

## Creating a Constellation

### General Informations

- ★ Level: Elementary 1st and 2nd cycles
- ★ Students per group: Individual activity
- ★ Where: In class
- ★ How long: Two 50-minute periods
- ★ When: Before the Planetarium visits your school
- ★ Type of activity: Discovery led by the teacher
- ★ Subjects covered : Science and Technology — English — Geography, History and Citizenship Education — Visual Arts
- ★ Essential knowledges : **Science and Technology:** constellations, stars, to become familiar with elements of the language specific to science and technology — Geography, History and Citizenship Education: elements of society that affect the organization of the territory (cultural characteristics: beliefs, religion, arts, language, diet, dress, recreational activities, customs) — **Visual Arts:** transforming gestures and their extension, the tools; visual arts productions
- ★ Subject-specific competencies : **Science and Technology:** To explore the world of science and technology; to become familiar with elements of the language specific to science and technology — **English:** read and listen to literature, popular and information- based texts; write self-expressive, narrative and information-based texts; use language to communicate and learn — **Geography, History and Citizenship Education:** understand the organization of a society in its territory; be open to the diversity of societies and their territory — **Visual Arts:** produce individual works in the visual arts
- ★ Cross-curricular competencies: Use information; Use creativity; Communicate appropriately

## Starting Point

What is a constellation? What picture does a group of stars evoke? Can I create my own constellation and think up a story about it?

## Preconceptions

Students, particularly younger ones, might not know what a constellation is. They may also believe that the constellations are the same for all people on Earth and that everyone who looks at a specific group of stars sees the same thing in it.

## Basic Concepts

From time immemorial, people have pondered the heavens. In the patterns formed by neighbouring stars, different cultures have seen animals, mythical creatures, legendary heroes, and objects of cultural importance. These groups of randomly linked stars are known as constellations.

## Goals

Students create their own constellation from a group of stars and invent stories explaining their constellation. They then compare their creations with what other students have thought up and what other cultures have seen in the same group of stars.

By the end of this activity, students should be able to:

- Define constellation (a pattern formed by a group of stars)
- Create a constellation using a specific group of stars
- Make up a brief story about their constellation

## Steps in the Activity

### Preparation

Make copies of the “Creating a Constellation” handout (one per student). If possible, make a transparency of both this handout and the “Ursa Major” teacher’s sheet to use in class with an overhead projector. You can also download the PowerPoint “Constellation.ppt” from the activity sheets in the educational activities section at the following address:  
[www.planetarium.montreal.qc.ca/Education/fiches.html](http://www.planetarium.montreal.qc.ca/Education/fiches.html)

### Supplies

For each student:

- “Creating a Constellation” handout
- Pencil
- Blank paper
- “Ursa Major” teacher’s sheet (optional)

For the teacher (optional):

- “Creating a Constellation” transparency
- “Ursa Major” transparency
- Overhead projector
- Computer
- Multimedia projector
- PowerPoint: “Constellation.ppt”

### **Assignment**

- ❶ Ask if students know what a constellation is. Ask them to name a constellation they know and have seen. Ask how they think the constellations got their names. Define constellation.
- ❷ Pass out the “Creating a Constellation” handout. Have students observe this group of stars from every angle possible.
- ❸ Ask students to place a blank sheet of paper over their handout and to draw figures or objects they see in the stars.
- ❹ Next, have students write a brief story explaining where their constellation came from and how it ended up in the sky. Younger students can present their story orally instead of in writing.
- ❺ Share with the class the students’ stories and constellations, stressing how different people see different things in the same group of stars. The drawings and stories can be posted on a bulletin board or grouped together in a class book.
- ❻ Mention that different cultures have seen different patterns in the same group of stars, just as the students did in this activity.
- ❼ Point out that the group of stars on the handout really exists. It’s the constellation Ursa Major, which contains the Big Dipper. Using an overhead projector, show where the Big Dipper is found in Ursa Major. Strictly speaking, the Big Dipper isn’t a constellation but rather an asterism (a group of stars that evokes a familiar object but forms only part of a constellation).
- ❽ If you don’t have an overhead projector, you may hand out a copy of the “Ursa Major” sheet to students. Or reproduce the drawing on the blackboard and have students copy it on a sheet of paper.

