The picture above shows the stars as seen from Pennsylvania in the summer. Put the labeled stars in order from dimmest to brightest.

Dimmest Star: ______________________________________
______________________________________________
______________________________________________
______________________________________________
______________________________________________

Brightest Star: _______________________________________
Using the data table below, write the brightness from Earth next to your list of brightest to dimmest star.

What do you notice about the brightness from Earth’s numbers compared to your order?
In general__________________________________________________________

Put the star cards in order from dimmest to brightest according to the brightness from Earth. With a wet erase pen label the star cards from **1 being the dimmest and 7 being the brightest from Earth**. Also write brightest on the brightest star and dimmest on the dimmest star.

<table>
<thead>
<tr>
<th>System Name</th>
<th>Brightness From Earth*</th>
<th>Actual Brightness*</th>
<th>Number of Stars in System</th>
<th>Systems Distance From Earth (light years)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>26.7</td>
<td>-4.2</td>
<td>1</td>
<td>0.000016</td>
</tr>
<tr>
<td>Castor</td>
<td>-1.9</td>
<td>-1.0</td>
<td>6</td>
<td>51</td>
</tr>
<tr>
<td>Pollux</td>
<td>-1.1</td>
<td>-1.1</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>Procyon</td>
<td>-0.3</td>
<td>-2.6</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Betelgeuse</td>
<td>-0.5</td>
<td>5.9</td>
<td>1</td>
<td>724</td>
</tr>
<tr>
<td>Sirius</td>
<td>1.5</td>
<td>-1.4</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Rigel</td>
<td>-0.1</td>
<td>7.8</td>
<td>3-5</td>
<td>860</td>
</tr>
</tbody>
</table>

For systems with more than one star, the information for the dominant star is given.

**Light Year:** The distance that light can travel in one year (9,490,700,000,000 km)

**Recording Brightness From Earth**

What is the difference between brightness from Earth and actual brightness, use the words apparent and actual brightness in your answer?__________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________
Part 2

Actual Brightness

Order the cards from dimmest to brightest actual brightness. Then using the ordered cards, write down the order of the brightness from Earth’s numbers (the numbers that you wrote on the cards earlier).

______  _______  _______  _______  _______  _______  _______  _______
Dimmest  _______  _______  _______  Brightest
Actual Brightness

A person claims that the brighter the actual brightness, the brighter the star will appear to be in the sky from Earth. Circle if you agree or disagree with this claim? Then use data to back up your argument.

I    agree  /  disagree  with the person because ______________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________

Share your answer to the previous question with the member of your group. Vote on which answer is the “best.” Write this answer on poster paper to share with the class.

Number of Stars

Go outside and watch the teacher demo.

How can a “star” be made up of multiple stars? ______________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________

Draw a Picture of the Stars from a Distance  Draw a Picture of the Stars Close Up
Part 3
Distance

Order the cards from farthest to closest from Earth. Then using the ordered cards, write down the order of the brightness from Earth’s numbers (the numbers that you wrote on the cards earlier). Put a circle around all the numbers that have the same number of stars in their systems.

<table>
<thead>
<tr>
<th>Least Stars</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Most Stars</th>
</tr>
</thead>
</table>

A person claims that the closer the star, the brighter the star will appear to be in the sky from Earth. Do you agree or disagree with this claim? Make sure that you use data to back up your argument.

I agree / disagree with the person because __________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

Share your answer to the previous question with the member of your group. Vote on which answer is the “best.” Write this answer on poster paper to share with the class.
Final Analysis

As a class discuss the following

- Is the brightness from Earth solely dependent on actual brightness, number of stars, or distance from Earth?
- What data would you need to get to show how each of these factors affect the brightness from Earth?

*Scientific Finding:* The number of stars only a small effect on the brightness of a star as seen from Earth. Therefore, we will assume this factor does not affect the brightness from Earth.

*Does actual brightness affect the brightness from Earth?*

To study this what must be true of the distance and number of stars?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Find the two stars that have the most similar distance from the Earth.

<table>
<thead>
<tr>
<th>Star Name:</th>
<th>Distance:</th>
<th>Actual Brightness:</th>
<th>Brightness from Earth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the difference in distance from Earth between these two stars?

______________________________

Do you think that actual brightness affects how bright the star appears to be from Earth and why?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

As the actual brightness increases, the brightness from Earth  increases  /  decreases.

How actual brightness affects the brightness from Earth and how you know this.
**Does distance affect the brightness from Earth?**

To study this what must be true of the actual brightness and number of stars?

_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________

What is the difference in actual brightness between these two stars?

Do you think that distance from Earth affects how bright the star appears to be from Earth and why?

_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________

As the distance from Earth increases, the brightness from Earth increases / decreases.

How distance affects the brightness from Earth and how you know this.

What is the biggest factor that explains why the Sun appears so much brighter than any other star from Earth?

_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________
_________________________________________________________________________________________

**Star Name:**

<table>
<thead>
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<th>Star Name</th>
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<th>Actual Brightness</th>
<th>Brightness from Earth</th>
</tr>
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<tbody>
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