

# SEEING STARS!

## -LOOKING AT THE PLOUGH IN TWO DIFFERENT WAYS



### Equipment

#### Younger Children

A 30 x 23 cm (i.e. A4) sheet of black cardboard, straws, blu-tack, yellow plasticine

#### Older children:

A 30 x 23 cm (i.e. A4) sheet of black cardboard, kitchen foil cut into 7 x 15 cm squares, black wool, ruler, sellotape, pencil to poke a hole in the cardboard.

### Suggested class level

3rd class upwards

### Preparation

Collection of materials.

Print out the map of the Plough at the end of this activity sheet.

It is suggested that this activity is done fairly soon after the topic 'First Farmers' in the History Curriculum.

### Background information

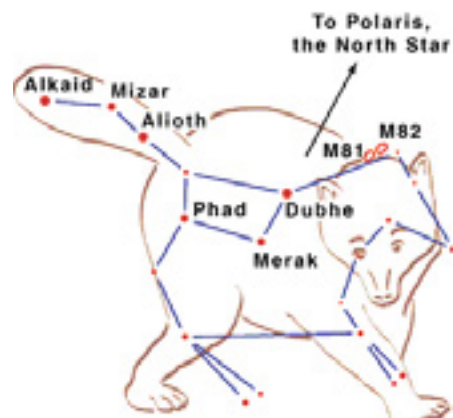
The Plough (or Big Dipper as it is known in the USA and Canada) is a distinct group of stars within the constellation Ursa Major (or Great Bear - 'Ursa' is a Latin word meaning 'Bear') in the Northern Hemisphere.

The Plough is significant because the North Star can be found using it: a line from the star Merak to Dubhe points to the North Star.

The Plough consists of seven stars: Alkaid, Mizar, Alioth, Merges, Phecda, Merak and Duhbe.

From Earth the Plough looks like a number of dots on a flat piece of paper, in the shape of a plough. But if you were out in space and looked at them from the side they would look quite different!

This activity will show you what the Plough would look like from the side in outer space!



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### Trigger Questions

#### Stars:

What are stars? (*Little bright lights in the sky*).

What are they made of? (*Huge burning balls of gas, like our Sun*).

Do you think stars can die? (*Yes, because the gas, like in a gas fire, can eventually burn out*).

How come they look so small? (*Because they are so far away*).

#### Ploughing:

What is a plough? (*An early instrument of agriculture, drawn by horses and oxen. Now pulled by tractors*).

What does a plough do? What shape is it?

North, south, east, west - how do you find your direction? Compass, sun + watch\* (*daytime*), stars (*plough and pole star- night-time*).

\*To use your watch as an approximate compass, hold the watch horizontal and point the hour hand at the sun. Half way between that point and the twelve o'clock mark on your watch points to the south (going clockwise from the hour hand to the 12 in the morning, and anticlockwise after noon).

For example, pointing the hour hand of the watch to the sun:

at 8 a.m. South would be at the ten o'clock position.

at 4 p.m. South would be in the two o'clock position.

At midday (twelve o'clock), the hour hand itself should point south.

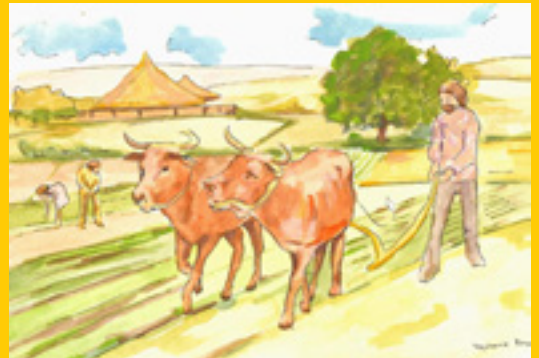
Questions asking how various things look from different angles:  
e.g how an astronaut might see certain things from space.

Can you draw a tree as you would see it from a distance?

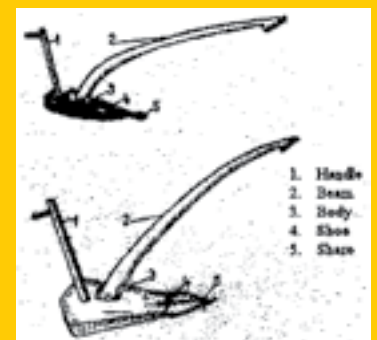
Now draw a tree as you would see it if you were sitting underneath it. Or as a bird might see it from above?

Do you know of any hill or mountain that looks a different shape from different directions?

Have you ever looked out the window of an aeroplane and wondered about the shapes you were flying over?



