

# Janet's Planet Science Companion

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## MODULE ONE: Navigating with Constellations

### LEAD-IN QUESTIONS

**QUESTION:** How do we know which way is north, south, east or west?

**ANSWER:** Possible answers: a compass, a map, seeing which way the sun or the moon rises or sets, since the sun and the moon rise in the east, and set in the west.

### NAVIGATING WITH CONSTELLATIONS

If you are taking a long walk, or bike ride, in an unfamiliar place, you can easily get turned around. Using a tool like a compass, or a map, you can figure out how to find your way back to where you started.

Since the beginning of recorded history, people have used directional tools to figure out their way around, so they could explore unfamiliar locations, without getting lost.

People from long ago, used stars that they could only see at certain times of the year, to recognize the changing seasons. As far back as we know people grouped the brighter stars into recognizable shapes to tell entertaining stories, and to help them remember which ones were which. These recognizable shapes are called **constellations**.

The oldest description of the constellations, as we know them, comes from a Greek poetry, written about 270 B.C.

## HOW MANY CONSTELLATIONS ARE THERE?

There are 88 constellations. The exact origin of these constellations still remains unknown to us.

## WHO NAMED THE CONSTELLATIONS?

These groupings of stars have been named from religious, or mythological figures, or animals, to make them easy to remember. The Greeks recognized and named 48 constellations. Many of these constellations were also recognized by the Arabs, Egyptians, and the Babylonians.

In 1928, the International Astronomy Union (IAU) fixed the boundaries of the 88 constellations in the sky. IAU is a group of professional astronomers from all over the world, who formed a group in 1919. IAU is involved in all types of space international projects. Today the IAU has 10,129 individual members, in 90 countries.

Originally the constellations were defined by their star patterns. By the early 20th century, astronomers decided it would be helpful to have an official set of constellation boundaries. New stars are being formed and discovered and named after the constellation they are found within, so it is important to agree where one constellation ends, and the next begins.

The names used by the Greeks, Egyptians, and other people were translated into Latin, because Latin was considered the language of education.

**TRY THIS**, next time you are outside on a cloudy day, look up at the sky, and see if you can identify any recognizable shapes.





Constellations are visible on any clear night. The particular constellations you can see have a lot to do with your location, the time of year, and the time of night. As the Earth makes its daily rotation about its axis, and its yearly revolution around the sun, different constellations come into view.

## SPACE TERMS

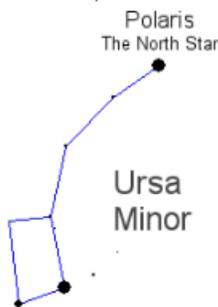
A **constellation** is a group of stars making a pattern, like connect-the-dots pictures, from our view on earth. A **galaxy** is actually a bunch of stars that are (in astronomical terms) close together. The stars in many constellations are quite a distance from one another. The closer view we have of these constellations the less the pattern we would see.



Most of you have probably heard of the Big Dipper. The Big Dipper is not one of the 88 known constellations, but rather a star cluster within a constellation. The Big Dipper is an **asterism**, in space terminology.

## OBSERVATION

**TRY THIS**, figure out which way is north from your front yard, by locating the **North Star**, also known as (**Polaris**) in the night sky. The North Star is the last star in the handle of the little Dipper (also known as the Ursa Minor) constellation.



## ANDROMEDA CONSTELLATION

An example of a constellation revealing a direction, and a season, is the Andromeda Constellation.

The constellation Andromeda is an autumn constellation, visible in the Northern skies, from June through February, and is best viewed in the fall if you live in the Northern Hemisphere. Only a few places in the Southern Hemisphere can see this strangely shaped constellation in the spring, because of where it's positioned.

Andromeda is a "V" shaped constellation, and kind of looks like a woman with her arms stretched out, and chained at the wrists, and is named after Andromeda, the princess in a Greek legend. The princess was chained to a rock to be eaten by sea monster because of her mother's vanity. Andromeda's mother bragged that she was prettier than the sea nymphs. The nymphs complained to king of the sea, who in turn sent a sea monster to destroy her land. The Queen was told to sacrifice her daughter to save the country.

Don't worry! In the story, a young hero, named Perseus, rescued and married Andromeda.

