# KINESTHETIC ASTRONOMY™
## Written Assessment Options for the *Sky Time* Lesson
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Name: _____

# WHAT DO YOU KNOW? [p 1 of 3]

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

NORTH AMERICA

SOUTH POLE

NORTH POLE

SOUTH AMERICA

**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?**

_____




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# 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.**

**East Looking South West**

**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):**




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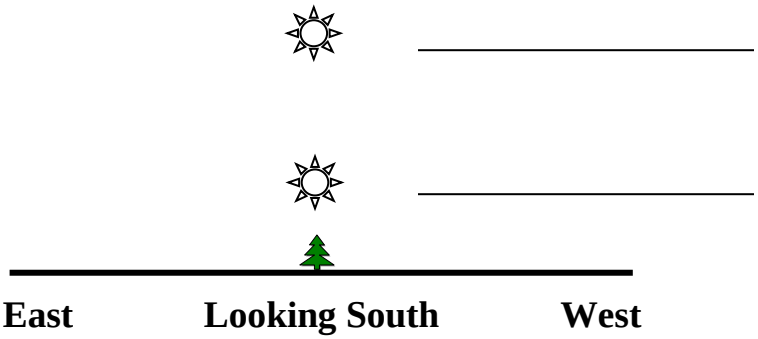
# WHAT DO YOU KNOW? [p 3 of 3]

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

**13. Write "summer" next to the sun that represents noon time in the summer. Write "winter" next to the sun that represents noon time in the winter.**




