

THE AWESOME AMATEUR ASTRONOMER'S GUIDE!

★ OBSERVE

★ BUILD

★ RESEARCH

★ MEASURE

★ SHARE

★ ANALYSE

★ RECORD

★ PUBLISH

NAME

SCHOOL

How to use the THE AWESOME AMATEUR ASTRONOMER'S GUIDE!

Curious about the Universe, but don't know where to start?

This guide will introduce you to every aspect of astronomy – the study of our wonderful cosmos – in eight steps. Each step has a list of things to do to conquer that topic and a badge you can earn if you collect enough stars. The more stars a task has the harder and more rewarding it is.

Collect all eight badges and earn the Awesome Amateur Astronomer Superbadge!

After you complete a task, show your results (a nice colour image of a galaxy or a poster on Mars for instance) to your teacher so they can sign your guide.

Each completed badge will also unlock a special astronomy related-prize which you can collect from your teacher.

At the back of the guide are some star maps and observation pages to get your astronomy adventure going.

Useful Websites:

Astronomy Picture of the Day - <https://apod.nasa.gov/apod/astropix.html>

In-The-Sky.org Sky Maps - <https://in-the-sky.org//skymap.php?skin=1>

Heavens Above Satellite Predictions - <https://www.heavens-above.com/>

Las Cumbres Observatory - <https://lco.global/>

National Schools' Observatory - <https://www.schoolsobservatory.org/>

Collect your badges here!

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1. OBSERVE

The night sky awaits you! You can get to know the night sky by:

- going outside and looking up!
- getting a star map to find out where stuff is.
- visiting your local planetarium.
- witnessing an astronomical event! Maybe there's a planet wandering by or a meteor shower. You can also look for the International Space Station!

You don't need a telescope or binoculars to start observing.
Just head outside and hope for clear weather!

RESOURCES

Stellarium the free planetarium software
Google Sky Map

Collect 12 Stars to
earn this badge!



Complete these tasks to collect stars!

Signature

	Complete these tasks to collect stars!	Signature
★	Make a drawing of the moon	
★★	Take a picture of the night sky with a camera	
★★	Observe the phases of the moon over a month and plot them on a star map	
★	Make drawings of three constellations	
★	Make a detailed diagram of one constellation and the stars around it	
★★	Observe the sun using a pinhole and draw a diagram showing any sunspots	
★★	Track the position of a planet in the night sky over a month on a star map	
★	Use a telescope to observe a galaxy or star cluster	
★	Use a telescope to observe a planet	
★★★	Track and view the International Space Station	

Collect 14 Stars to earn this badge!



2. RESEARCH

What is astronomy? And what are all the things you see in the night sky?
Find out by:

- going to the library and getting an astronomy book or magazine
- asking an astronomer
- watching videos online (like Crash Course Kids) or space-related films
- join an astronomy society!

RESOURCES

Astronomy Picture of the Day (Website)

Cosmos (Documentary)

Horizon (Documentary)

Stargazing Live (Documentary)

	Complete these tasks to collect stars!	Signature
★	Make a poster about your favourite planet	
★★	Ask a real life astronomer a question	
★★	Visit your local library and find a space related book	
★	Write a review of a space related book or film	
★	Make a poster explaining how Earth gets its seasons	
★★★	Make a video explaining the order of the planets	
★★	Find out who is on the International Space Station	
★★	Make a list of important astronomical events in the next year such as meteor showers and eclipses	
★	Use a planetarium app or star map to plan your next observing evening	
★	Find out what would happen when you get too close to a black hole	

3. Build

Amateur astronomers love building their own equipment, ranging from the simple to the complicated. There are lots of things you can build. You could make:

- a [sundial](#) to tell time using the Sun.
- an [astrolabe](#) to measure the position of objects in the sky.
- a [solar viewer](#) so you can safely observe the Sun.
- a [spectroscope](#) to look at the colour spectrum of the light around you. Astronomers use this to determine what different stars are made of!
- a [telescope](#)! Then you can get up-close with your favourite celestial objects!

You will need to ask your teacher for help with some of these projects. These projects are marked with a *.

Collect 11 Stars to earn this badge!



Complete these tasks to collect stars!

Signature

	Complete these tasks to collect stars!	Signature
★	Make a model of any planet	
★	Build a sundial	
★	Build a model telescope	
★	Build a solar viewer or pinhole camera*	
★★	Build an astrolabe to measure the position of objects in the sky*	
★	Build a spectroscope	
★	Make a compass	
★	Make your own Golden Record like Voyager's to send into space	
★★	Build and launch a rocket	
★★★	Build your own Mars rover*	

Collect 11 Stars to earn this badge!