Early farmer ploughing  
(See [www.askaboutireland.ie](http://www.askaboutireland.ie))



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### Content

**GEOGRAPHY:**  
Planet Earth in Space

**MATHS:**  
Measures: Length  
Shapes and Angles: 2D, 3D

### Skills

Observing,  
Measuring,  
Designing  
and  
Making

### Cross-curricular links

*Geography:* Natural environments - Planet Earth in Space; mapping; cross-sections.

*History:* First Farmers - Agricultural Revolution 8000 years ago - humans started changing from hunting to farming near the Tigris and Euphrates, cereal cultivation; ploughing.

*Art:* Perspective: Seeing and drawing from different angles. (Star stickers and glow-in-the-dark paint can be useful for art work relating to the stars; also glue and glitter on black paper).

### Activity

#### OLDER CHILDREN:

- Print a copy of the Plough/Big Dipper Map (see end of activity sheet), and stick the map onto the piece of black cardboard.
- Poke holes in the cardboard where the stars appear on the paper.
- Cut seven pieces of black wool about 30 cm long.
- Tape the end of one piece of wool to a 15 cm square of kitchen foil.
- Crumple the foil up into as tight a ball as you can around the wool.
- Repeat the above six times, so you now have seven 'stars' on wool.
- Poke the free end of one piece of wool through the hole in the cardboard from the black side for Star 1 (the first star on the end of the 'handle' of the plough).

CHART OF STARS IN THE PLOUGH			
	Star Name	Distance from Earth in Light Years	String Length
1	Alkiad	101	12 cm
2	Mizar	78	23 cm
3	Alioth	81	22 cm
4	Mergez	81	22 cm
5	Phecda	84	20.5 cm
6	Merak	79	22.5 cm
7	Duhbe	124	0 cm

(One light year is almost 10 million million kilometres!)

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- Looking at the above chart, and for Star 1 which is called Alkiad, find how long the wool should be (12 cm).
- Pull the wool through the hole until the foil ball is 12 cm from the board
- Tape the wool in place on the back of the board
- Repeat the whole procedure for the other stars. For Star 7 pull the wool up until the ball hits the board.

*This is your 3D Plough or Big Dipper!*

- Now tape your mobile to the ceiling (Carefully) or stick it to the underside of the desk.
- Look at the mobile from underneath. What do you see?
- Now look at your mobile from the side. That's what the Plough or Big Dipper might look like from Space!



**N.B.** This activity can also be done using a subtraction method: pull all the seven pieces of wool through to the back; subtract the various string lengths from 30 cms and leave that amount of wool at the back, cut off the excess and then stick down the remainder with sellotape.

### YOUNGER CHILDREN:

- Print a copy of the Plough/Big Dipper Map (see end of activity sheet), and stick the map onto the piece of black cardboard.
- Poke a hole through where the stars appear on the paper (to transfer the map to the black card).
- Using the chart above measure a length of straw for each of the stars.
- Stick the straws in the correct place on the chart using blu-tack.
- Make 7 little balls out of yellow plasticine and place them on top of the straws (in the case of Duhbe, which is furthest from the Earth, the plasticine will go straight onto the cardboard).
- Stick the card to the underside of the desk.
- Look at the card from underneath and from the side. Can you draw what you see from both angles?
- Which star, of the Plough, is nearest the Earth? (*Mizar*). Which is the furthest? (*Duhbe*).



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### Safety

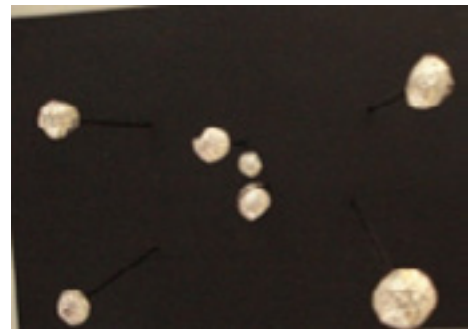
Care to be taken when the mobiles are being attached to the ceiling.

