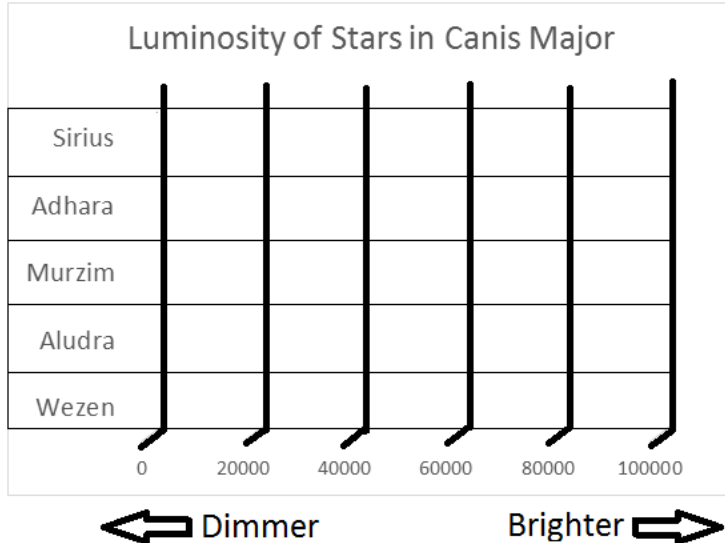# ACTIVITY – WHICH STARS ARE THE BRIGHTEST IN THE SKY?

When you are trying to locate constellations in the sky it is helpful to know which stars in the sky are producing the most light. When astronomers measure the Luminosity of stars, they are measuring the energy being released by the star over time. We will think of luminosity as a measure of how much light a star is releasing. The table lists the approximate luminosity of different stars in the constellation Canis Major. Graph the information using the bar graph provided.

Star Name	Approximate Luminosity
Sirius	25
Adhara	38,000
Murzim	26,000
Aludra	100,000
Wezen	50,000

Luminosity of Stars in Canis Major

Sirius
Adhara
Murzim
Aludra
Wezen

0   20000   40000   60000   80000   100000

⇐ Dimmer   Brighter ⇒

1.) Which star is the brightest according to the luminosity bar graph? _____

2.) Which star is the dimmest according to the luminosity bar graph? _____

3.) Rank the stars from highest luminosity (1) to the dimmest luminosity (5)?
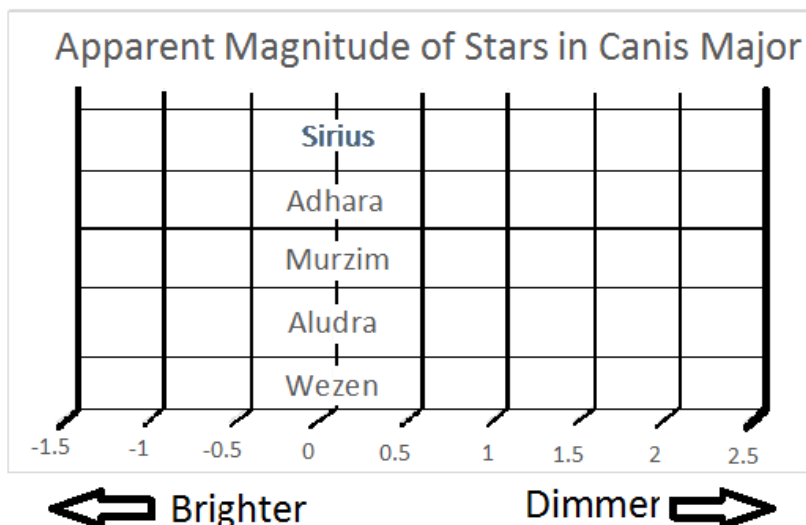
1 = _____
2 = _____
3 = _____
4 = _____
5 = _____

Another way that astronomers measure brightness is to compare how bright the stars visibly appear in the sky, which is called the apparent magnitude of the stars. The table lists the apparent magnitude of different stars in the constellation Canis Major. Chart the information on the bar graph provided.