4. MEASURE

The heavens are filled with all sorts of objects and to learn about them astronomers have to take measurements, such as their size, how distant they are, how old they are and how many of them are around. You can (don't be intimidated, these aren't as hard as they sound!):

- use the parallax method to measure the distance to something, like the distance between you and a tree, to understand how astronomers measure the distance of stars.
- count the numbers of stars you can see in your night sky by counting the stars in a small area and assuming they are distributed evenly.
- make an angular measurement of some of the objects you see in the sky: their size or the distance between them.
- measure the period of a variable star.



Complete these tasks to collect stars!

	Complete these tasks to collect stars!	Signature
★	Make a poster showing the scale of the universe	
★★	Make some angular measurements of objects in the night sky	
★	Count the total number of visible stars in the night sky	
★★	Measure how fast the Sun rotates	
★	Measure the distance between you and another object using parallax	
★★	Measure Earth's circumference with a shadow	
★★	Measure the wind speed at your location	
★★	Measure the brightness of a galaxy	
★★	Measure the strength of Earth's magnetic field	
★★★	Measure the period of a variable star	

5. SHARE

Want to share your newfound interest in astronomy? You can:

- join an astronomy club or association.
- find an online discussion forum about astronomy. There you can discuss what you see when you are out observing the night sky or ask for guidance.
- find out if there's a star party coming up! That's when amateur astronomers meet and look at the sky together. You can even go to a Messier Marathon!
- try inspiring a friend or two to take part in your astronomical endeavour!

Collect 11 Stars to earn this badge!



Complete these tasks to collect stars!

Signature

★	Tell your friends and family about astronomy club	
★	Share a picture you've taken of the night sky	
★	Visit an astronomy society or university observing evening	
★★	Write a set of instructions for one of your BUILD tasks and upload it to instructables	
★★	Prepare a presentation on any astronomy topic and present it to your class	
★★	Visit a dark sky site and share a photo of your adventure	
★★	Spend a night camping under the stars with friends	
★	Make a poster as a group to advertise astronomy club	
★	Design a logo for astronomy club	
★★★	Upload a video of one of your experiments	

6. RECORD

Collect 11 Stars to earn this badge!

When you are observing the night sky it's nice to record what you are seeing, especially if you see something unusual! You can:



- take your very own astrophoto! Use your regular camera to take photos of the night sky in general or something prominent like the Moon or a comet. If you want to get really serious, you can get some extra equipment (such as a CCD camera) so that you can use your telescope to take some up-close pictures of your favourite planet or galaxy!
- make a detailed drawing of what you see through your binoculars or your telescope - that's what Galileo did!
- make field notes in a journal. Gather photos and drawings (and badges!) along with your notes.

	Complete these tasks to collect stars!	Signature
★	Make a colour image of a galaxy	
★	Make a detailed drawing of an open cluster like the Pleiades	
★	Print an image you've taken	
★	Take images of at least three planets	
★★	Observe a meteor shower and count how many you see	
★	Sketch the stars in the night sky and identify the constellations	
★★	Take a photo of the Moon and annotate it	
★★	Go observing 10 times and log what you saw	
★★★	Take 50 images using telescopes	
★	Video a satellite flyover	

7. ANALYSE

Do you want to get your hands on some real science? Then you can:

- go online to participate in a [citizen science project](#)!

RESOURCES

Citizen science projects:

- Zooniverse: has many projects.
- Cosmoquest: map craters on the Moon, Mercury and on asteroids.
- SETI@Home: search for extraterrestrial life.
- Stardust@Home: look for tracks of interstellar dust particles.
- Globe At Night & Great World Wide Star Count: measure light pollution.

Collect 10 Stars to
earn this badge!



Complete these tasks to collect stars!

Signature

	Complete these tasks to collect stars!	Signature
★	Join a Zooniverse project	
★★	Process Hubble telescope data using its legacy archive	
★	Join a cosmoquest project	
★	Make a poster explaining the importance of citizen science	
★★	Look for new impact craters on the Moon by taking two images a month apart	
★★★	Analyse the composition of meteorite samples	
★★	Look for transient objects in one patch of sky	
★	Analyse the spectra of stars to help classify them	
★★	Image and analyse the Sun's spectra	
★★	Measure the light pollution near your home	

8. PUBLISH

Collect 14 Stars to
earn this badge!

