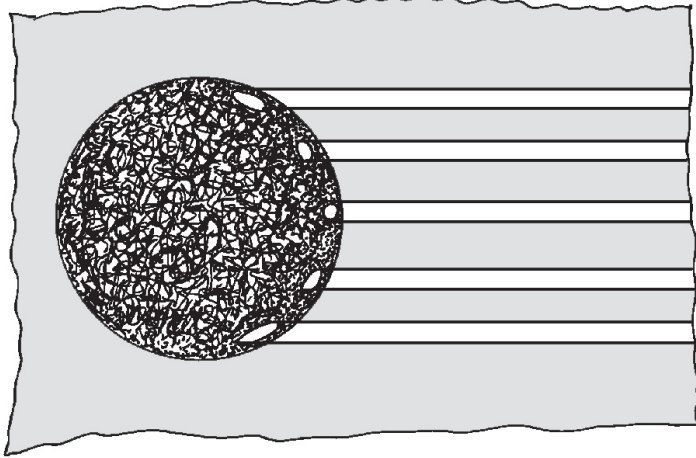
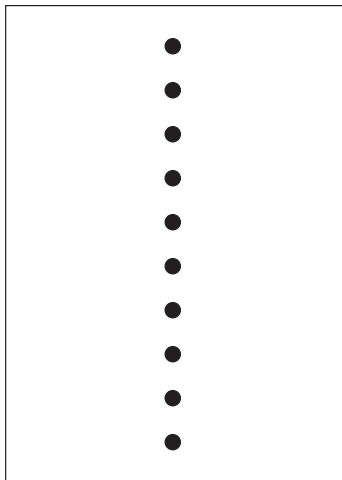


ANGLE OF SUNLIGHT 1



OUTCOME: Students learn about another reason for the seasons, the angle of sunshine striking the surface of the earth and the area covered by sunlight.



Direct light in summer heats the Earth more than the indirect light we receive in the winter. Helping children to understand indirect light can be very difficult, but it is key to understanding one of the causes of the seasons.



SUPPLIES: punched sheet, overhead projector, globe

PROCEDURE:

A specially prepared sheet can be found in the supply kit. Evenly spaced holes were punched down the paper.

By placing this sheet on the overhead, circles of light are projected on the wall.

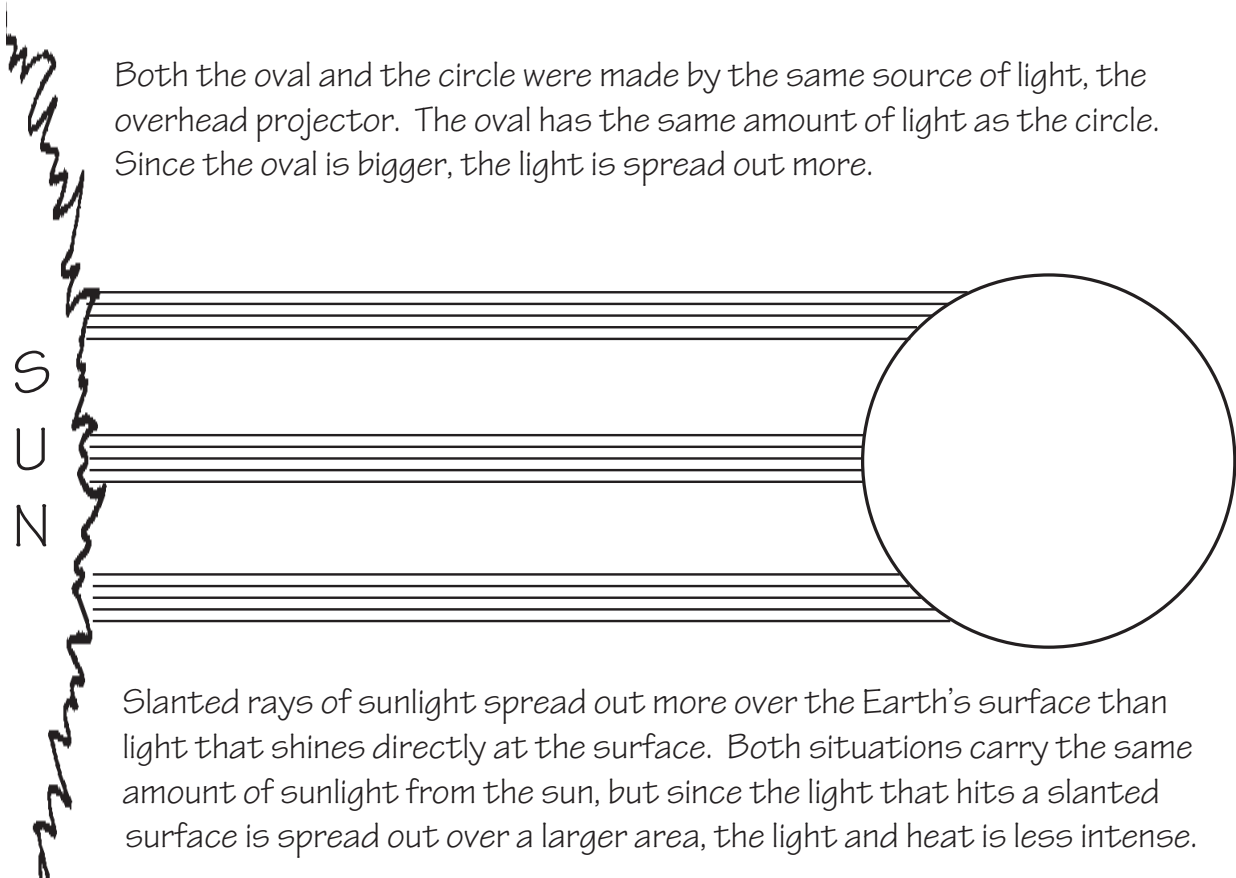
Place a globe in the path of the light with the light from the center hole on the sheet shining on the Equator on the globe.