## **Wrap-up**

Read to students (or have volunteers read) the myths and legends created by different cultures to explain Ursa Major (Appendix 1). If they wish, students may illustrate these stories using a blank sheet on which they'll copy the stars from the "Creating a Constellation" handout (with help from the transparency).

## **Going further**

Suggest that students do research on other constellations. Try to find the myths and legends developed by different cultures to explain the same group of stars.

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## Ursa Major Myths from Around the World

### Greeks

Ursa Major, like most constellations in the northern hemisphere, originated in ancient Greece and inspired many legends there.

The best-known legend involves Zeus, who ruled Mount Olympus where the gods of ancient Greece lived. Though devoted to his wife Hera, Zeus had many love affairs with mortal women. One of his conquests was the beautiful nymph Callisto. When Hera learned of her husband's affair with this simple mortal, she became enraged and swore revenge. To protect Callisto, Zeus changed her into a bear. In her disguise, Callisto now had only hunters to fear.

One day, a young hunter named Arcas spied Callisto in the forest. Though Arcas was Callisto's son, he couldn't recognize his mother in her bear disguise. Arcas drew his bow. But before the poor boy could kill his own mother, Zeus stepped in and changed him into a bear, too.

To protect Callisto and Arcas from further danger, Zeus grabbed them both by the tail, twirled them over his head, and then threw them into the sky. That's why we now see the two bears side by side every night above the northern horizon. It's also why Ursa Major and Ursa Minor (the Great Bear and the Little Bear) have much longer tails than real bears.

According to a lesser-known Greek legend, the sky is a huge bowl covering the Earth. The stars are hung on the inside of this bowl. According to this legend, Ursa Major is a bear skin held up in the heavens by seven nails. These nails are the seven stars in the Big Dipper.

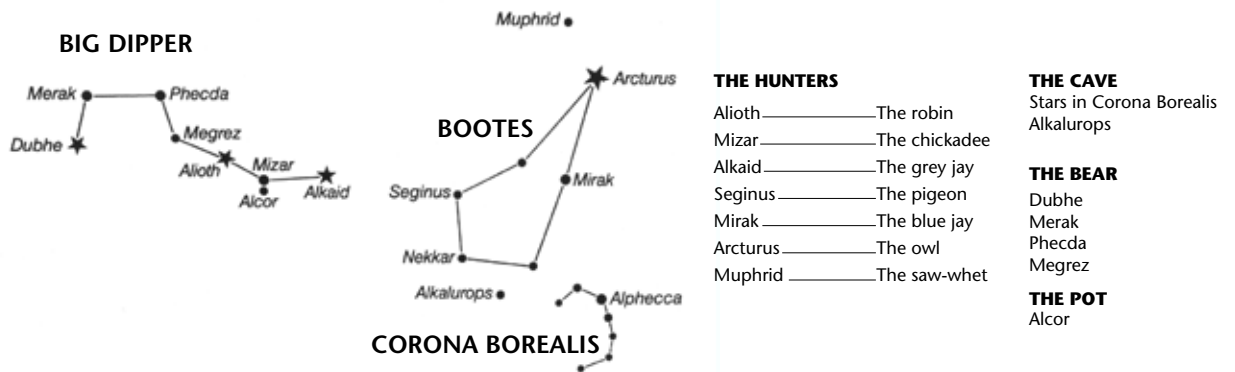
### Iroquois

The Great Bear legend of the Iroquois goes as follows: Long ago in a strange and distant land, a group of aboriginals was hunting a bear in the forest. Their running and shouting disturbed three giants, who grew tired of the racket and killed all the hunters but three. The giants carried the survivors and the bear into the sky where the hunt continues today.