Astronomers love sharing their findings. Why don't you:



- create a [blog](#) to keep track of your awesome astronomy activities! Gather your recordings of what you have observed and experienced. You can include drawings, photos, screenshots, links, badges, etc.
- write an [article](#) for your school newspaper or astronomy club.
- give a [talk](#) at your school.
- post your photos and thoughts on online forums.
- tweet about your own observations or research, or share cool facts about the Universe.

	Complete these tasks to collect stars!	Signature
★	Start an astronomy club twitter	
★★	Write a newspaper article about your astronomy work	
★★	Give a talk at an observing evening	
★	Present one of your BUILD projects as a poster	
★	Write a letter to the government arguing for telescopes in every school	
★★★	Create an astrophotography Zine	
★★	Present as a group to your school	
★★	Post a video tutorial on how to make water rockets	
★★	Write up one of your ANALYSE projects	
★	Tweet 30 images you've taken	

Starmaps

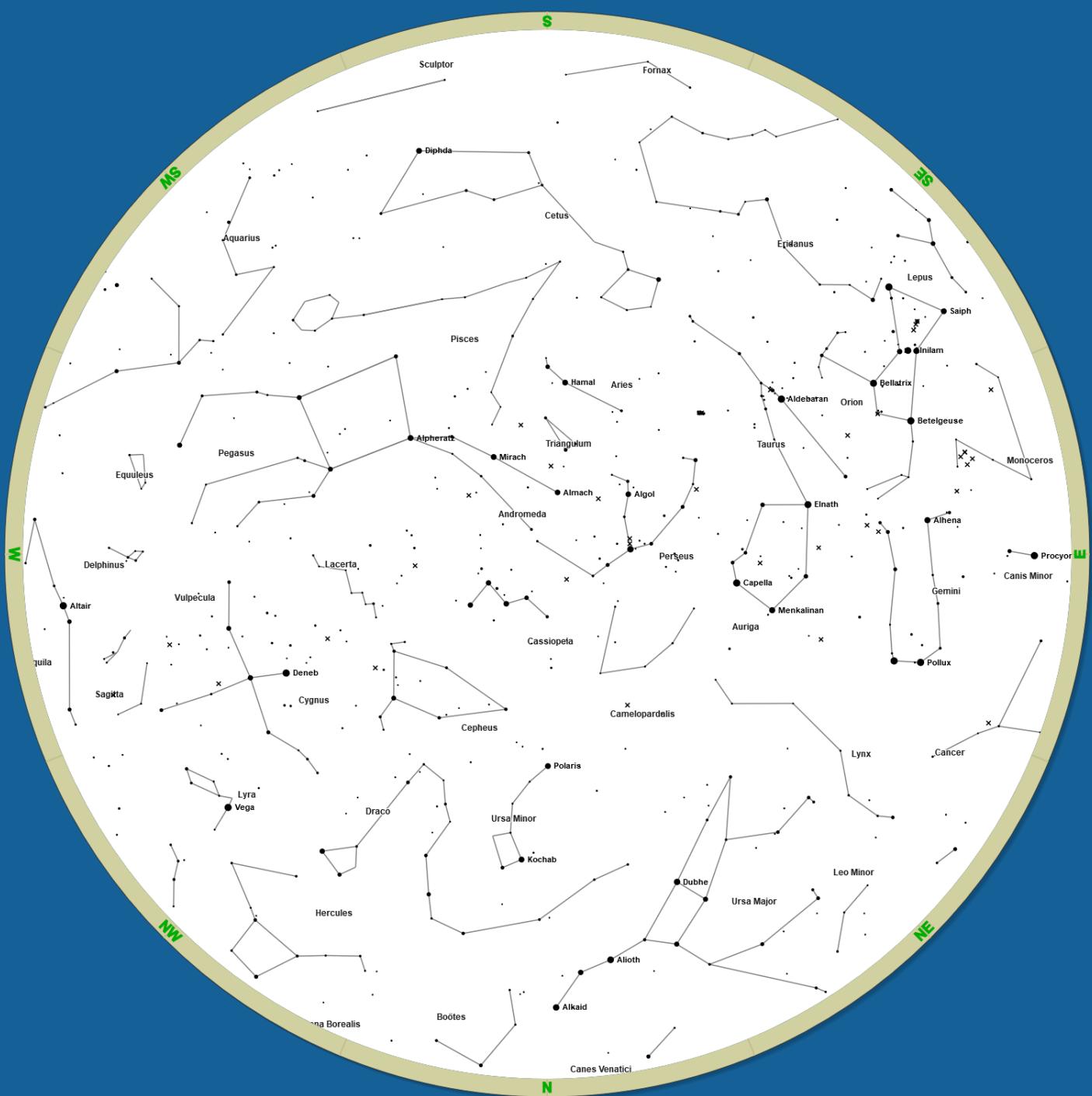
Nottingham 360°
2019/09/21



Use these starmaps to help identify constellations and objects in the sky or to map the motion of an object as it crosses the night sky.