Star Name	Apparent Magnitude
Sirius	-1.5
Adhara	1.5
Murzim	2.0
Aludra	2.5
Wezen	1.8

The Greek astronomer Hipparchus tried to classify the apparent magnitude of the stars in the sky by labeling the brightest stars as magnitude 1 stars and dimmer stars became magnitude 2, magnitude 3, magnitude 4, etc. for dimmer and dimmer stars. Lower numbers on the scale represent brighter stars, but unfortunately several stars were classified as magnitude 0 or magnitude 1 before the brightest stars like Sirius were classified. This meant that very bright stars, like Sirius, receive a negative apparent magnitude. The farther left a star is on the number line the brighter the stars apparent magnitude in the sky. Larger negatives represent brighter stars, but this is just because the scale for brightness did not start with the brightest stars seen in the sky, which actually would have started with the sun which has a much bigger apparent magnitude than any of the other stars that can be seen from the earth.

Apparent Magnitude of Stars in Canis Major

Sirius
Adhara
Murzim
Aludra
Wezen

-1.5   -1   -0.5   0   0.5   1   1.5   2   2.5

⇐ Brighter   Dimmer ⇒

4.) Which star is the brightest according to the apparent magnitude bar graph? _____

5.) Which star is the dimmest according to the apparent magnitude bar graph? _____

6.) Rank the stars from highest to lowest apparent magnitude?

1 = _____
2 = _____
3 = _____
4 = _____
5 = _____

Discussion Questions:

7.) Are the stars with the highest luminosity also the stars that appear brightest in the night sky? _____