Notice that the circle at the Equator is round. Sunlight shines directly onto the Equator.

The circles of light shining on the Northern and Southern Hemisphere are oval. Sunlight does not shine directly onto the land in these parts of the globe. Because of the curve of the Earth and the tilt of the axis of the Earth, the sunlight is spread out over more area in the Northern and Southern Hemisphere than at the Equator.

TEACHER BACKGROUND

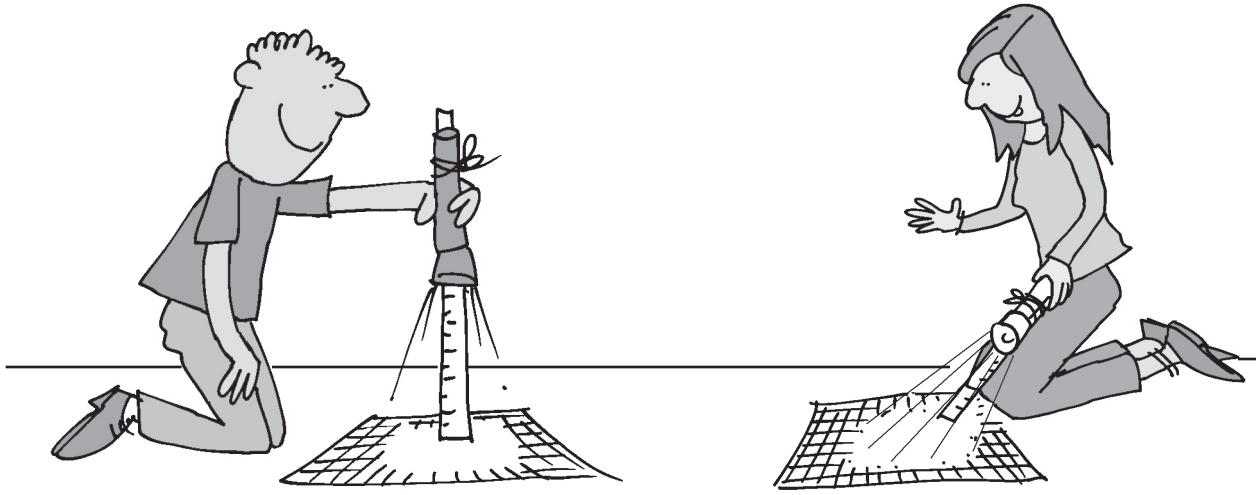
Both the oval and the circle were made by the same source of light, the overhead projector. The oval has the same amount of light as the circle. Since the oval is bigger, the light is spread out more.



Slanted rays of sunlight spread out more over the Earth's surface than light that shines directly at the surface. Both situations carry the same amount of sunlight from the sun, but since the light that hits a slanted surface is spread out over a larger area, the light and heat is less intense.

Places at the equator, where the sun shines directly, receive more direct sunlight. Places far from the equator receive less sunshine because it is spread out over a larger area.

ANGLE OF SUNLIGHT 2



OUTCOME: Students learn about another reason for the seasons, the angle of sunshine striking the surface of the earth and the area covered by sunlight.