Nottingham 360°

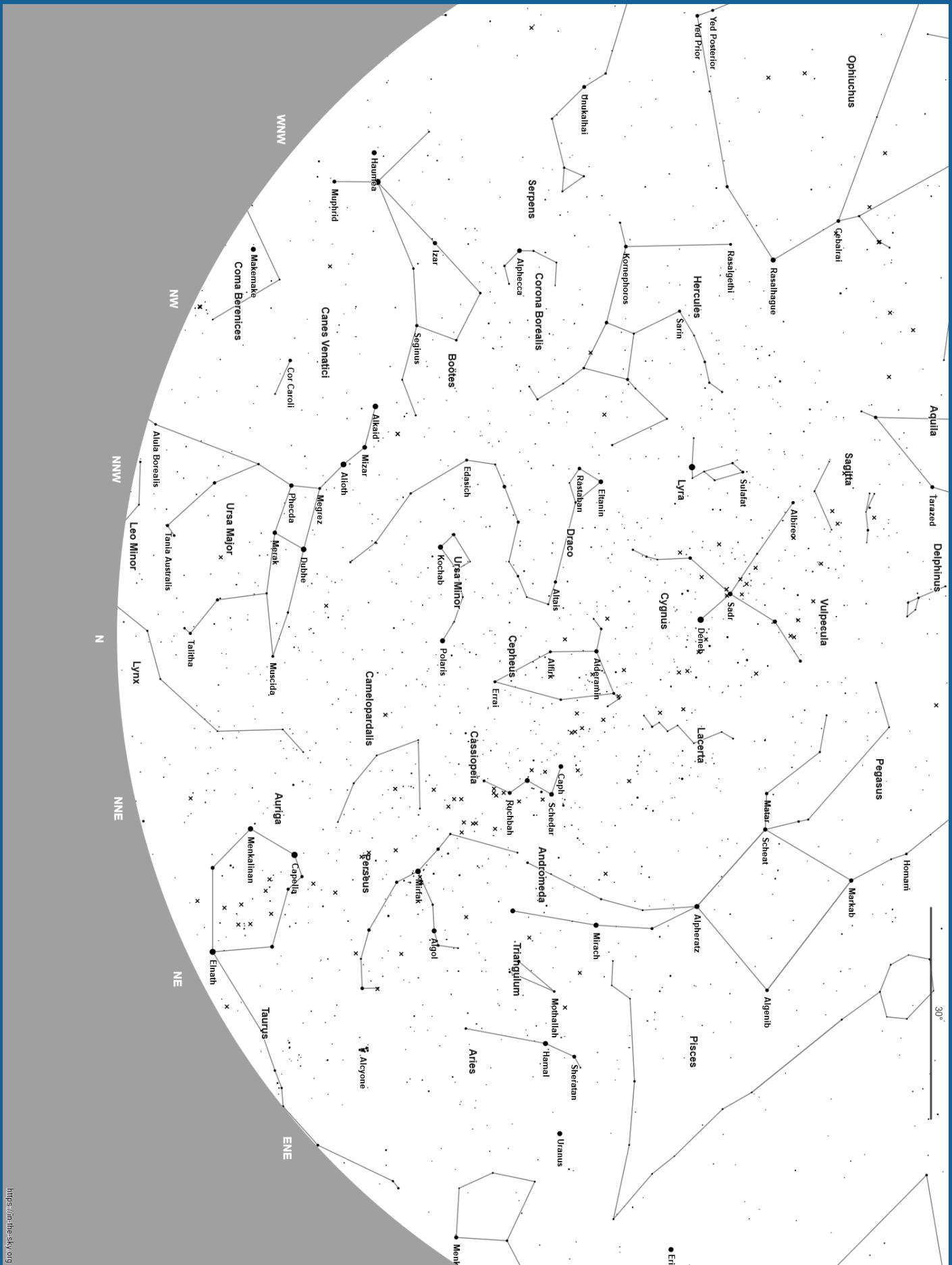
2019/11/21



You can make your own star maps exactly like these by visiting:
In-The-Sky.org Sky Maps – <https://in-the-sky.org//skymap.php>

