Summer 6-2017

Characteristics of the Universe (8th grade)

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Understanding By Design

Unit Title: Characteristics of the Universe

Grade Level: 8th

Subject/Topic Area(s): Middle School Science

Designed By: Veronica Mansfield and Meggan Partain

Time Frame: Two weeks (10 days)

School District: North East Independent School District, San Antonio, TX

School: Krueger Middle School

School Address & Phone: 438 Lanark Dr, San Antonio, TX 78218 (210)356-4700

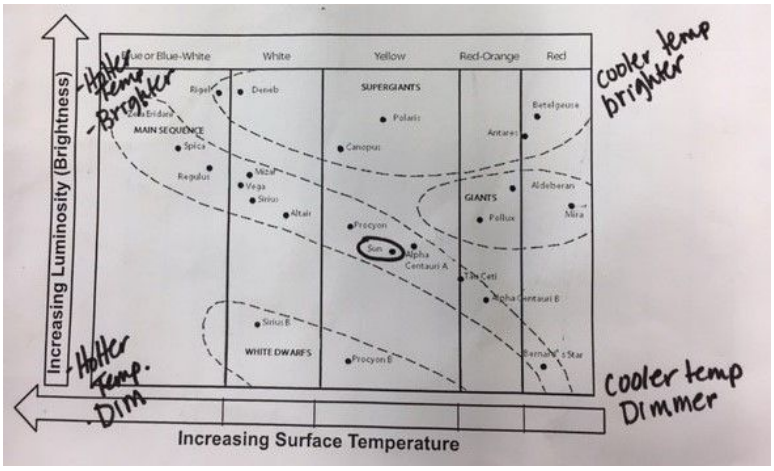
<table>
<tr><th colspan="3">Stage 1 – Desired Results</th></tr>
<tr><td rowspan="6">Established Goals
8.8(A) describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification

8.8(B) recognize that the Sun is a medium-sized star located in a spiral arm in the Milky Way galaxy and that the Sun is many thousands of times closer to Earth than any other star</td><td colspan="2">Transfer</td></tr>
<tr><td colspan="2">Students will independently use their learning to…
plotting “new” stars on an HR diagram based on characteristics presented in a table format
use google draw to create HR diagram model of the new stars</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>Understandings
Students will understand that…
Earth is part of a larger system of objects in the universe.
Humans understand the universe by categorizing objects into groups of similar characteristics.</td><td>Essential Questions
Where is Earth located in space?
What do stars, nebula, and galaxies have in common?
How do scientists study objects that we can’t touch or measure?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Knowledge
Students will know…
characteristics of galaxies (shape, type of stars, age of</td><td>Skills
Students will be able to…
determine characteristics of</td></tr>
</table>

	stars) ● identify a nebulae , star and galaxy from picture or written description ● the sun is a medium sized, main sequence star located on the spiral arm of the Milky Way galaxy ● The sun is thousands of times closer to the Earth than any other star ● H-R diagram shows luminosity, temperature, size and color of a star ● The x-axis of an HR diagram decreases from left to right ● features of major star groups (such as main sequence stars)	stars using an HR diagram ● plot a star on the HR diagram given its characteristics ● compare characteristics of stars using information on the HR diagram ● classify galaxies according to characteristics ● List astronomical objects in order of size ● interpret information given in a table
Stage 2 – Evidence		
CODE (M or T)	**Evaluative Criteria** (for rubric)	
T M	Rubric	Performance Task(s) *Students will demonstrate meaning-making and transfer by…* ● Student groups will be given a table of 12 renamed stars based upon the characteristics of real stars. The table provides the students with 2 of 4 characteristics to include color, temperature, size, and brightness/luminosity. ● The students need to fill in the missing characteristics of the 12 stars in the table. ● Once they have completed the table, students will use google draw to color, plot, and label the stars (using the HR diagram template) based upon their characteristics. --- Other Evidence (e.g., formative) ● Quizizz on Characteristics of the Universe ● Sort galaxies using pictures or written description (card sort) ● Exit tickets
Stage 3 – Learning Plan		
CODE		