In this legend, the four stars in the Big Dipper's bowl form the bear. The three stars in the handle are the hunters. The hunter nearest the bear is armed with a bow to kill his prey. The second hunter clutches a big pot to cook the bear. The third hunter carries wood to light a fire. Mizar and Alcor, a double-star system in the middle of the handle, represent the second hunter and his pot.

## Algonquins

The Algonquins tell a variation of the Iroquois story that explains the passing of the seasons. The bear is still represented by the four stars in the Big Dipper's bowl, but the hunters are now seven birds in the Big Dipper's handle and the nearby constellation Boötes. Throughout the winter, the bear hibernates safely in his mountainside cave. But in the spring, the beast leaves its den and climbs down into the valley in search of food. The sharp-eyed chickadee spots it immediately. Since this bird is too small to hunt the bear itself, it asks other birds to help out.



So seven birds go after the bear. The lead bird is the robin, followed by the chickadee and the grey jay. These three birds are represented by the three stars in the Big Dipper's handle. After them come four more birds: the pigeon, the blue jay, the owl and finally the saw-whet. These four birds are represented by stars in the constellation Boötes (the bright star Arcturus is the owl). The famished hunters relentlessly pursue the bear. Over the summer, the bear heads toward the northern horizon. In the fall, the hunters begin losing the bear's trail. Four of them abandon the hunt: first the saw-whet and owl (since they fly more slowly and awkwardly) and then the blue jay and pigeon. Only the robin, chickadee and grey jay (the stars in the handle) are left.

These three birds finally catch up to their prey in mid-fall. The cornered bear rears up to fight. The robin shoots an arrow. The bear is struck dead and falls on its back. To satisfy its hunger, the robin jumps on the bear and gets covered in its blood. The bird then flies off, shaking the blood from its feathers. All the blood comes off, except on the robin's breast, which still today remains red. The blood flicked from the robin's feathers spatters on the Earth's forests. That's why the leaves of many trees turn blood-red in the fall.

The chickadee lends the poor robin a hand. Together, they chop up the bear and cook its meat. The grey jay, which has left the job of catching and cooking the bear to the other two birds, arrives to join in the feast. Still today, whenever a bear, moose or other animal is killed, the grey jay shows up to claim its share. That's why this bird is known as the latecomer. Over the winter, the bear's skeleton lies on its back in the sky. But the bear's soul has already been reincarnated in the body of another bear, which spends the winter in its den. In the spring, this new bear leaves its cave and begins fleeing its pursuers, the protagonists in a never-ending drama.

## Zuni

The Zuni live in the southwestern United States. For them, too, Ursa Major is responsible for the passing of the seasons. For most of the year, the Great Bear guards the western lands from the ice gods of the north. In the winter, however, the bear hibernates, leaving the land to be ravaged by the frozen breath of the ice gods. Luckily, the bear wakes in the spring. Its growling, which is heard in the thunder of spring storms, drives the ice gods back north. As a result, the earth can turn green again... at least until the following winter.

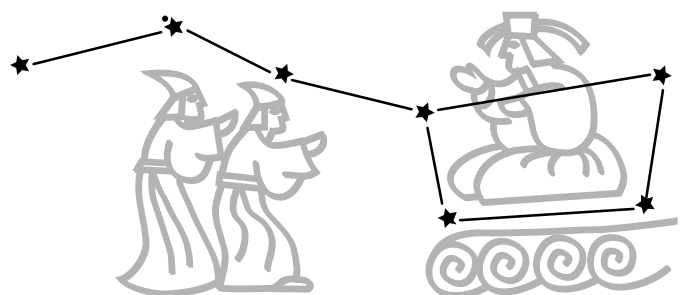
## Basques

The Basques, a people of southwestern France and northern Spain, tell an intriguing Ursa Major story involving oxen instead of a bear. Long ago in the land of the Basques, a rich farmer was robbed of two oxen. The farmer sent his servant after the two thieves. When the servant failed to return, the man also sent his housekeeper and dog. Finally, furious that they were all taking so long to return, the farmer joined the chase himself. The gods, however, punished the man for losing patience with his loyal staff. The farmer was condemned to pursue the two thieves in the heavens for eternity.