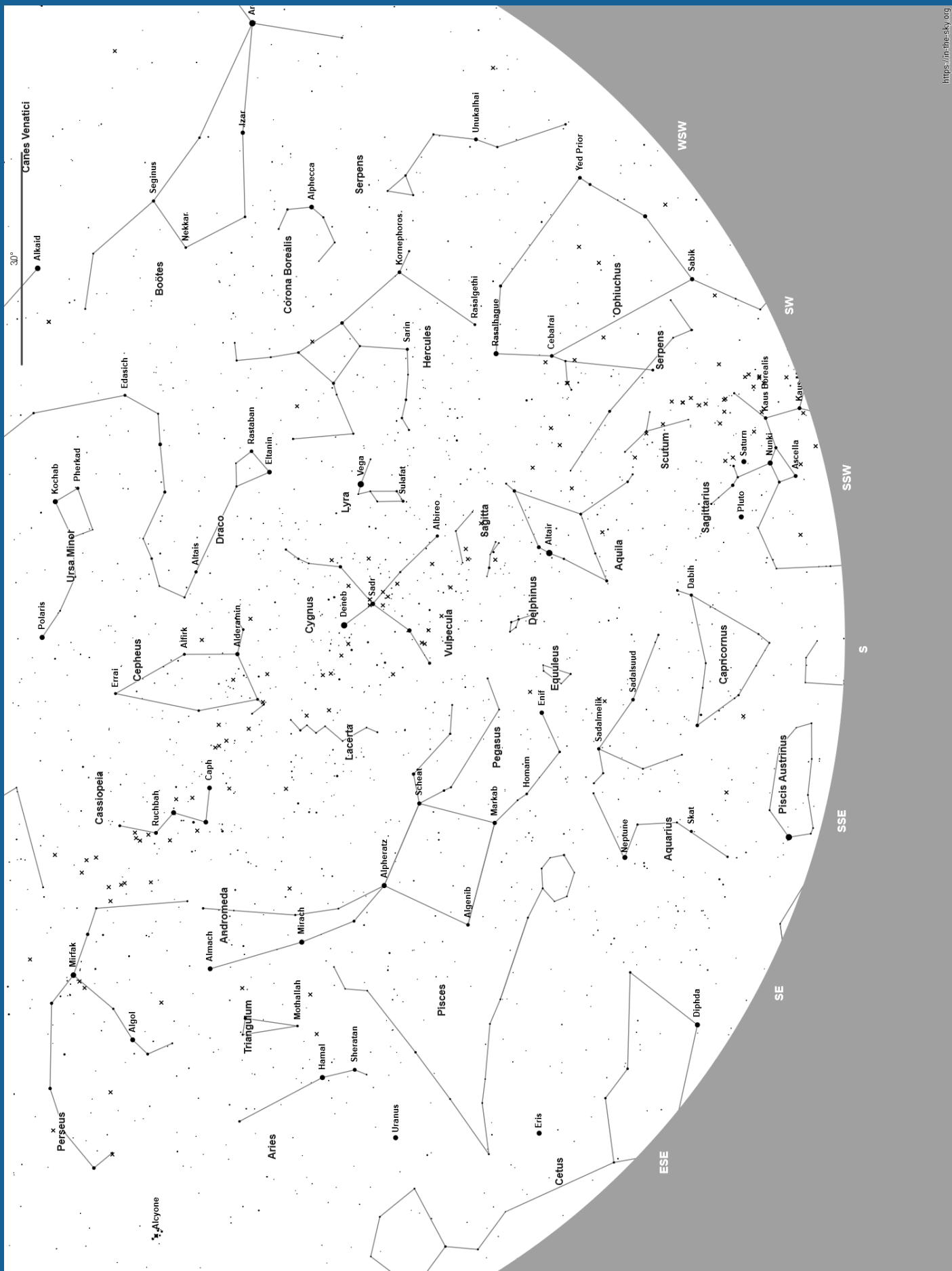
Nottingham 180° North

2019/09/21



Nottingham 180° South

2019/09/21



Observation Log

Use this page to log your observations!