(A, M, T)		
A	**Learning Activities** **Day 1:** ● **Gallery walk activity:** students visit each poster as a preview of the unit vocabulary they will see. At each poster, the student will add a sticky note about what they see in the picture. Posters will include galaxies, nebula, HR diagram, Sun, solar system, moon. Posters include sentences stems for students who may need additional support ● **Watch:** Mindblowing! Comparing the Earth to the rest of the universe (3:35) ● When video concludes, ask students what were object that were mentioned in video. Record on board or could post these terms on word wall for later use. Introduce the term universe. ● Introduction to 3 types of galaxies & characteristics: PPT presentation with notes. PPT can be given to students through nearpod, peardeck or google classroom. If this option is selected, a linguistically simplified version is available here.	Progress Monitoring (e.g., formative data) Teacher review of student generated post-it notes.
A	**Day 2:** ● **Practice:** identify galaxy type and characteristics using brainrush flashcards. (can use notes from previous day) ● **Vocab activity:** Using context clues, determine what each word means. (luminosity, dim, bulge, and irregular) ● Galaxy Riddles exit ticket	Exit ticket
A	**Day 3:** ● Introduce nebula & stars. ● **Watch:** Star and nebula (emphasize dust & gas; students don't need to know types of nebula). ● **Speed Dating:** Divide students into two groups. Each group will participate in speed dating activity. Goal is to have students use vocabulary to have structured conversations about stars, nebulae, universe & galaxy. (students may use interactive notebook during this activity).	Teacher observation/listening to students while participating in speed dating activity.
M	**Day 4:** ● **Create:** Students create a one pager review to review stars, nebulae and galaxies. Students handout. To scaffold assignment for students, teacher can provide page numbers from interactive notebook where material can be found. May also want to show a 1 pager example for a different topic.	Teacher conversations with students will monitoring student work.

A	**Day 5:** ● Quizizz on Characteristics of the Universe	Formative quizizz assessment on characteristics of the universe
A and M	**Day 6: Intro HR** ● Show HR diagram from Day 1 Gallery Walk activity. Read a few of the post-its from gallery walk to the group. ● Each student should receive a personal HR diagram where common star and group names are given (stemscopes). This chart should be added to interactive notebook. ● With your shoulder partner, brainstorm & record in your ntbk as many statements about this chart. (2 min.) ● Have students share an item from their group (use randomizing tool) ● As class, label HR diagram with temperature descriptions (hotter, medium, cooler)--Remind students that all stars are very hot...cooler just means not as hot. ● Label brightness (brighter, medium, dimmer). Remind students of the meaning of the word dim. Some classes may benefit from having a visual representation of dimmer. ● Have students color the spectral classes (Blue, white, yellow, orange, red) on HR chart. ● Perform formative assessment	Using small white board & marker, ask students to use their HR diagram to answer these questions one at a time. Remember to have students not reveal their answer until they hear the bell. -What group is the Sun in? -What color is the star Deneb? -Where are the brightest stars located? Top, Middle, Bottom -A synonym for the word luminosity is? -What color star is hotter? orange or white?
T	**Day 7:** ● Gizmo from www.explorelearning.com on the HR diagram. Click on “find gizmo”, type in HR diagram, and click on the first link titled “HR Diagram”. Use the student exploration sheet during the simulation. ● Label parts of an HR diagram for reference in interactive notebook, see example below.	Exit ticket

	 ● HR Diagram exit ticket: comparing two stars	
T	**Day 8: Mob-Stars Project day** ● Introduce performance assessment to students. Give each student a blank HR diagram to use for information. ● Make student groups of 3-4 ● Each student will be responsible for plotting 3-4 stars (depending on group sizes) on the HR diagram ● After explanation of project, the students can start to fill in the missing characteristics of the 12 stars in the table. Student Handout ● Answer Key	Performance Assessment
T	**Day 9: Mob-Stars Project day** ● Students complete the missing information of the table ● Using the Google Draw template, students will begin to plot their stars from the information in the table. (Note: students will have to make a copy of the template first) ● Each student is responsible for making a key on the HR diagram of the stars that they were responsible for.	Performance Assessment
T	**Day 10: Mob-Stars Project day** ● Students finish labeling their HR diagram according to the rubric.	Performance Assessment

Charac. of Universe Vocabulary Activity

Context Clues- Read the sentence before, and after the word and try to find clues or examples that explain the unknown word.