The seven stars in the Big Dipper represent the characters in this story. The first two stars (on the side of the bowl opposite the handle) are the oxen. Following them are the two thieves (the other two stars in the bowl), the servant, and then the housekeeper and dog (Mizar and Alcor). Finally, the farmer himself comes huffing and puffing from behind.

## Chinese

The Chinese have been practising astronomy for several thousand years. In the Big Dipper, ancient Chinese astronomers saw a scale for weighing fate. Chinese peasants, however, saw a scale for weighing grain. Still others pictured a powerful government official seated on a throne and surrounded by hopeful citizens asking favours.



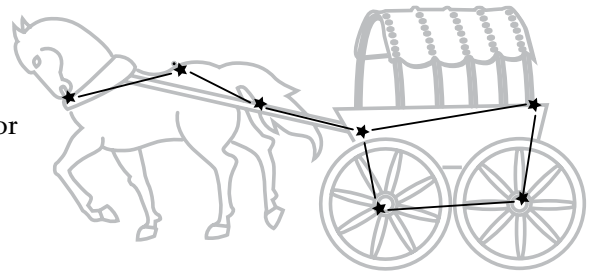
## Arabs

In the early Middle Ages, Greek philosophers and scholars passed on their knowledge of astronomy to Arab astronomers. For several centuries, the Arabs nurtured this gift. They invented many instruments of measurement and observation, such as the astrolabe, and devised new mathematical tools. The Arabs also coined the names we still use today for most of the stars.

In the Big Dipper, the Arabs saw a coffin followed by mourners. The four stars in the bowl are the coffin, while the three stars in the handle are the dead man's three mourning sons. According to the legend, the sons are chasing Polaris (the North Star at the tip of the Little Bear's tail). They're seeking revenge because they believe this star killed their father.

## Germans

Despite much first-hand experience with bears, the Germans call the Big Dipper the Grosse Wagen or big wagon.

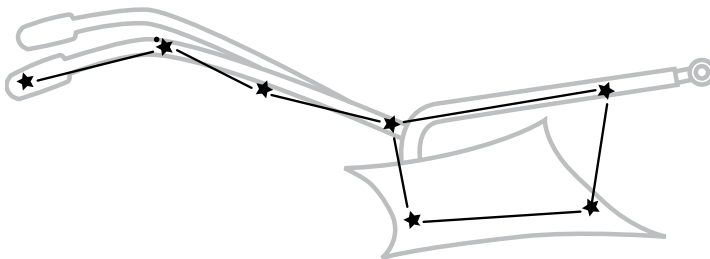


## French

In some parts of France, the Big Dipper is called the big ladle. Elsewhere in the country, the seven stars are known as the big wagon or Charles' Wain.

## English

Legend has it that after King Arthur died, his soul rose into the portion of the sky marked by the Big Dipper. This legend later changed so that today the English speak of King Arthur's Chariot, which slowly circles the north celestial pole. The Big Dipper is also called the Plough in England.



## Irish

The Irish refer to the seven stars as King David's Chariot in honour of an ancient king of Ireland.



## The Origin of the Constellations

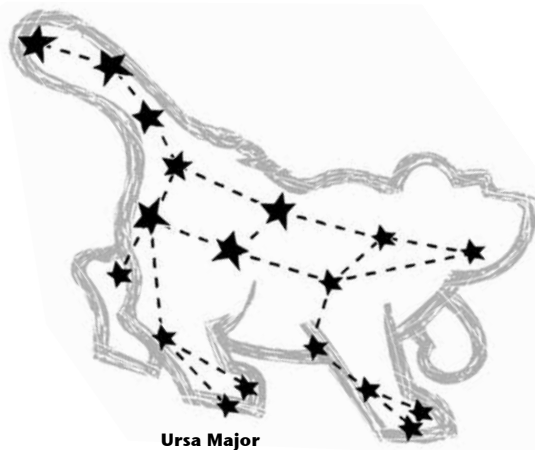
The ancients had practical reasons for observing the skies: the daily movements of the Sun, the Moon and the stars helped them measure time. Before watches, clocks and calendars were invented, the Sun's position in the sky was the only way people had to tell time. The lunar phases, the height of the Sun at noon, and the appearance or disappearance of certain stars or groups of stars marked the passing of months and seasons. Travellers also used certain stars to guide them across the land and seas.