There are constellations that are supposed to be the shape of all the characters in the story. Stars are constantly moving, and over thousands of years, the shapes these constellations are making, change. IAU's geographic area designations are what most astronomers use now, rather than the Greek legends, because the shapes of these characters and animals are becoming less obvious as the stars continue to move.

The stars in the constellations are actually moving at fantastic speeds, but to our eye it takes thousands of years before the movement is visible.

**TRY THIS**, place your finger a couple of inches away from your eyes and experiment with moving your finger from left to right. Even when you move your finger very slowly, it still appears to move faster than a speeding plane that is many miles away. This phenomenon has to do with depth perception. We have no depth perception in space, because the stars are billions of miles away from us.

### DID YOU KNOW?

All stars are many billions of miles away from earth. Who wants to write or talk about numbers that have 20 digits in them? Astronomers don't either, so a different way to measure space distances is used, a **light year**. Light travels at 186,000 miles per second (300,000 kilometers per second). Therefore, a **light second** is 186,000 miles (300,000 kilometers). A light year is the distance that light can travel in a year, or:  $186,000 \text{ miles/second} * 60 \text{ seconds/minute} * 60 \text{ minutes/hour} * 24 \text{ hours/day} * 365 \text{ days/year} = 5,865,696,000,000 \text{ miles/year}$  A light year is **5,865,696,000,000 miles** (9,460,800,000,000 kilometers). Now that's a long way, away! (1)

### DID YOU ALSO KNOW?

NASA (National Aeronautics and Space Administration) first logo is shaped after the constellation Andromeda, the brightest Northern star, dating back to 1959?



<p><b>Perseus</b> "The Hero" is the Greek mythical character who rescued the Princess Andromeda from the sea monster. This constellation is most clearly visible in December.</p>	 <p>Perseus</p> A diagram of the constellation Perseus, showing a series of black dots representing stars connected by thin black lines. The constellation is labeled "Perseus" at the top.
<p><b>Andromeda</b> "The Princess" or "The Chained Maiden" is the Greek mythical African princess, who was to be sacrificed to a sea monster in order to pacify the angry gods. She was rescued by Perseus and became his wife.</p>	 <p>Andromeda</p> A diagram of the constellation Andromeda, showing a series of black dots representing stars connected by thin black lines. The constellation is labeled "Andromeda" at the bottom.

## MATCH UP TERMS WITH DEFINITIONS

	A bunch of stars positioned close together, in astronomical terms.
	A group formed in 1928 of professional astronomers from all over the world.
	A group of stars that form a pattern or a picture in the sky.
	A mass of gas that usually appears as a small light in the sky.
	A star cluster within a constellation.

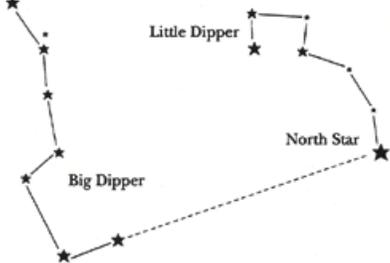
1) Star, 2) Galaxy, 3) Constellation, 4) Asterism, 5) IAU

### ACTIVITY: Dance the Constellations

**Supplies: glow tape, glow stars, glow sticks, appropriate music for age group with a CD player or other musical playing device, an open floor area (gym floor works great!)**

1. Teacher places the glow tape or glow stars in various constellation patterns on the floor.
2. The room is darkened as much as possible to see the affect of the glow tape and glow stars.
3. Each student is given a glow stick (or glow star) to hold in their hand.
4. Students *dance* from one constellation to the next, while the music plays, mimicking the stars dancing in out of the constellations.
5. Teacher stops the music after a few minutes.
6. Whichever constellation the students are on, they have to be able to name it.

Here are a few examples of constellation patterns:

URSA MAJOR, The Great Bar	
CASSIOPEIA, The Queen	
ORION, The Hunter	
POLARIS, The North Star	

## QUIZ

1. Constellations were used by Ancient peoples to:
  - a. Predict the future
  - b. Mark the changing of seasons and to navigate in the seas and deserts
  - c. Radio waves
  - d. None of the above
  
2. The earliest reference to the constellations, as we know them, comes from a poem written about 270 B.C. (True or False)
  
3. There are \_\_\_\_\_ known constellations.
  - a. 50
  - b. 70
  - c. 78
  - d. 88
  
4. Many of the constellations we recognized were recognized also by the:
  - a. Greeks
  - b. Arabs
  - c. Egyptians and Babylonians
  - d. All of the above
  