### Follow-up activity

1. **Make a 3-D model of Orion using the same method. :**

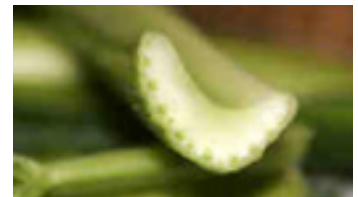
Find a map of Orion, copy it and use the following figures for the lengths of string:

Name of Star	Distance from Earth (Light Years)	Length of String (cm)
Betelgeuse	640	14.4
Rigel	770	11.8
Bellatrix	240	22.4
Mintaka	900	9.2
Alnilam	1360	0
Alnitak	800	11.2
Saiph	720	12.8



2. **Draw various objects from different angles, :**

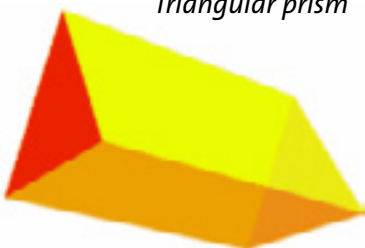
e.g candles seen from above  
or a piece of celery



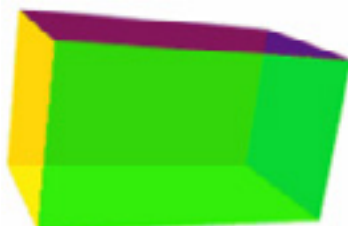
### More Maths

For each of the following three prisms draw two different shapes which you would see when you look at them from different angles:

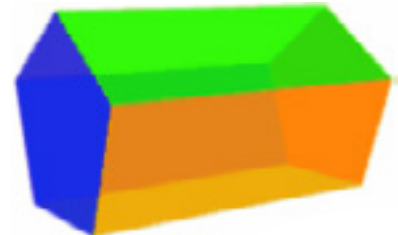
*Triangular prism*



*Square prism*



*Pentagonal prism*



The above diagrams were taken from the following website: [www.mathsisfun.com/geometry/prisms.html](http://www.mathsisfun.com/geometry/prisms.html)

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### Children Can:

- Look up at the sky on a clear night and try to find the Plough. (*In the Northern Hemisphere it can be seen very often*).
- Look up the sign of the zodiac for their birthday (if they don't know it already) and find out what that name means. They can then draw the shape of the star pattern for their sign, and draw it to scale.

The following website could help with this:

[www.enchantedlearning.com/subjects/.../stars/comstellations.shtml](http://www.enchantedlearning.com/subjects/.../stars/comstellations.shtml)

### Did You Know?

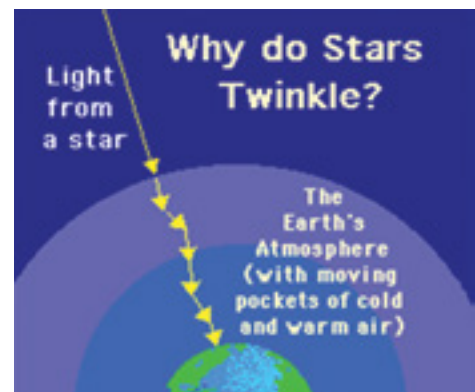
An Irishman, Henry George Ferguson from Co. Down, invented a special plough which linked to a tractor. He then helped to develop the modern agricultural tractor. His name lives on in the name of the Massey Ferguson company.



Stars would not twinkle if we looked at them from outer space! They twinkle because we look at them through the Earth's atmosphere which contains lots of pockets of warm and cold air. This bends the light (refraction) and so the stars twinkle.

There is no air in outer space to bend the light.

A black hole is where a star has collapsed. The hole has so much gravity that everything around it is pulled into its centre and nothing can escape! (*But there is no need to worry as they are billions of kilometres away!*).



The flag of the state of Alaska in the USA features the Big Dipper and North Star.

Patterns of stars in the sky have been very important in some cultural groups such as the Aborigines and native Americans. Predicting and explaining various natural occurrences such as weather, which influenced food production, was one reason.

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### Useful Websites:

- The idea for this activity was taken from the 'Resources for Learning' section of the website of the American Museum for Natural History:  
[www.amnh.org/learn-teach/pre-k-to-grade-2/\(offset\)/30/\(view\)/all](http://www.amnh.org/learn-teach/pre-k-to-grade-2/(offset)/30/(view)/all)
- Two simple art activities for the Plough can be found at:  
[www.ehow.com/info-tip\\_8059659\\_art-activities-big-dipper.htm](http://www.ehow.com/info-tip_8059659_art-activities-big-dipper.htm)

Visit the websites of three space-related Discover Science Centres:

CIT Blackrock Castle Observatory, Cork [www.bco.ie](http://www.bco.ie)

Birr Castle (home of the giant telescope - the Leviathan), Co. Offaly [www.birrcastle.com](http://www.birrcastle.com)

Armagh Planetarium, Co. Armagh [www.armaghplanet.com](http://www.armaghplanet.com)

Ireland

 esero

 Discover Primary  
Science and Maths  
[www.primaryscience.ie](http://www.primaryscience.ie)

Alkiod

Mizor

Aloth

Mergez

Phecda

Duhbe

Merck