Date: 16/9/2019
Location: Tenerife (Liverpool Telescope)
Weather Conditions: Clear
Fellow Astronomers: Max
Moon Phase: Waning gibbous

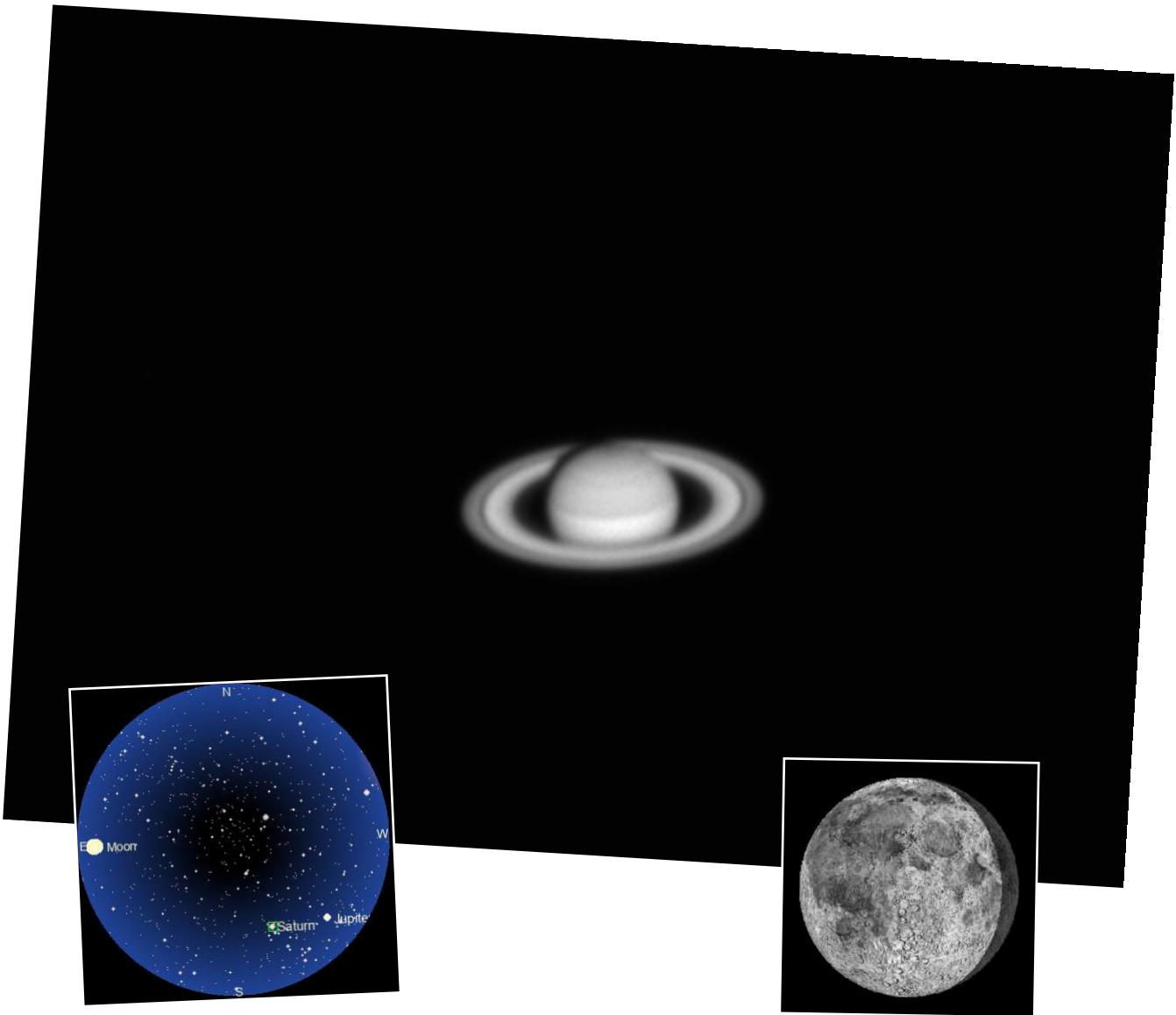
Objects Observed:

Saturn!

Results:

(This could be a star map, a photo, a drawing, or something else!)

EXAMPLE



Notes:

The Liverpool Telescope is awesome and free for UK schools to use!
Visit - www.schoolsobservatory.org

Observation Log

Use this page to log your observations!

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Location: _____
Weather Conditions: _____
Fellow Astronomers: _____
Moon Phase: _____

Objects Observed:

Results:

(This could be a star map, a photo, a drawing, or something else!)

Notes:

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