The ancients were impressed by the beauty of the skies and imagined that the stars had supernatural powers. For these peoples, the true nature of the Universe was still a mystery. They named certain groups of stars after the gods, goddesses and mythical creatures that, they believed, governed their lives.

We know little about the origin of the constellations used today. Since prehistoric times, different cultures have linked together groups of easily recognizable stars into constellations with various names. These names, or what they represent, give clues about the origin of the constellations. For example, many constellations used today, like Leo and Scorpio, represent animals and insects. Yet there are no elephants, camels, crocodiles or tigers. Given their absence, we can rule out India, Arabia and Egypt as the creators of our constellations. Because of Leo the lion, we can also discount Greece, Italy and Spain.

It's widely believed that the constellations used today originated in Mesopotamia (now Iraq) several thousand years ago. But the names we use for these ancient constellations come from the Greeks. Certain constellations are mentioned in Greek poetry and prose as of the fourth century BC. In AD 150, the Greek astronomer Ptolemy published *Almagest*, an important book on astronomy that lists 48 constellations. Most of these constellations are still used today.

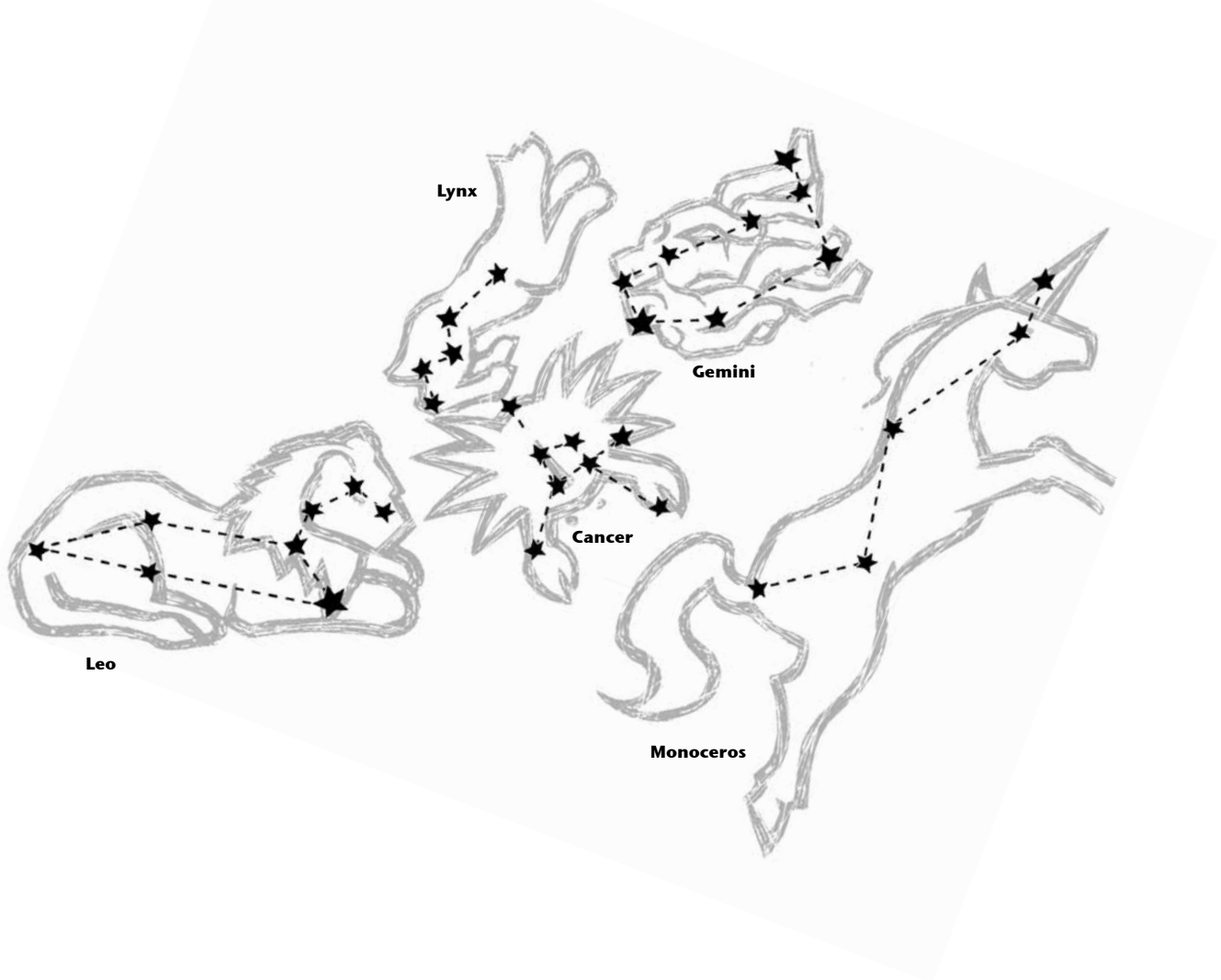
The people from Mesopotamia and Greece didn't name the stars in the southern hemisphere since this portion of the sky was invisible to them. The constellations in the southern hemisphere were created much later by European navigators during the great period of exploration. These constellations often represent inventions of the day such as the microscope, telescope and