Clothing stores sometimes have clothes that are defective or messed up, such as when pant legs are different lengths. These **irregular** clothes are often on sale or sent to outlet stores to get rid of them.

irregular means:

_____.

Movie theaters often **dim** the lights when the movie starts. This is because the **luminosity** of the lights would cast a glare on the screen and you wouldn't be able to see the movie.

luminosity means:

_____.

dim means:

_____.

The Hulk's muscles **bulge** when he gets angry causing his shirt to rip open.

bulge means:

_____.

Galaxy Riddles Exit Ticket

1. The Andromeda Galaxy is the closest galaxy to the Milky Way. Andromeda contains a concentrated bulge of matter in the middle, surrounded by a disk of gas, dust, and stars. It is a _____ galaxy.

2. Cosmo Redshift 7 is one of the oldest and most distant galaxies. It has no definite shape so it is a _____ galaxy.

3. M87 is a galaxy that has a supermassive black hole at its center. Because of the black hole, this galaxy has little gas or dust and is circular in shape. M87 is a _____ galaxy.

4. NGC 1365 is a galaxy that is twice as long as our Milky Way galaxy. Its bar, made up of two massive arms, rotates clockwise and completes a rotation every 350 million years. This is an example of a _____ galaxy.

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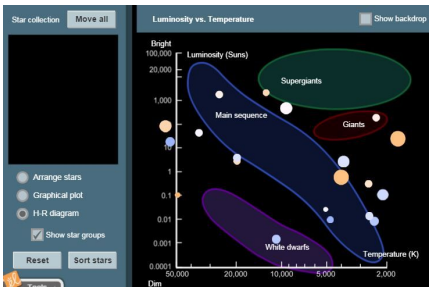
Name: _____ Date: _____

HR Diagram

Luminosity and temperature	Get the Gizmo ready: • Click **Reset**. • Select **H-R diagram** • Select **Move all** • Select **Sort Stars** • Check **Show Star Groups**



Using the HR Diagram you created in Gizmo, answer the following questions.

1. How does the diagram classify the stars? (Look at the graph's axis)

   _____

2. What is unusual about the HR diagram's x-axis?

   _____

3. What does luminosity mean?

   _____

4. Click on the graph. Where is our Sun located in the HR diagram?
   A. Supergiants
   B. Giants
   C. White Dwarfs
   D. Main Sequence
5. Which group are most stars found in?
   A. Giants B. White dwarf C. Main Sequence D. Supergiants

6. How would you describe main sequence stars in the HR Diagram?

   _____

7. Click on the stars in the graph. Which of the following stars is a bright and cool star?
   A. Barnard's star B. Antares C. Rigel D. Regulus

8. Click on the stars in the graph. Which of the following stars is a bright and hot star?
   A. Sirius B B. Alpha Centauri B C. Spica D. Procyon B

9. Click on the stars in the graph. Which of the following stars is a hot and dim star?

A. Sirius B B. North Star C. Barnard's Star D. Zeta Eridani

11. For most stars, what does a higher temperature tend to go with?

A. A lower luminosity
B. A higher luminosity
C. A red color
D. None of the above

12. Looking at the HR Diagram, which color of star is hotter in temperature?

A. Red
B. Yellow
C. White
D. Blue

13. Looking at the HR Diagram, which color of star is cooler in temperature?

A. Red
B. Yellow
C. Blue
D. White

14. According to the HR diagram above, what are the stars in the lower left region?

A. Main Sequence Stars
B. Supergiants
C. Giants
D. White Dwarfs

15. How are white dwarf stars different from supergiants?

A. White dwarfs are cooler and have higher luminosity than supergiants.
B. White dwarfs are cooler and have lower luminosity than supergiants.
C. White dwarfs are warmer and have higher luminosity than supergiants.
D. White dwarfs are warmer and have lower luminosity than supergiants.

