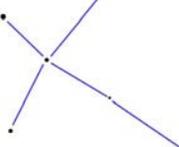
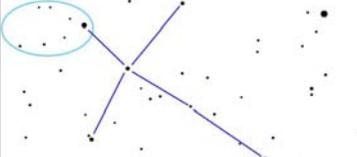
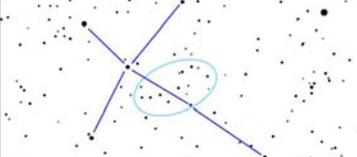
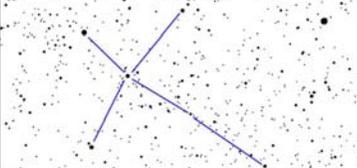
Northern Hemisphere Observing Guide



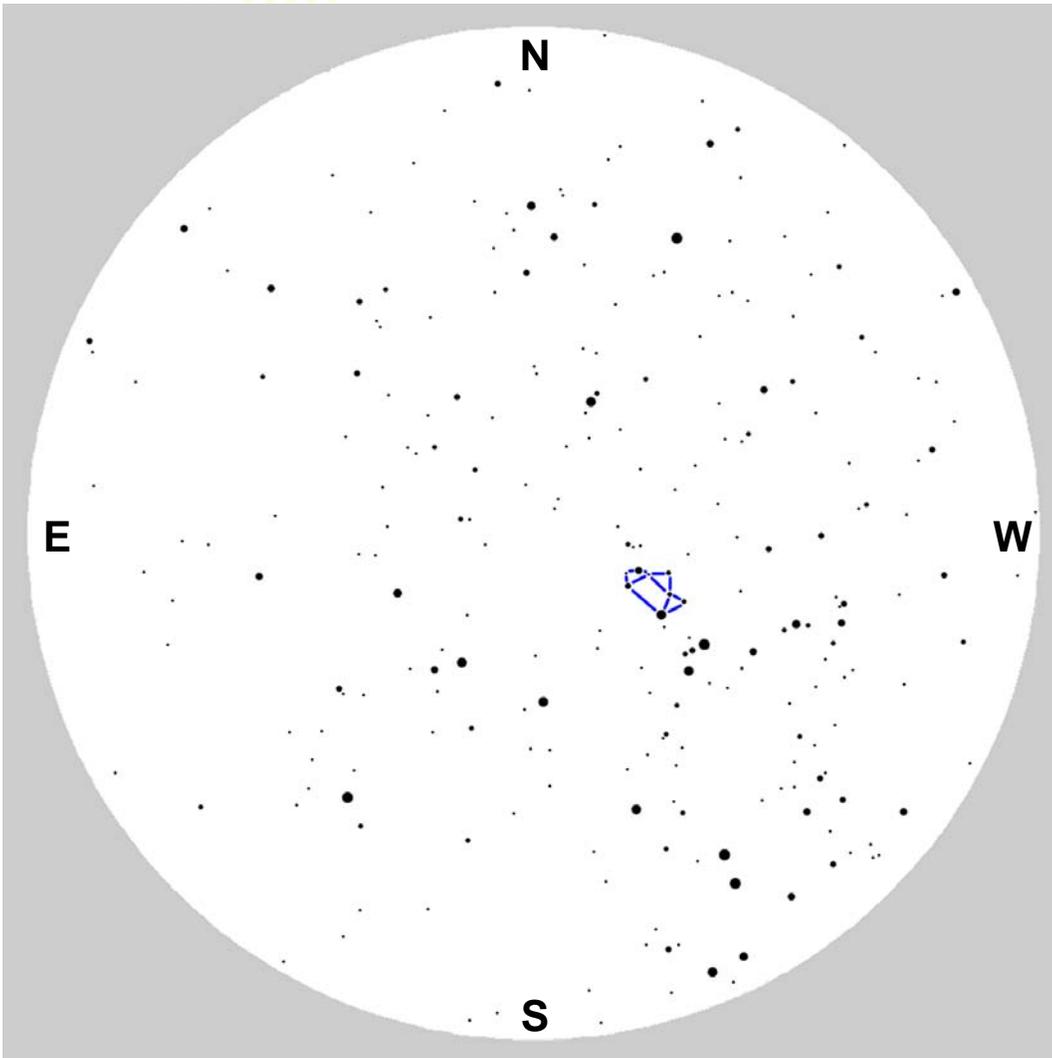
How to Find Cygnus and Use the Magnitude Charts

The illustration above represents the night sky as seen from the Northern Hemisphere about an hour after sunset in early October and should help you find the Northern Cross in Cygnus. Hold this page above your head so that the compass directions around the edge point in the right direction. Your sky view should roughly match the illustration. You may see more stars or fewer, depending on the quality of your night sky and how long you've been outside. You will see more stars if you stay outside for 15 minutes!