5. IAU stands for:
  - a. Independent Air University
  - b. International Air Union
  - c. International Astronomy Union
  - d. None of the Above
  
6. The early names given to the constellations were translated into:
  - a. Greek
  - b. Latin
  - c. English
  - d. None of the above

7. The Big Dipper is a:
- a. Constellation
  - b. Galaxy
  - c. Asterism
  - d. Star
8. The Andromeda is a:
- a. Constellation
  - b. Galaxy
  - c. Asterism
  - d. Star

## DISCUSSION

Discuss why it is important for students to study the stars today?

**To help start the discussion, teacher may mention astronauts can make up to a hundred thousand dollars a year, being a space explorer!**

## FOR FUN and extra credit

Create a travel brochure on a specific constellation. On the front cover design a flag for your chosen constellation. Include some historical information on how the constellation was named. Include at least three reasons why you think your constellation is special. Be prepared to present your brochures to the rest of the class, as though you were selling a vacation package to your constellation.

## **Alphabetical List of Constellations**

- |                     |                  |                         |
|---------------------|------------------|-------------------------|
| 1. Andromeda        | 31. Cygnus       | 61. Pavo                |
| 2. Antlia           | 32. Delphinus    | 62. Pegasus             |
| 3. Apus             | 33. Dorado       | 63. Perseus             |
| 4. Aquarius         | 34. Draco        | 64. Phoenix             |
| 5. Aquila           | 35. Equuleus     | 65. Pictor              |
| 6. Ara              | 36. Eridanus     | 66. Pisces              |
| 7. Aries            | 37. Fornax       | 67. Piscis Austrinus    |
| 8. Auriga           | 38. Gemini       | 68. Puppis              |
| 9. Boötes           | 39. Grus         | 69. Pyxis               |
| 10. Caelum          | 40. Hercules     | 70. Reticulum           |
| 11. Camelopardalis  | 41. Horologium   | 71. Sagitta             |
| 12. Cancer          | 42. Hydra        | 72. Sagittarius         |
| 13. Canes Venatici  | 43. Hydrus       | 73. Scorpius            |
| 14. Canis Major     | 44. Indus        | 74. Sculptor            |
| 15. Canis Minor     | 45. Lacerta      | 75. Scutum              |
| 16. Capricornus     | 46. Leo          | 76. Serpens             |
| 17. Carina          | 47. Leo Minor    | 77. Sextans             |
| 18. Cassiopeia      | 48. Lepus        | 78. Taurus              |
| 19. Centaurus       | 49. Libra        | 79. Telescopium         |
| 20. Cepheus         | 50. Lupus        | 80. Triangulum          |
| 21. Cetus           | 51. Lynx         | 81. Triangulum Australe |
| 22. Chamaeleon      | 52. Lyra         | 82. Tucana              |
| 23. Circinus        | 53. Mensa        | 83. Ursa Major          |
| 24. Columba         | 54. Microscopium | 84. Ursa Minor          |
| 25. Coma Berenices  | 55. Monoceros    | 85. Vela                |
| 26. Corona Austrina | 56. Musca        | 86. Virgo               |
| 27. Corona Borealis | 57. Norma        | 87. Volans              |
| 28. Corvus          | 58. Octans       | 88. Vulpecula           |
| 29. Crater          | 59. Ophiuchus    |                         |
| 30. Crux            | 60. Orion        |                         |

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## About the Author:



Ms. Mary Garrison is a trainer and curriculum writer at Sensible Solutions. In her role she instructs technical and business skills classes. Her workshop format is Instructor-led, group-paced, classroom-delivery learning model with structured hands-on activities. With over 20 years of experience in training and development, Ms. Garrison has established herself as an award winning, highly accomplished and motivated workplace training specialist, with a proven track record of rapport building, resourceful problem-solving, and communication skills.

Ms. Garrison has a Bachelor of Arts in Communications, specializing in Journalism, from Belmont University. She holds the designation of a Microsoft Certified Professional. In her practice she concentrates on training corporate and government participants, and developing and updating curriculums for classroom, and reference usage.

In addition, to her curriculum writing, Ms. Garrison has written various related articles, including *How Much Do We Really Need Applications* Published by ASTD Middle Tennessee Chapter.