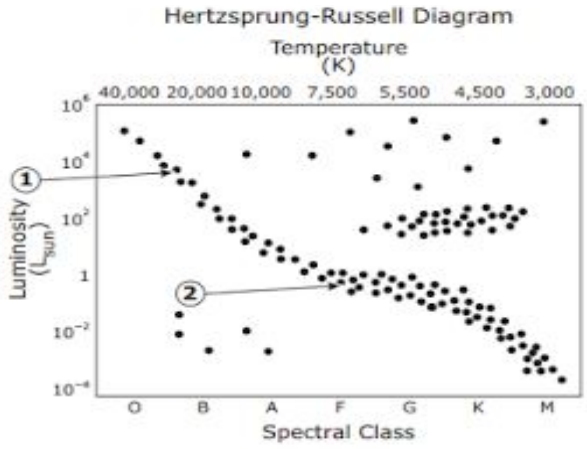
16. Which of the following stars is a white dwarf?

A. Polaris B. Algol C.Procyon B D. Aldebaran

Name: _____ Period: _____

HR Exit Ticket

1.



Based on this diagram, how do the characteristics of Star 1 and Star 2 compare?

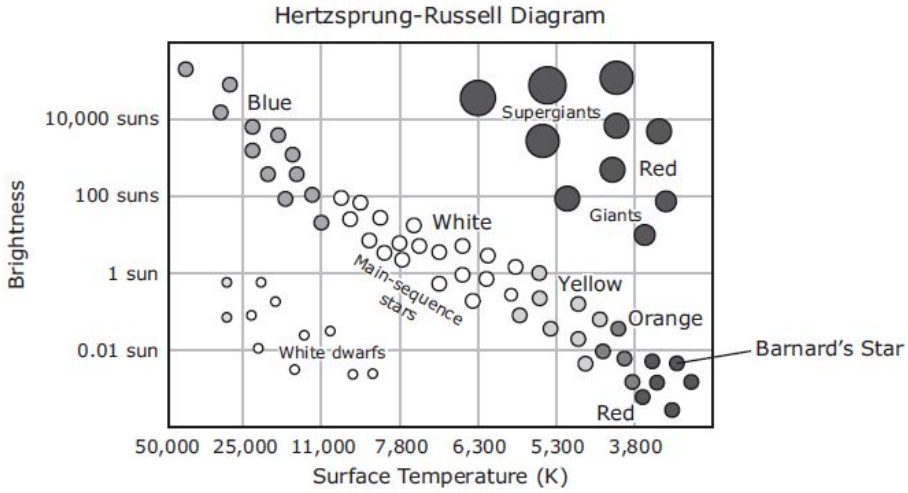
F Star 1 is cooler and less bright than Star 2.

G Star 1 is hotter and brighter than Star 2.

H Star 1 is cooler and brighter than Star 2.

J Star 1 is hotter and less bright than Star 2.

2.



Which of these observations of Barnard's Star is most likely accurate?

A Barnard's Star is less bright than the sun, has a surface temperature below 3,800 K, and is red.

B Barnard's Star is less bright than the sun, has a surface temperature above 3,800 K, and is red.

C Barnard's Star is brighter than the sun, has a surface temperature below 5,300 K, and is yellow.

D Barnard's Star is brighter than the sun, has a surface temperature above 5,300 K, and is yellow.