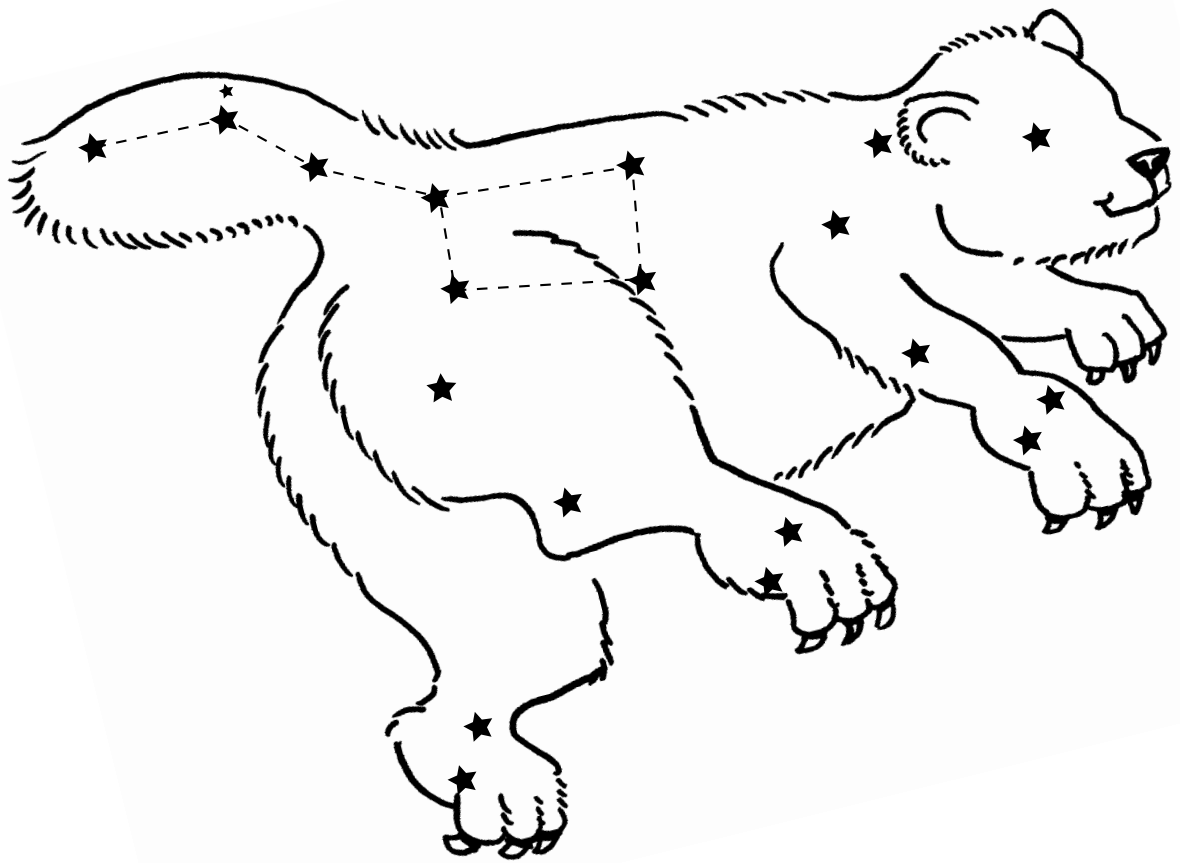
compass. Over the two centuries that followed, the list of constellations grew to over a hundred names. This situation led to much confusion because the boundaries of the constellations often overlapped. As a result, a single star could be part of two different constellations.

