LESSON MAKER PRO

Stars Near and Far

Use distance models to explain what we see in the sky.

GRADE 5 · 5.10

5.10 "Obtain and communicate information to explain why the sun appears to be larger and brighter than other stars."

NAME _____ DATE _____

DISTANCE CHANGES APPEARANCE

The Sun is a star. It looks larger and brighter than other stars mainly because it is much closer to Earth, not because all other stars are smaller or give off less light. In the made-up models below, divide a distant star's distance by the Sun's distance to compare them. The model numbers are not real space distances.

WORKED EXAMPLE

In a model, the Sun is 7 units from Earth. Another star is 63 units from Earth. How many times as far away is the other star?

1. Divide the other star's distance by the Sun's distance.
2. 63 / 7 = 9
3. The other star is 9 times as far away in this model.

Answer: 9 times as far away

PRACTICE 6 problems

1 In a model, the Sun is 3 units from Earth and another star is 45 units from Earth. How many times as far away is the other star?

ANSWER _____

2 In a model, the Sun is 4 units from Earth and another star is 80 units from Earth. The other star looks smaller. How many times as far away is it? Does its appearance prove that it is physically smaller than the Sun? Explain briefly.

ANSWER _____

3 In a model, the Sun is 5 units from Earth. Another star is 18 times as far away. How many units from Earth is the other star?

ANSWER _____

4 Use the model table. Which star, A or B, is nearer to Earth? How many times as far away as the Sun is that star?

MODEL DISTANCES FROM EARTH

Object	Distance in units
Sun	6
Star A	96
Star B	144

ANSWER _____

5 In a model, the Sun is 8 units from Earth and another star is 200 units from Earth. How many times as far away is the other star? If the two stars were the same size and gave off the same amount of light, which would look larger and brighter from Earth?

ANSWER _____

6 In a model, the Sun is 10 units from Earth and another star is 120 units from Earth. A student says the other star is 10 times as far away. Find the correct comparison.

ANSWER _____

APPLY IT Show your work

1 At a planetarium, you try a distance model. Use the table to find how many times as far away Star A is as the Sun. If Star A were the same size as the Sun and gave off the same amount of light, which would look larger and brighter from Earth?

PLANETARIUM DISTANCE MODEL

Object	Distance from Earth in units
Sun	2
Star A	150
Star B	300

ANSWER _____

2 Your science club makes a stargazing poster. Its model places the Sun 6 units from Earth and another star 180 units from Earth. A draft says the other star is 20 times as far away. What number should replace 20? Explain why the Sun looks larger and brighter than distant stars.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Use the model table. How many times as far away as the Sun are Star P and Star Q? If all three stars were the same size and gave off the same amount of light, which would look brightest from Earth? Explain using the distances.

THREE-STAR DISTANCE MODEL

Object	Distance from Earth in units
Sun	14
Star P	280
Star Q	420

WORK SPACE AND ANSWER

ANSWER KEY

Stars Near and Far

GRADE 5 · 5.10

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In a model, the Sun is 3 units from Earth and another star is 45 units from Earth. How many times as far away is the other star?	**15 times as far away**
2	In a model, the Sun is 4 units from Earth and another star is 80 units from Earth. The other star looks smaller. How many times as far away is it? Does its appearance prove that it is physically smaller than the Sun? Explain briefly.	**It is 20 times as far away. No, a star can look smaller because it is farther away.**
3	In a model, the Sun is 5 units from Earth. Another star is 18 times as far away. How many units from Earth is the other star?	**90 units**
4	Use the model table. Which star, A or B, is nearer to Earth? How many times as far away as the Sun is that star?	**Star A is nearer. It is 16 times as far away as the Sun.**
5	In a model, the Sun is 8 units from Earth and another star is 200 units from Earth. How many times as far away is the other star? If the two stars were the same size and gave off the same amount of light, which would look larger and brighter from Earth?	**The other star is 25 times as far away. The Sun would look larger and brighter.**
6	In a model, the Sun is 10 units from Earth and another star is 120 units from Earth. A student says the other star is 10 times as far away. Find the correct comparison.	**The other star is 12 times as far away.**

PART 2 · APPLY IT

1. **Star A is 75 times as far away. The Sun would look larger and brighter.** Divide 150 by 2 to get 75. Of the two equally sized, equally light-producing stars, the closer Sun would look larger and brighter.
2. **Replace 20 with 30. The Sun looks larger and brighter because it is much closer to Earth.** Divide 180 by 6 to get 30. The model comparison supports an explanation based on distance, not a claim that the Sun is physically larger than every other star.

CHALLENGE

Star P is 20 times as far away as the Sun, and Star Q is 30 times as far away. The Sun would look brightest because it is closest to Earth.

Accept equivalent wording that compares each star's distance with the Sun's distance. Students should not claim that a star's physical size or light output can be determined from how large or bright it appears.