

KINESTHETIC ASTRONOMY™

Written Assessment Options for the *Sky Time* Lesson

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WHAT DO YOU KNOW? [p 1 of 3]

1. Draw arrows to connect each box with the correct place on planet Earth.



2. Draw the EQUATOR on the Earth cartoon above.

3. Order the objects below from smallest (1) to largest (3).

_____ Earth

_____ Moon

_____ Sun

4. Order the objects below from closest (1) to farthest (3) from Earth.

_____ Sun

_____ Moon

_____ North Star

5. How many stars are in the Solar System? _____

6. How do you think people kept track of time before the invention of clocks, watches, and numbered calendars? What is a day? What is a year?

7. If it is noon where you are, what time is it on the opposite side of Earth?

WHAT DO YOU KNOW? [p 2 of 3]

8. How does the Sun appear to move in the sky during the day? Draw the path of the Sun on the diagram below.



9. Why do you think the Sun appears to rise in the East and set in the West?

10. Do stars and constellations also appear to rise and set?

Circle one: YES NO

Explain:

11. Does Earth move in space? Circle one: YES NO

Explain (draw pictures if it helps to explain):

Name: _____

WHAT DO YOU KNOW? [p 3 of 3]

12. How many trips around the Sun have you made in your life? _____

13. Do we see the same stars and constellations at different times of year?

Circle one: YES NO

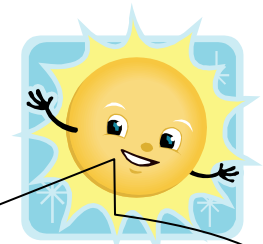
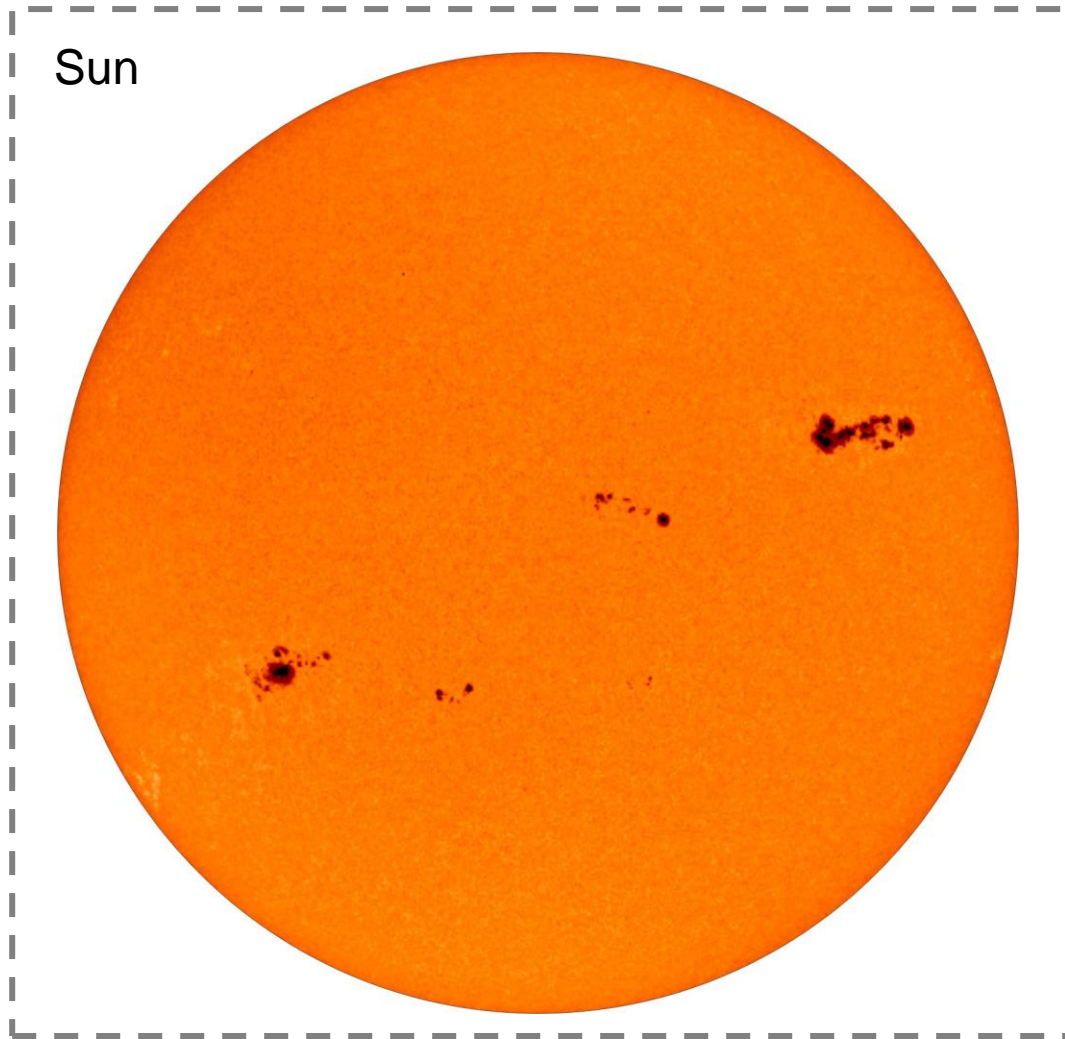
Explain (use drawings if it helps you to explain):