Mob-Stars Student Handout

Directions: Below are some characteristics about some star suspects. These rogue stars have been leading a life of crime and hiding amongst stars of similar characteristics. Your mission, detectives, is to uncover all of the missing information based upon the clues given. From this information, you will be creating a scientific picture (HR diagram on Google Draw) exposing these hooligans for who they really are.

Code Name	Temperature	Luminosity	Size	Color	Group
Ralphie	Hotter			Blueish	Supergiant
Sonny B.				Yellow	Main Sequence
Benny Two-Toes	Cooler	Medium		Red	
Jake the Snake	Hotter	Dim			White Dwarf
Fat Charlie			Large	White	
Slim Jim			Medium	Red-Orange	
Suzie Q		Bright		Yellow	
Babyface Nelson		Medium		White	
Switchblade Sal	Medium	Dim			
Cuddles Malloy	Hotter	Bright		Blue	
Tony Bananas				Red	Main Sequence
The Butcher	Cooler		Large		

****Check with your teacher before beginning to create your picture on Google Draw****

Mob-Stars Answer Key

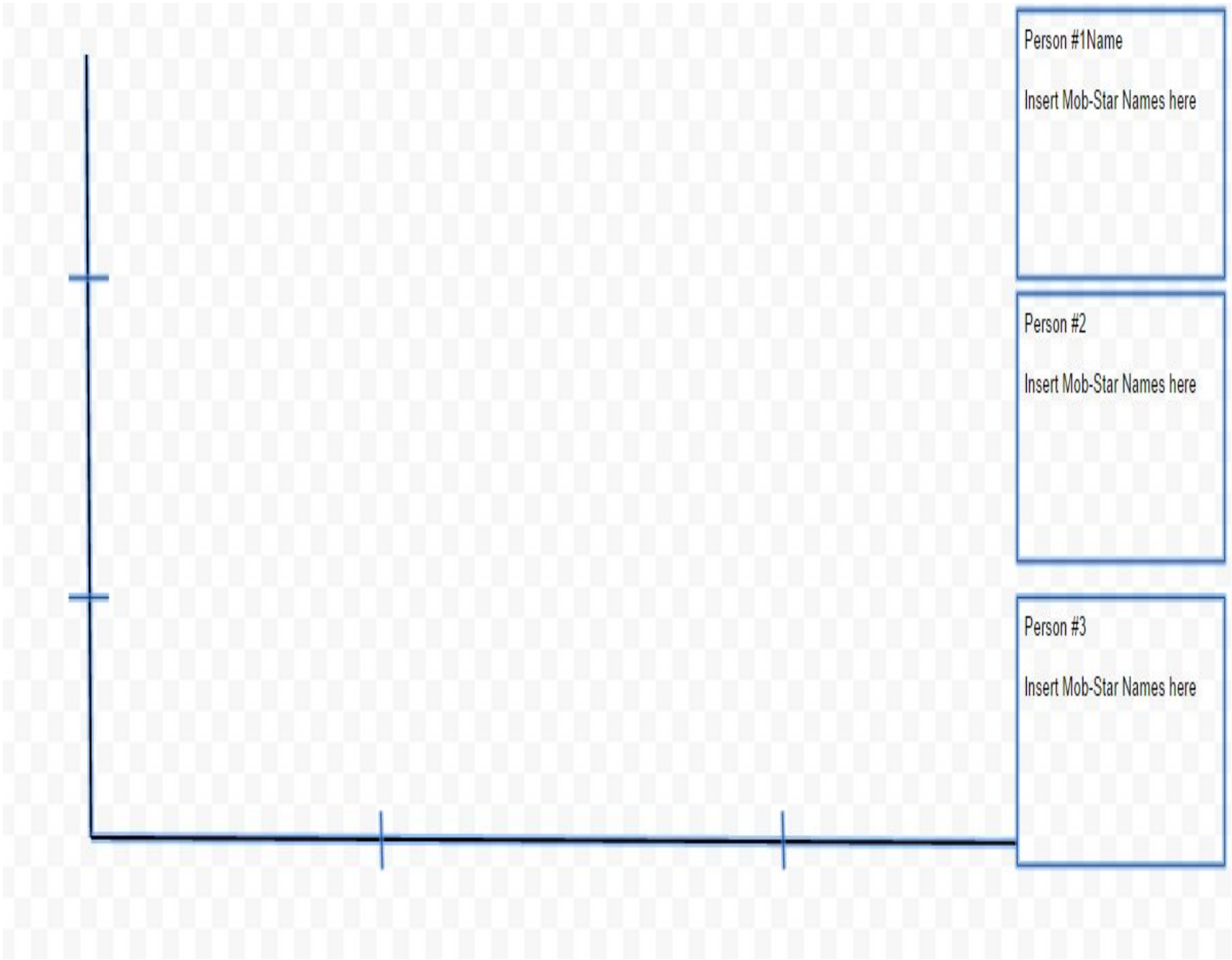
Directions: Below are some characteristics about some star suspects. These rogue stars have been leading a life of crime and hiding amongst stars of similar characteristics. Your mission, detectives, is to uncover all of the missing information based upon the clues given. From this information, you will be creating a scientific picture (HR diagram on Google Draw) exposing these hooligans for who they really are.