**14. In what season do we experience the most daylight hours? _____**

**15. Why is it hotter in summer and colder in winter?**
**(Use drawings if it helps you to explain)**

**16. 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):**

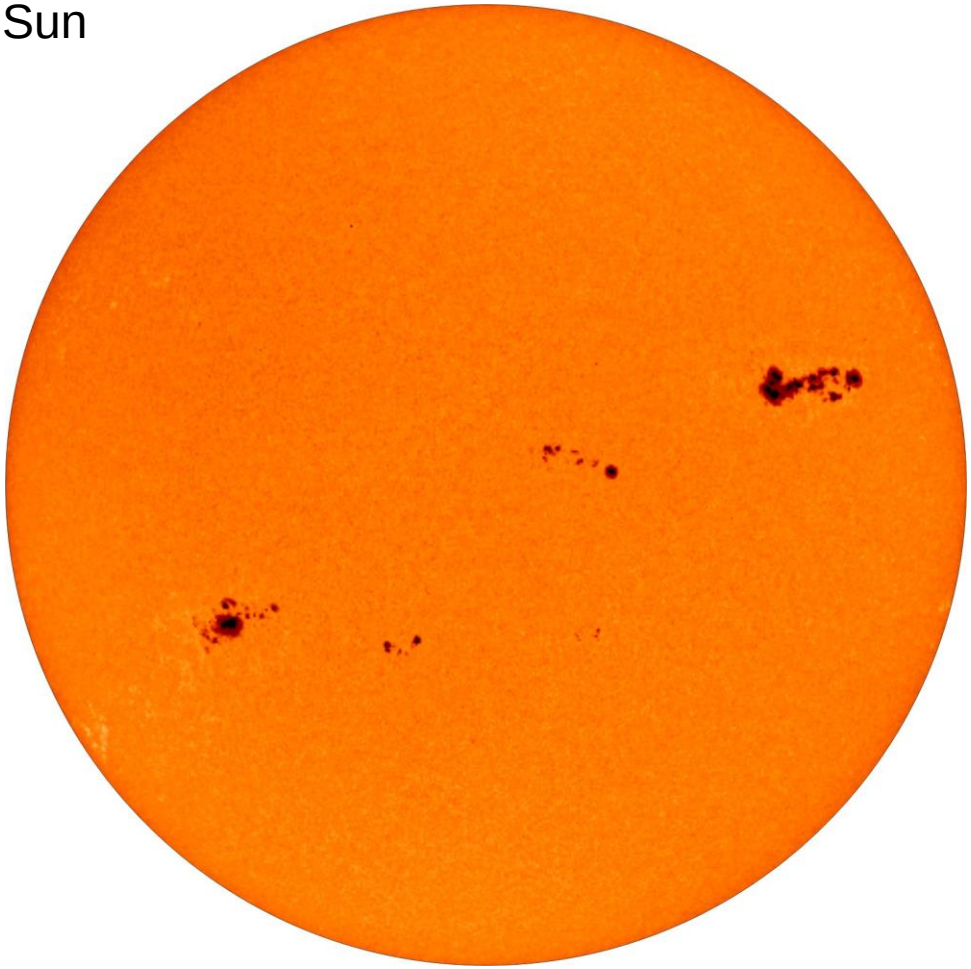
Name: _____

# SCALE MODEL OF THE SUN, EARTH AND MOON

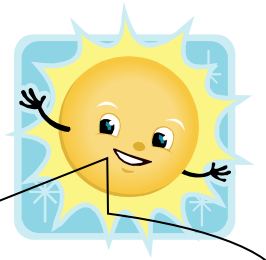
Here are images that show the relative size of the Sun compared to the Earth and Moon. In reality all of these objects are 10 billion times wider. This page is too small to show the properly scaled distance between the Sun and the Earth-Moon system. That part is up to you!

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!

Sun



Moon Earth



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

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**Answer:** Alpha Centauri would be about 4000 km (2400 miles) away in this scale model – like having the cut-out Sun in California and a cut-out star in New York!

Name: _____

# EXPLORING THE STRUCTURE OF THE UNIVERSE

**Fill in the blanks. ~~Cross out~~ the words below as you use them.**

| | | | | | |
|---|---|---|---|---|---|
| asteroids | galaxy | meteoroids | orbit | Solar System | Sun |
| comets | galaxies | moon | planets | star | Universe |
| Earth | Jupiter | moons | planets | Sun | 100 billion |

The Sun is a _____ located at the center of our _____. Our home, called _____, is one of at least 8 _____ that orbit around the _____. Earth has one _____ that orbits around it each month, showing different phases. Some planets have many _____ that _____ around them. Mercury and Venus have no moons. In addition to the Sun, planets, and moons the Solar System contains smaller objects such as _____, _____, and _____. Sometimes these smaller objects collide with the larger objects. Most meteors are between the size of a grain of sand and a peanut, but they can make a bright streak across the sky as they travel through Earth's atmosphere. In 1994, astronomers all over the world watched a comet break up and impact the atmosphere of the largest planet in the Solar System called _____. Our _____ is one of about _____ stars contained in the _____ we call the Milky Way. Astronomers are just now discovering Jupiter-sized _____ that orbit around some of those distant stars. Outer space is even bigger yet because the Milky Way is only one of an estimated 100 Billion (100,000,000,000) _____ in the _____!




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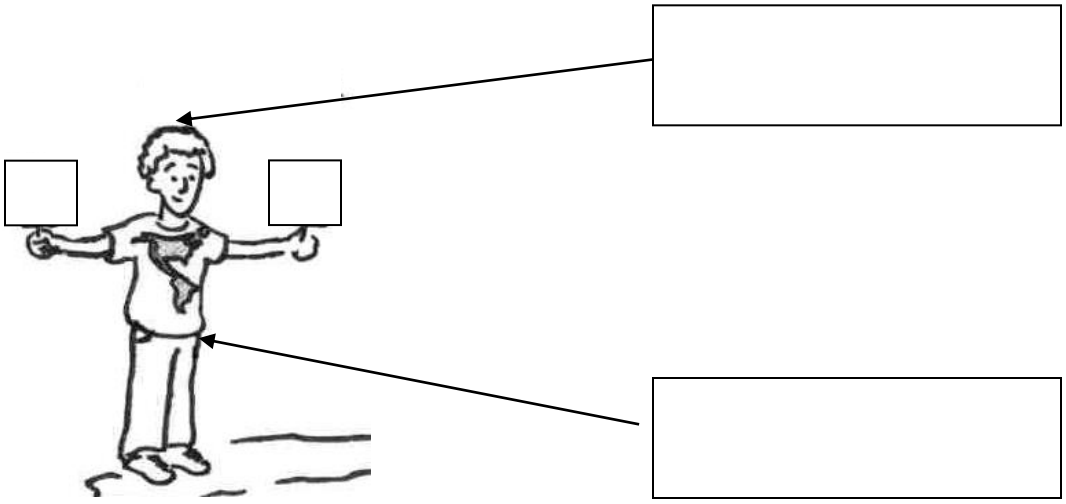
# BODY GEOGRAPHY