Direct light in summer heats the Earth more than the indirect light we receive in the winter. Helping children to understand indirect light can be very difficult, but it is key to understanding one of the causes of the seasons. Students can think indirect is bounced light, sometimes from invisible objects in space.

SUPPLIES IN THE KIT: flashlight

SUPPLIES TO FIND: graph paper, protractor, ruler

PREPARE:

Use a rubber band to attach a flashlight to a twelve-inch ruler.

PROCEDURE:

Place a sheet of graph paper on a table.

Place the end of a student ruler in the center of the graph paper.

Shine the light from the flashlight onto the paper at a ninety-degree angle and notice the circle illuminated by the flashlight.

Move the ruler so that it forms a forty-five degree angle to the graph paper. How does the number of squares on the graph paper change?

Compare the circle of light created if the ruler is vertical to the table or at an angle to the table.

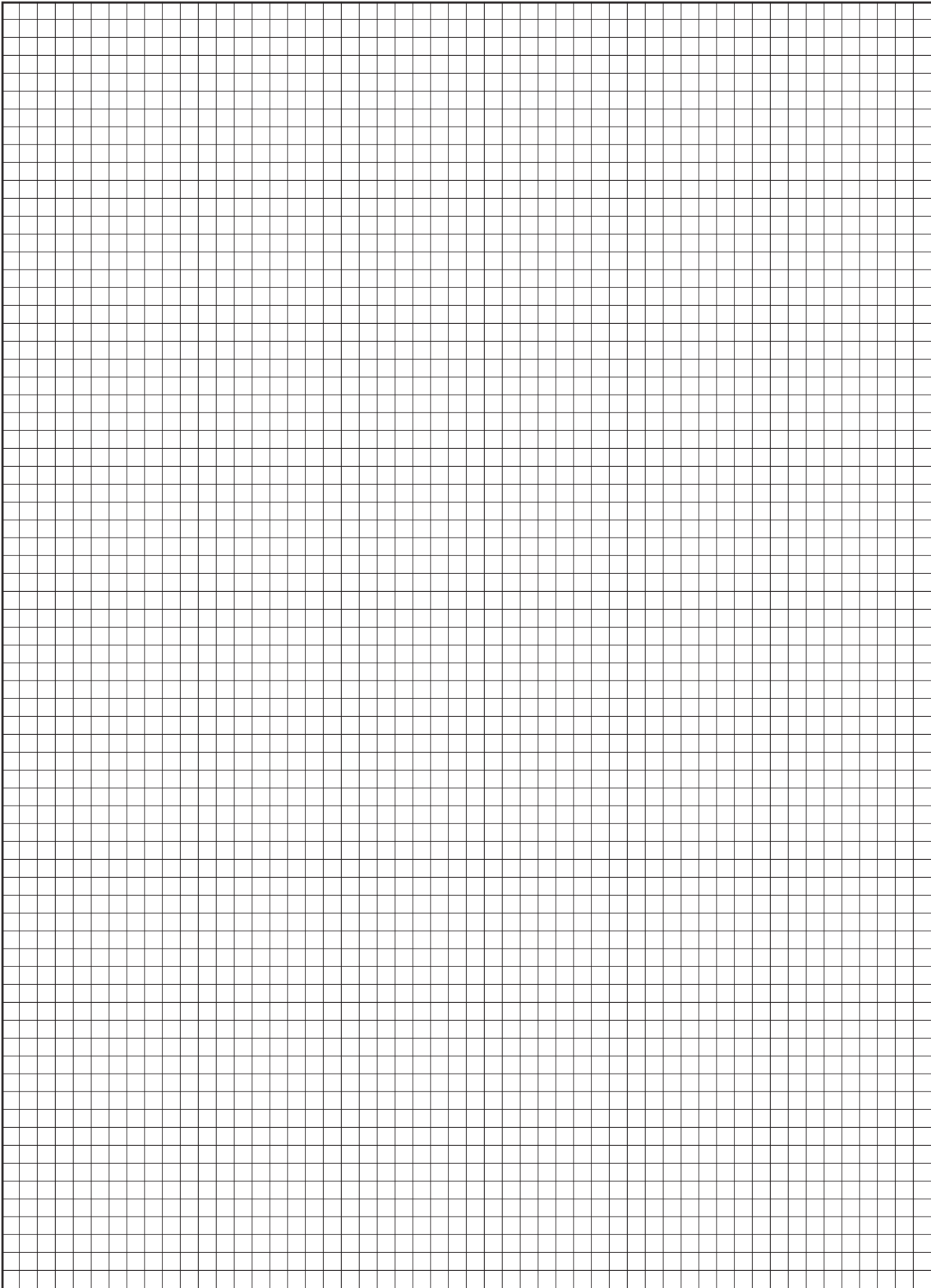
Count the number of squares that are brightly illuminated if the flashlight shines on the graph paper from above the paper or from the side.