Code Name	Temperature	Luminosity	Size	Color	Group
Ralphie	Hotter	**Bright**	**Big**	Blueish	Supergiant
Sonny B.	**Medium**	**Medium**	**Medium**	Yellow	Main Sequence
Benny Two-Toes	Cooler	Medium	**Medium**	Red	**Giants**
Jake the Snake	Hotter	Dim	**Small**	**White**	White Dwarf
Fat Charlie	**Hotter**	**Bright**	Big	White	**Supergiants**
Slim Jim	**Cooler**	**Medium**	Medium	Red-Orange	**Giants**
Suzie Q	**Medium**	Bright	**Large**	Yellow	**Supergiants**
Babyface Nelson	**Hotter**	Medium	**Medium**	White	**Main Sequence**
Switchblade Sal	Medium	Dim	**Small**	**Yellow**	**White Dwarf**
Cuddles Malloy	Hotter	Bright	**Large**	Blue	**Main Sequence**
Tony Bananas	**Cooler**	**Dim**	**Small**	Red	Main Sequence
The Butcher	Cooler	**Bright**	Large	**Red**	**Supergiants**

****Check with your teacher before beginning to create your picture on Google Draw****

HR Diagram Performance Assessment Rubric

	Exceeds	Meets	Approaching
Characteristics Table	● All characteristics are filled in ● 40 pts	● More than half of missing characteristics are filled in (17) ● 20 pts	● Less than half of missing characteristics are filled in ● 10 pts
Diagram Axis	● Both axis labeled ● 10 pts	● One axis labeled	● No labels given ● 0 pts
Title	● Title Labeled ● 5 pts		● No title given ● 0 pts
Stars plotted	● Your four stars are in the correct location ● 10 pts	● At least two stars in the correct location ● 5 pts	● Most stars are <u>not</u> in the correct place ● 3 pts
Stars colored	● Your four stars are colored correctly based on temperature ● 10 pts	● At least two stars are colored correctly ● 5 pts	● Most stars are <u>not</u> colored correctly ● 3 pts
Stars labeled	● All four of your stars are correctly named with their “mob-star name” ● 10 pts	● At least of your two stars are correctly named. ● 5 pts	● Most stars are not named correctly ● 3 pts
Star size	● All four stars are drawn the correct size relative to each other. ● 10 pts	● At least two stars are sized correctly ● 5 pts	● Most stars are <u>not</u> the correct size relative to each other. ● 3 pts
Responsibility Key	● Key is filled out on margin of template showing which “mob-stars” you were responsible for ● 5 pts	● Key is partially filled out on margin of template ● 3 pts	● Key is not given for your four “mob-stars” ● 0 pts


Person #1Name
Insert Mob-Star Names here
Person #2
Insert Mob-Star Names here
Person #3
Insert Mob-Star Names here