SCALE MODEL OF THE SUN, EARTH AND MOON

Name: _____

Here are images that show the relative size of the Sun compared to the Earth and Moon. In reality all of these objects are 10 billion times wider. This page is too small to show the properly scaled distance between the Sun and the Earth-Moon system. That part is up to you!

First, cut out the images along the dashed lines. Then **measure about 14 meters (45 ft) from the Sun to the Earth-Moon system**. Now you have your own scale model!



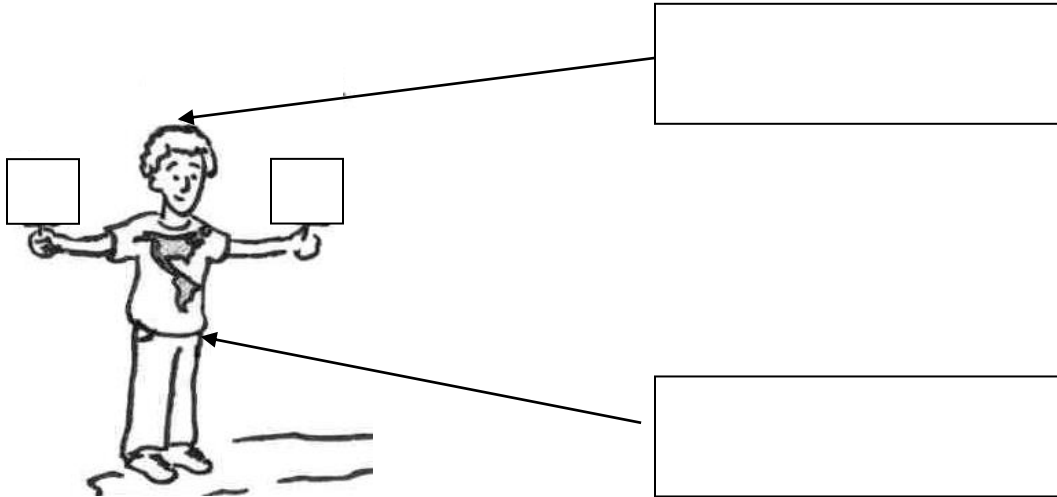
Question: How far away would the nearest star to the Sun be in this scale?

Name: _____

BODY GEOGRAPHY

DIRECTIONS:

1. Label the North and South Poles by filling in the boxes shown.
2. Fill in the "E" and "W" signs in the student's hands.
3. Draw the Equator on the boy (whose upper body represents the whole Earth).



Name: _____

KINESTHETIC TIMES OF DAY

- A. Write the correct times of day for someone on the front of the rotating boy
Choose from: **SUNRISE, SUNSET, NOON OR MIDNIGHT**