The data is actually correct. Sometimes the stars that release the most light do not look like the brightest stars in the night sky. To show the contrast between the luminosity and the apparent magnitude the two quantities are diagramed side by side below. The diagram on the left represents the luminosity of the stars, and the diagram on the right represents the apparent magnitude of the stars. The size of the white dots represents the brightness of the stars in the constellation Canis Major with respect to luminosity and apparent magnitude respectively.
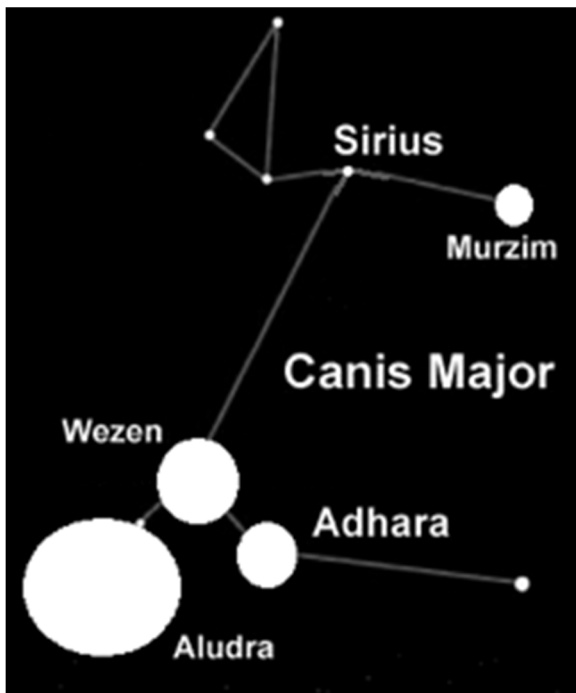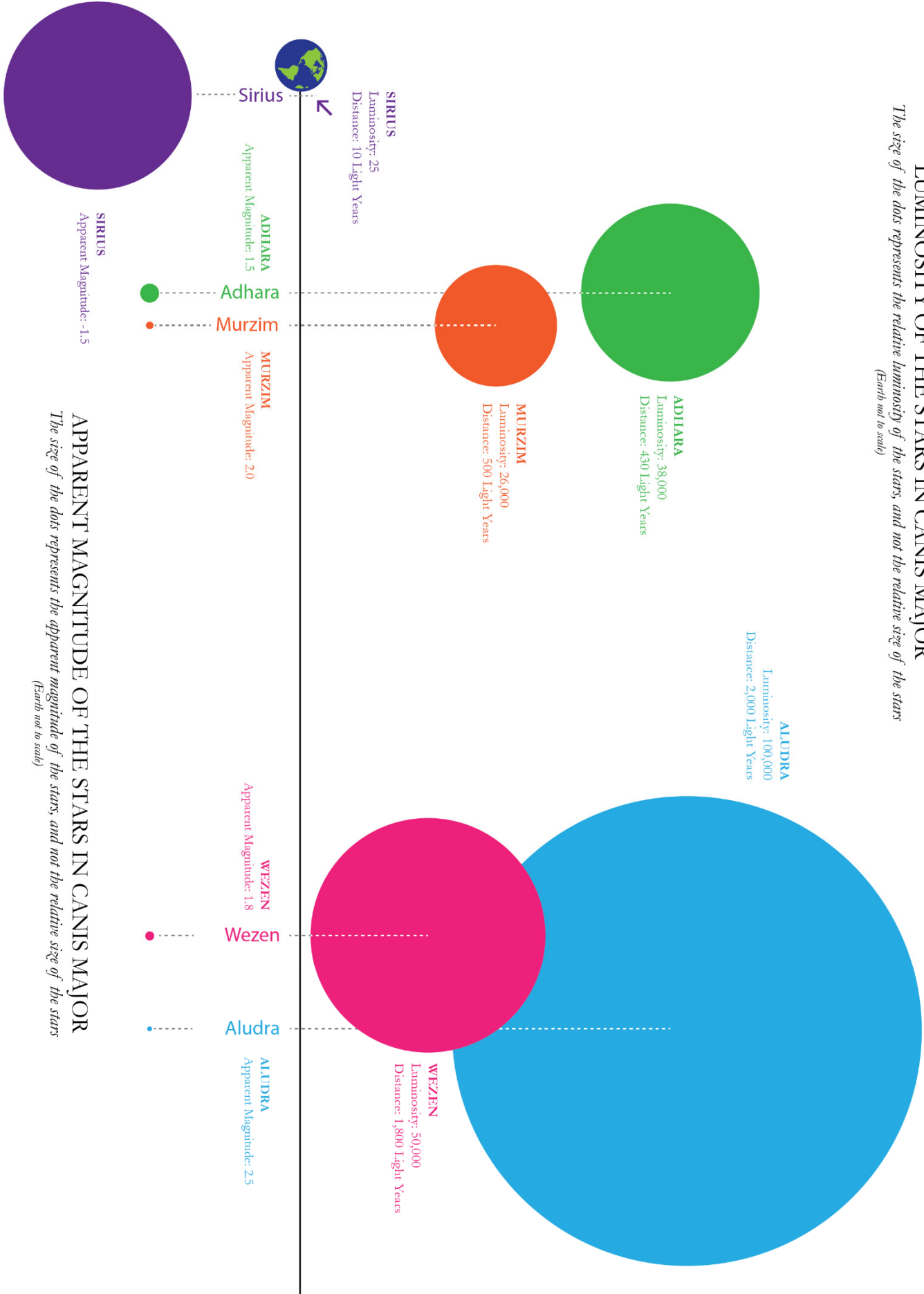
Luminosity   Apparent Magnitude

8.) Can anyone hypothesize (give a possible explanation) of how stars that are actually very bright can appear dim in the night sky. In other words, what other factors besides a stars luminosity (how much light a star releases) could affect the stars apparent magnitude (how bright the star appears in the sky).