**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).



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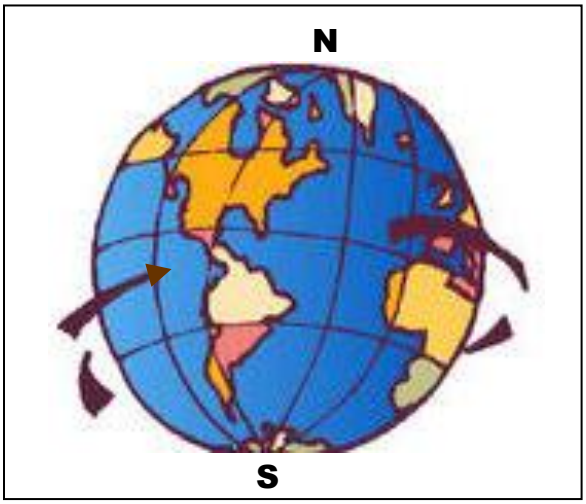
# KINESTHETIC TIMES OF DAY

**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**



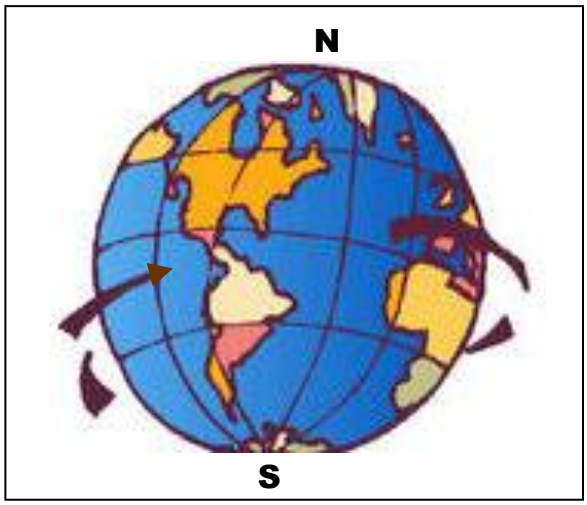

Earth turns about its axis. We call this movement _____.

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

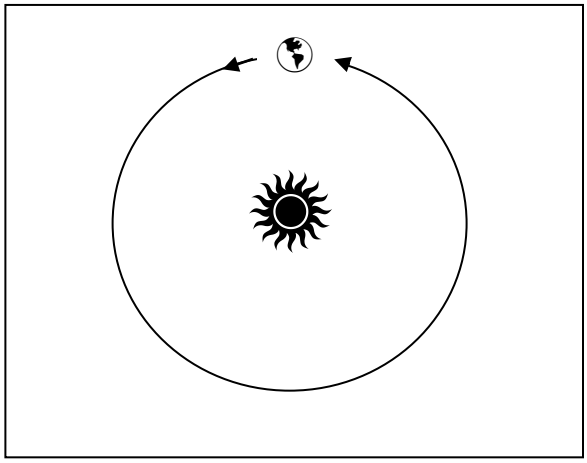
Name: _____

# 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.

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# 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**:




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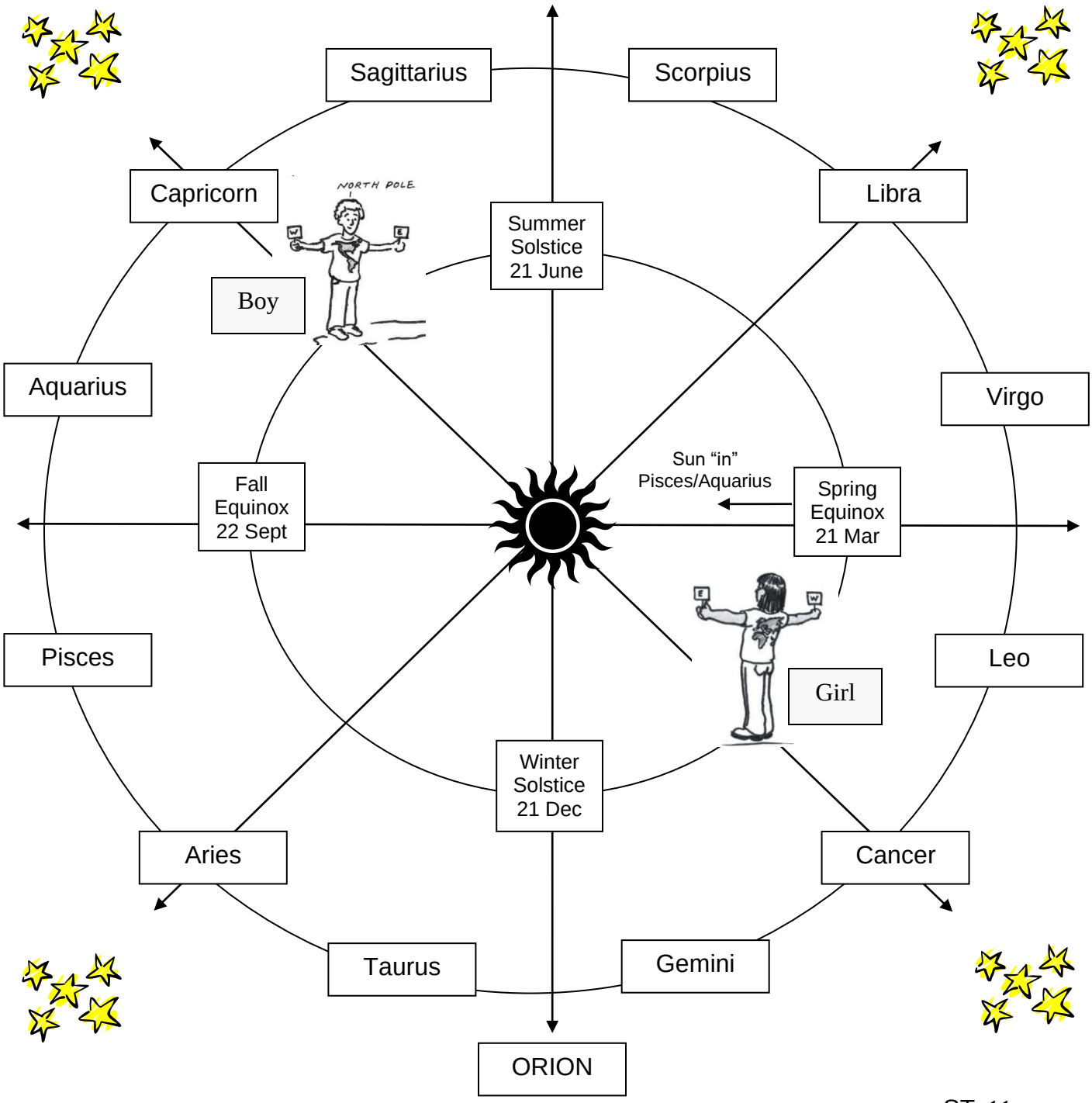
# THE ZODIAC DIAGRAM [p 2 of 2]

**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.







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Name: _____

# DIFFERENT STARS FOR DIFFERENT SEASONS
## FILL-IN-THE-POEM

**by Cherilynn Morrow**
cheri@KinestheticAstronomy.net

**Use the words at the bottom to fill in the blanks of the poem. As you choose your answers, be sure to consider the astronomy you know as well as the rhyming scheme.**

Now we KNOW planet __ __ __ __ __, she does circle the __ __ __;.

And it takes her a __ __ __ __ 'til one orbit is done.

She __ __ __ __ __ to a pole star – this causes the __ __ __ __ __ __ __,

And moves through our birthdays with gravity's reason.

There's __ __ __ the lion – we see THIS in the Spring,

But night skies in Fall gives us Pegasus' wings.

In summertime nights we see Cygnus the swan;

In __ __ __ __ __ __, Orion flies dusk until __ __ __ __.

So why DO we not see the same constellations,

As Earth __ __ __ __ __ __ 'round through her seasonal stations?

See, the __ __ __ __ __ side of Earth – without Sun's reflections –

Faces out to the __ __ __ __ __ in different __ __ __ __ __ __ __ __ __ __.

| | | |
|---|---|---|
| STARS | YEAR | SEASONS |
| ORBITS | DAWN | WINTER |
| TILTS | NIGHT | EARTH |
| DIRECTIONS | LEO | SUN |