1. _____



2. _____

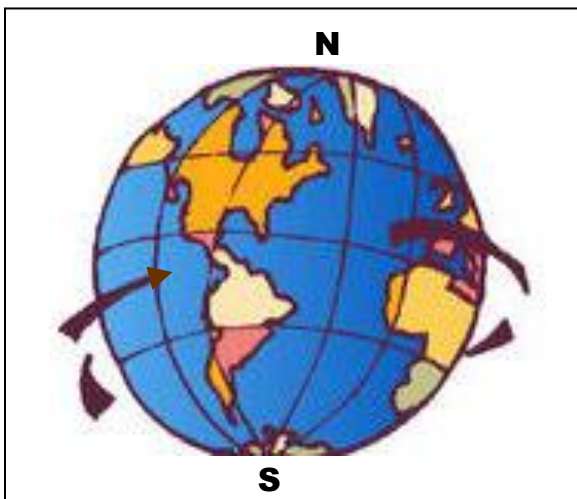


3. _____



4. _____

- B. Fill in the blanks below



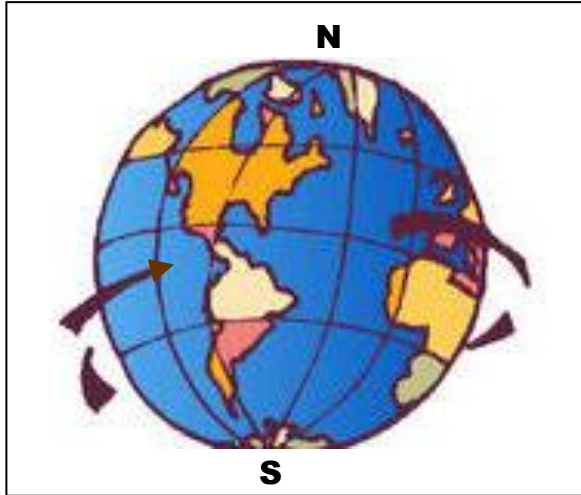
Earth turns about its axis. We call this movement _____.

Earth takes _____ hours to rotate around. We call this length of time Earth's rotational period.

Name: _____

ROTATION VS. ORBIT

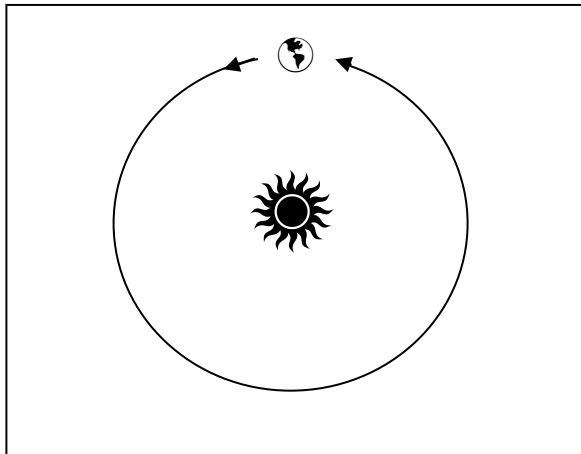
Fill in the blanks below



Earth turns about its own axis. We call this movement _____.

Earth takes _____ hours to rotate around. We call this length of time

Earth's rotational period.



Earth moves around the Sun. We say that Earth _____ the Sun.

Earth takes _____ days to go once around. We call this length of time

Earth's orbital period.

Name: _____

YOUR BIRTHDAY STARS [p 1 of 2]

Use the *Zodiac Diagram* to answer these questions.

1. Estimate the date at the girl's position: _____.
2. Name a Zodiac constellation that would be visible to her *at midnight*.

3. Write the names of two Zodiac constellations that would be visible in the night sky *at midnight* on the Summer Solstice (21 June).

4. Do we see different stars at different times of year?

Circle one: YES NO

Explain:

5. Write down your birthdate (day, month, year): _____

6. Mark an "X" on the Diagram to show your birthday position in Earth's orbit around the Sun.

7. Write the names of two constellations that would be visible in the night sky *at midnight* on your birthday:

8. Can you see the constellation representing your "sign" of the Zodiac in the night sky on your birthday?

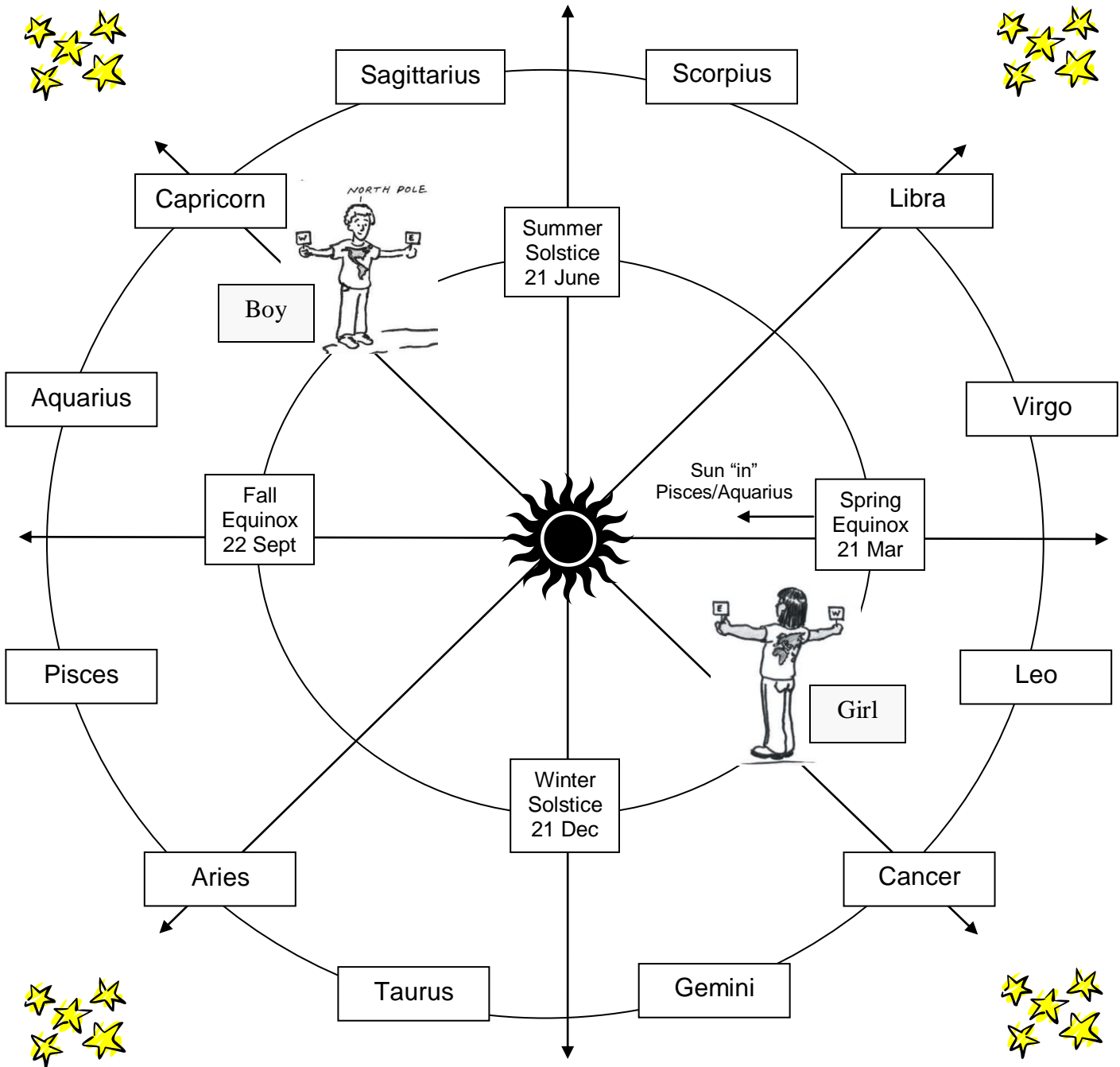
Circle one: YES NO

Explain:

THE ZODIAC DIAGRAM [p 2 of 2]

Use this Zodiac Diagram to answer questions.



REMEMBER: During the lesson, you were standing around the inner circle with your body representing Earth in orbit around the Sun.



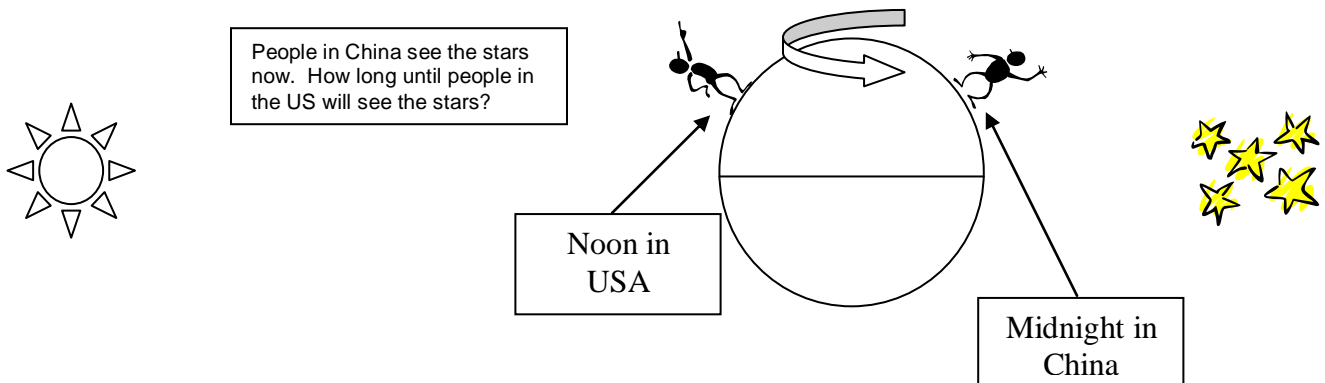
THE NIGHT SKY IN CHINA

Fill in the answers and design a kinesthetic demonstration

1. Do you think people in the US will see pretty much the same stars tonight as people in China saw 12 hours ago? **Circle one:** **YES** **NO**

 **STOP! RECORD AND KEEP YOUR ANSWER ABOVE. THEN GO ON TO SEE IF YOUR ANSWER CHANGES OR STAYS THE SAME BY THE END. LET'S GO!** 