LUMINOSITY OF THE STARS IN CANIS MAJOR

The size of the dots represents the relative luminosity of the stars and not the relative size of the stars

(Earth not to scale)

Sirius

SIRIUS
Luminosity: 25
Distance: 10 Light Years

Adhara

ADHARA
Luminosity: 38,000
Distance: 430 Light Years

Murzim

MURZIM
Luminosity: 26,000
Distance: 500 Light Years

ALUDRA
Luminosity: 100,000
Distance: 2,000 Light Years

APPARENT MAGNITUDE OF THE STARS IN CANIS MAJOR

The size of the dots represents the apparent magnitude of the stars, and not the relative size of the stars

(Earth not to scale)

SIRIUS
Apparent Magnitude: -1.5

ADHARA
Apparent Magnitude: 1.5

MURZIM
Apparent Magnitude: 2.0

WEZEN
Apparent Magnitude: 1.8

Wezen

Aludra

ALUDRA
Apparent Magnitude: 2.5

WEZEN
Luminosity: 50,000
Distance: 1,800 Light Years

ACTIVITY – HOW DOES LOCATION AFFECT THE BRIGHTNESS OF STARS?

1.) Point the flashlight at the styrene ball, and record what happens to the styrene ball. _____

2.) Explore what happens to the brightness of the styrene ball when the flashlight is moved to different locations, and write down your observations in the space provided below.
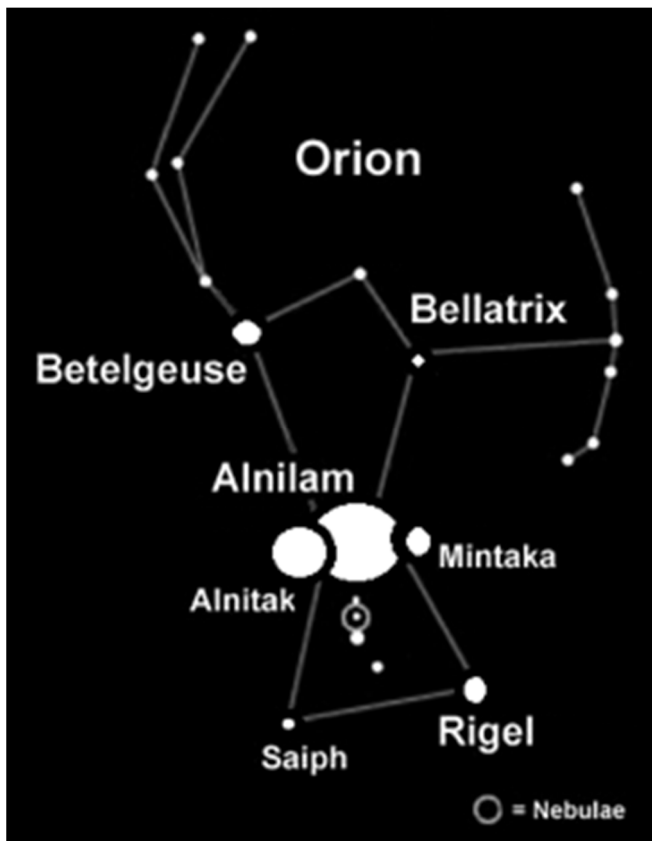
Discussion Questions:

3.) What variable changed during the different trials? _____

4.) In the activity what represented the luminosity of the star (how much light a star releases)?

5.) How was the luminosity affected by the changing variable listed in question 3?

6.) In the activity what represented the apparent magnitude of the star (how bright a star appeared in the sky)?

7.) How was the apparent magnitude affected by the changing variable listed in question 3?

8.) What happened to the amount of the light that the styrene ball received from the flashlight as the flashlight moved away from the styrene ball?

9.) Explain how it is possible that some stars that are actually very bright can appear dim in the night sky. Include the terms luminosity and apparent magnitude in your explanation.

10.) Combining the information about Sirius' luminosity and apparent magnitude compared to Aludra's luminosity and apparent magnitude what would you hypothesize about Sirius' distance from the earth compared to Aludra's distance from the earth? Explain.

Use the diagrams below to answer the following questions:

11.) What star in Orion releases the most light? _____

12.) What two stars in Orion appear the brightest in the night sky? _____

13.) Which star would you hypothesize is the furthest from the earth? Explain.

The size of the white dots represents the brightness of the stars in the constellation Orion. The diagram on the left represents the luminosity of the stars, and the diagram on the right represents the apparent magnitude of the stars.

Luminosity

Apparent Magnitude