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Name: _____

# THE NIGHT SKY IN CHINA

## Fill in the answers and design a kinesthetic demonstration

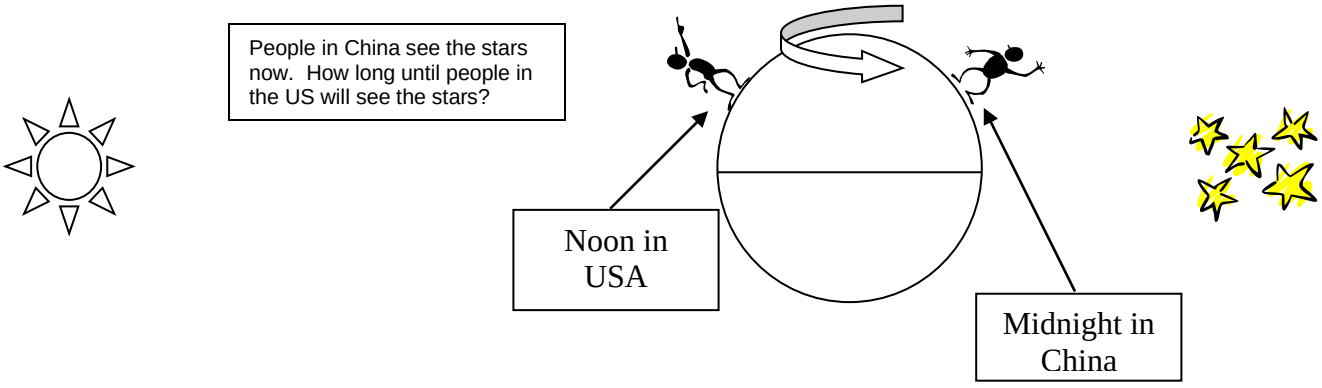
1. Do you think people in the US will see pretty much the same stars tonight as people in China saw 12 hours ago? **Circle one: YES NO**

**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? _____º
6. So *about* how many degrees does Earth move in orbit in one day? _____º
   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? _____ º



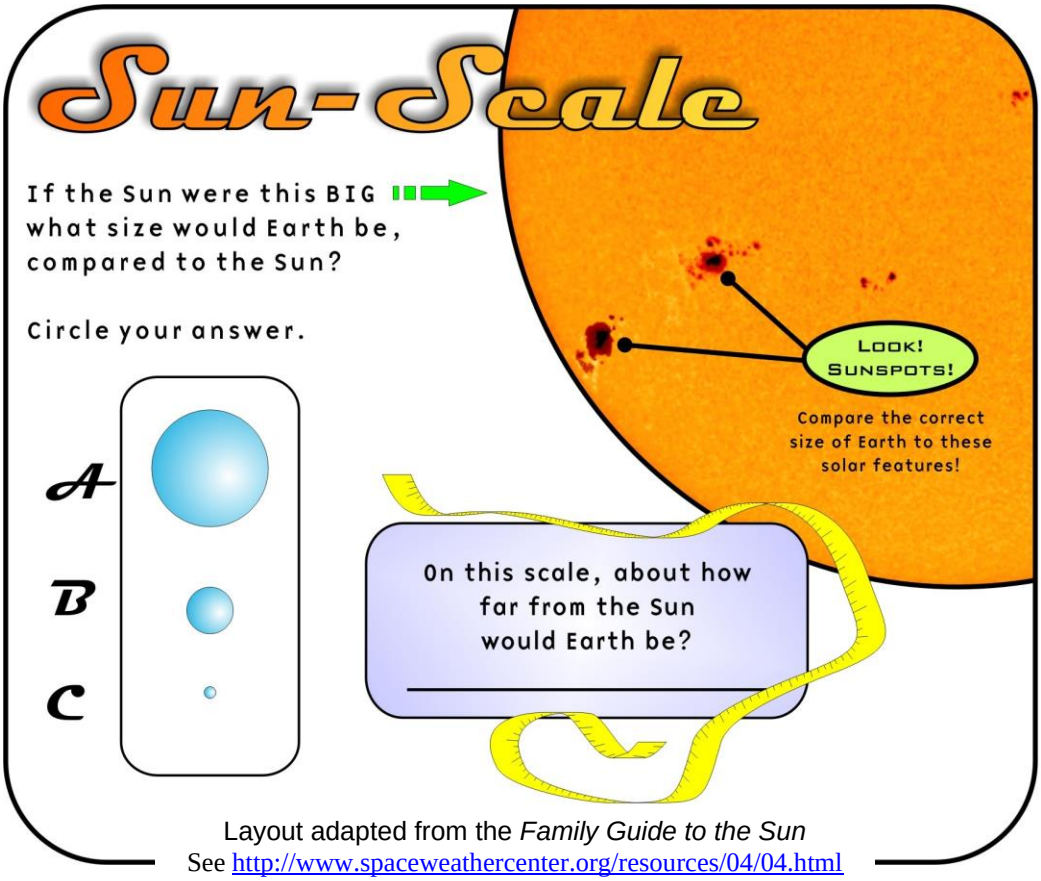

9. Will people in the US see pretty much the same stars tonight as people in China saw 12 hours ago? **Circle one: YES NO**
10. Work in pairs to design a ***kinesthetic demonstration*** that proves your answer.