2. What is Earth's rotational period (in hours)? _____
3. What is Earth's orbital period around the Sun (in days)? _____
4. How many times does Earth rotate during one orbit of the Sun? _____
5. How many degrees are in a circular orbit? _____°
6. So *about* how many degrees does Earth move in orbit in one day? _____°
Explain:
7. Look at the diagram. How long will it take for Earth to rotate from noon in the USA (midnight in China) to midnight in the USA (noon in China)? _____hrs?
8. So *about* how far will Earth have moved in its orbit during this time? _____°



9. Will people in the US see pretty much the same stars tonight as people in China saw 12 hours ago? **Circle one:** **YES** **NO**
10. Work in pairs to design a **kinesthetic demonstration** that proves your answer.

WHAT HAVE YOU LEARNED? [p 1 of 4]

1. How many stars are in the Solar System? _____
2. Provide the TWO answers requested in the box below:

Sun-Scale

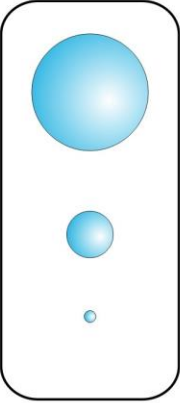
If the Sun were this BIG ▶▶▶▶▶
 what size would Earth be, compared to the Sun?

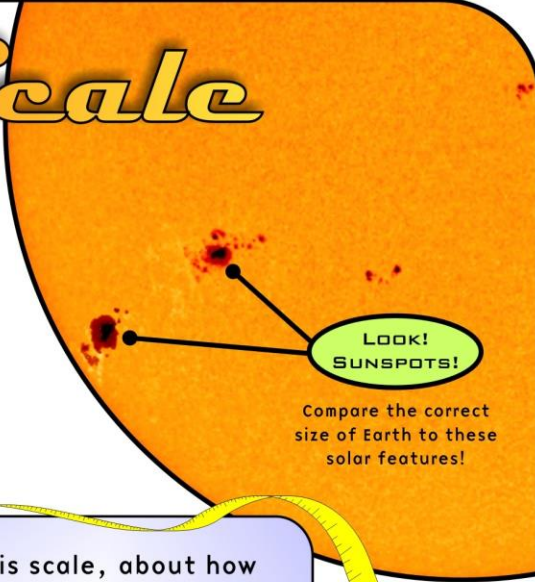
Circle your answer.

A

B

C





On this scale, about how far from the Sun would Earth be?

Layout adapted from the *Family Guide to the Sun*
 See <http://www.spaceweathercenter.org/resources/04/04.html>

3. Write the correct times of day for someone on the front of the rotating boy.



1. _____ 2. _____ 3. _____ 4. _____

Choose from **SUNRISE**, **SUNSET**, **NOON** or **MIDNIGHT**.

Name: _____

WHAT HAVE YOU LEARNED? [p 2 of 4]

4. Do stars appear to rise and set? Why or why not?

5. Fill in the blanks below and DRAW PICTURES to show what you mean.

a) Earth turns about its own axis. It takes _____ hours to turn once around.

We call this movement _____.

DRAWING of Earth doing this movement:

b) Earth moves around the Sun. It takes _____ days to go once around.

We say that Earth is in _____ around the Sun. How many trips around the Sun have you made in your life? _____

DRAWING of Earth doing this movement:

6. How many times does Earth rotate during one orbit of the Sun?

7. About how much (out of 360°) does Earth move in orbit in one day?
_____° Explain your reasoning:

WHAT HAVE YOU LEARNED? [p 3 of 4]

8. Refer to the Zodiac Diagram on the next page to answer these questions:

a) Estimate the date at the boy's position: _____.

b) Name a Zodiac constellation that would be visible to him *at midnight*:

c) Estimate the date at the girl's position: _____.

d) Name a Zodiac constellation that would be visible to her *at midnight*:

e) Write the names of two constellations that would be visible in the night sky *at midnight* on the Winter Solstice (21 December).

f) Do we see the same stars at different times of year? Why or why not?

g) Write down the date of your birthday: _____

h) Mark an "X" on the Diagram to show your birthday position in Earth's orbit.

i) Write the names of two constellations that would be visible in the night sky *at midnight* on your birthday.

j) **BONUS:** Can you see the constellation representing your "sign" of the Zodiac in the night sky on your birthday? Explain your answer on the back.

THE ZODIAC DIAGRAM [p 4 of 4]

DIRECTIONS: Use this Zodiac Diagram to answer questions.

REMEMBER: During the lesson, you were standing around the inner circle with your body representing Earth in orbit around the Sun.