In 1928, the International Astronomical Union cleared up the confusion by defining official boundaries for the constellations and reducing their number to 88. The sizes of these constellations vary greatly; some are even several times larger than their neighbours. Still, they extend across the celestial canopy without overlapping.

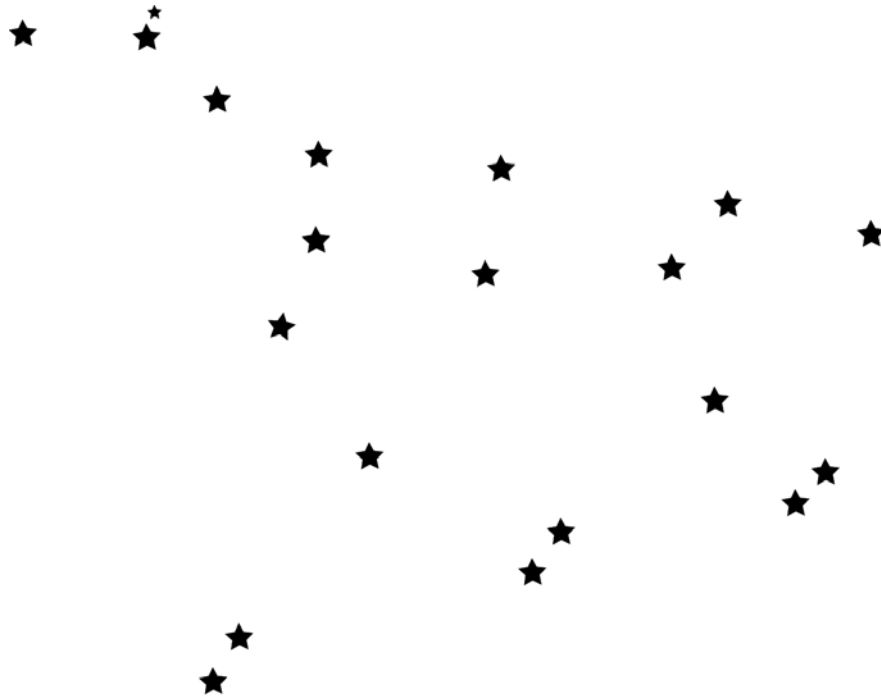
Today, 13 mythical figures, 9 birds, 2 insects, 19 land animals, 8 sea creatures, 6 mythical creatures and 31 inanimate objects are spread across the heavens.



## Ursa Major



## Creating a Constellation!



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