Name: _____

# WHAT HAVE YOU LEARNED? [p 1 of 4]

1. **How many stars are in the Solar System? _____**

2. **Provide the <u>TWO answers</u> requested in the box below:**




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.**

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Name: _____

# WHAT HAVE YOU LEARNED? [p 2 of 4]

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

4. **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:**

5. **How many times does Earth rotate during one orbit of the Sun? _____**

6. **About how much (out of 360º) does Earth move in orbit in one day? _____º Explain your reasoning:**

Name: _____

# WHAT HAVE YOU LEARNED? [p 3 of 4]

**7. 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.

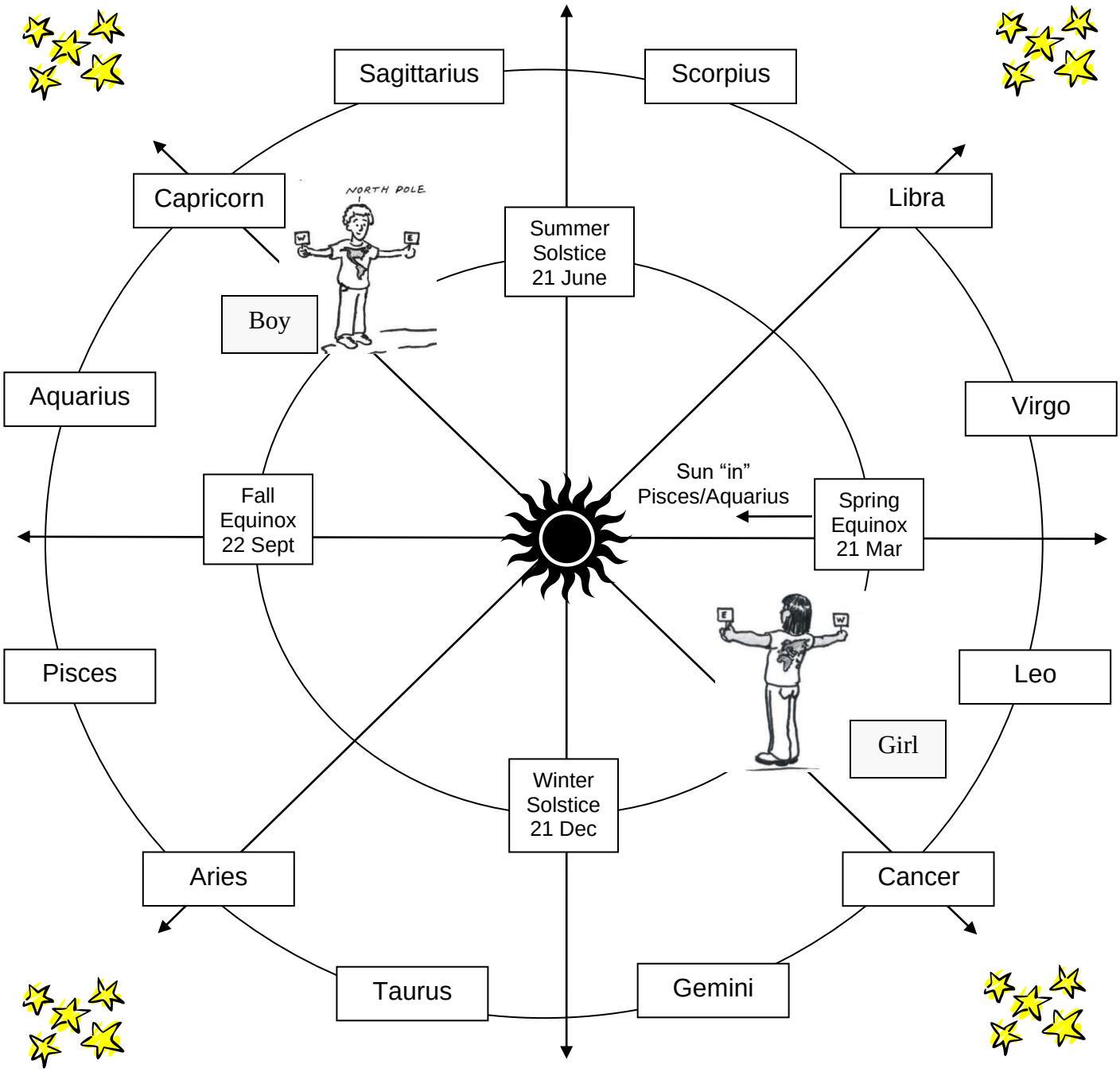
_____ _____

**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.







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