The three brightest stars above you are Vega, Altair, & Deneb, known as the Summer Triangle (marked in red above). Deneb is the dimmest of the three and will be almost directly overhead. Remember that constellations usually look larger than you might expect! If you extend your arm straight up and stretch your thumb and little finger as wide as possible, they should almost reach from the top of the Northern Cross (Deneb) to the bottom (Alberio). Once you have found the Northern Cross, use the seven magnitude charts on the right to determine the limiting magnitude at your location. Each chart includes a hint to help you decide.

 <p>Vega*</p> <p>Mag 1: No stars in the cross are visible, but you can see Vega.</p>
 <p>Deneb*</p> <p>Mag 2: Deneb is the only star visible the cross.</p>
 <p>Mag 3: Only four stars visible at the top of the cross.</p>
 <p>Mag 4: All six main stars visible in the cross.</p>
 <p>Mag 5: Six stars in a "V" at the top of the cross.</p>
 <p>Mag 6: "S"-shaped curve of stars visible.</p>
 <p>Mag 7: Too many stars to count!</p>

Southern Hemisphere Observing Guide



How to Find Sagittarius and Use the Magnitude Charts

The illustration above represents the night sky as seen from the Southern Hemisphere about an hour after sunset in early October and will help you find the Teapot in Sagittarius. Hold this page above your head so that the compass directions around the edge point in the right direction. Your sky view should roughly match the illustration. You may see more stars or fewer, depending on the quality of your night sky and how long you've been outside. You will see more stars if you stay outside for 15 minutes!

The Teapot is easy to find. If you are facing west, look up about half way to the zenith (straight overhead). If you are lucky enough to live where you can see the Milky Way, it runs right through the Teapot, and looks like steam pouring out of the spout! Remember that constellations usually look larger than you might expect! If you extend your arm and make a loose fist, the Teapot asterism will be slightly wider than the width of your hand. Once you have found the Teapot, use the seven magnitude charts on the right to determine the limiting magnitude at your location. Each chart includes a hint to help you decide.

	Mag 1: No stars visible in the teapot.
	Mag 2: Only one star visible in the teapot.
	Mag 3: Six stars visible in the teapot.
	Mag 4: All eight stars visible in the teapot.
	Mag 5: Three stars visible above the "spout."
	Mag 6: Four stars visible in the body of the teapot.
	Mag 7: Too many stars to count!

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Report Form: Complete this form for each observation made.

WHEN did you observe?

*Date: _____

*Local Time: ____ : ____ PM (suggested times are between 7:00-9:00 pm local time)

WHAT did you observe?

*Constellation:

Northern Hemisphere – Cygnus



Southern Hemisphere – Sagittarius



*Nighttime Sky: For help see pages 2 & 3

- Too cloudy to see
- Limiting Magnitude 1
- Limiting Magnitude 2
- Limiting Magnitude 3

- Limiting Magnitude 4
- Limiting Magnitude 5
- Limiting Magnitude 6
- Limiting Magnitude 7

Comments:

WHERE did you observe? For help visit www.windows.ucar.edu/starcount/latlon.html

*Lat: _____ decimal degrees (remember that North is positive (+) and South is negative (-))

*Lon: _____ decimal degrees (remember that East is positive (+) and West is negative (-))

*Country: _____

Report your observation online at windows2universe.org/starcount/report.html

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Activity: How Many Stars Are You Missing?

Based on "Calculating Stars Lost" by Fred Schaaf in *Seeing the Sky*, John Wiley & Sons, 1990

In order to complete this activity you will need to determine your local limiting magnitude by observing Cygnus or Sagittarius as described in the prior pages.

By now you know that the number of stars visible is affected by the quality of the night sky. The Moon, atmospheric conditions, and light pollution can make it hard or impossible to see the fainter stars. You have also probably discovered that astronomers use the **magnitude scale** to measure the brightness of stars. Remember that magnitude 1 stars are brighter than magnitude 2 stars, which are brighter than magnitude 3 stars, and so on.

As part of the Great World Wide Star Count, you have learned to measure the **limiting magnitude** of your night sky, that is, what are the dimmest stars that can be seen? Under perfect conditions—no Moon, clear skies, and far, far away from any lights, the human eye can see stars down to about 6th or 7th magnitude. According to the table below, that's about 14,000 stars!

Limiting Magnitude	Approximate Number of Stars Visible
1	6
2	45
3	150
4	540
5	1,700
6	4,900
7	14,000

Now you are ready to calculate how many stars you are missing at your location. All you have to do is subtract the approximate number of stars visible from your location from 14,000. For example, if you measured your limiting magnitude to be 3, you can see about 150 stars with the naked eye, but you are missing around 13,850 stars ($14,000 - 150 = 13,850$)!

Questions:

1. What do you think the result would be if you took a measurement closer to the nearest town or city? How about farther away?
2. Try taking a measurement as soon as stepping outside, followed by another in 15 minutes—using the table above, how many more stars can you see after your eyes adapt to the dark?