Use a protractor to move the ruler so that it forms a 90° , 60° , 45° or 30° angle to the table. Count the squares brightly illuminated and graph them using the student worksheet.

TEACHER BACKGROUND

Both the oval and the circle were made by the same source of light, the flashlight. The oval has the same amount of light as the circle. Since the oval is bigger, the light is spread out more.

MATH CONNECTION: Use worksheet to graph the results of the experiment.



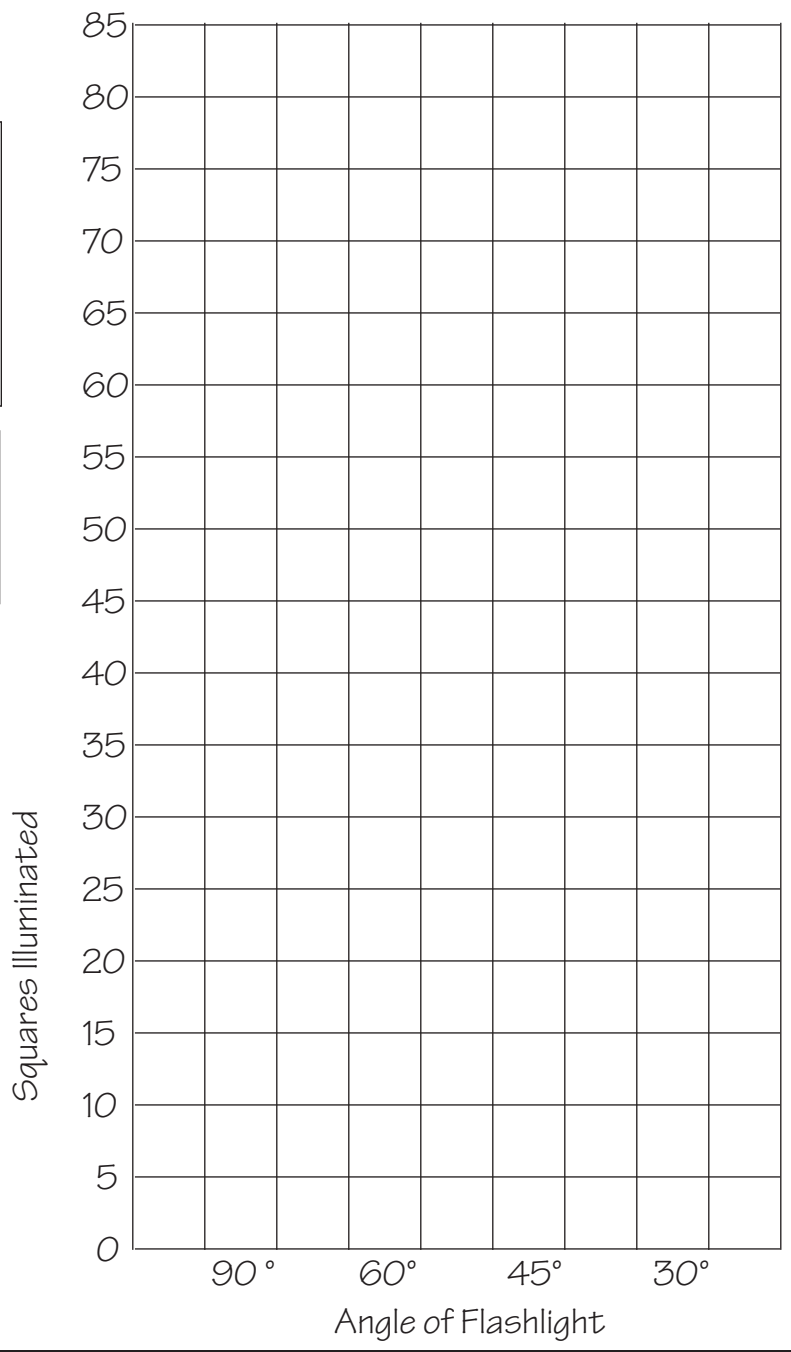
Name: _____

Record the squares covered by the light:

| Squares Illuminated: | |
|----------------------|----|
| Degree of Angle: | 90 |
| | 60 |
| | 45 |
| | 30 |

| KEY | |
|--------------------------|-------|
| <input type="checkbox"/> | day |
| <input type="checkbox"/> | night |

Graph the results of your data here:



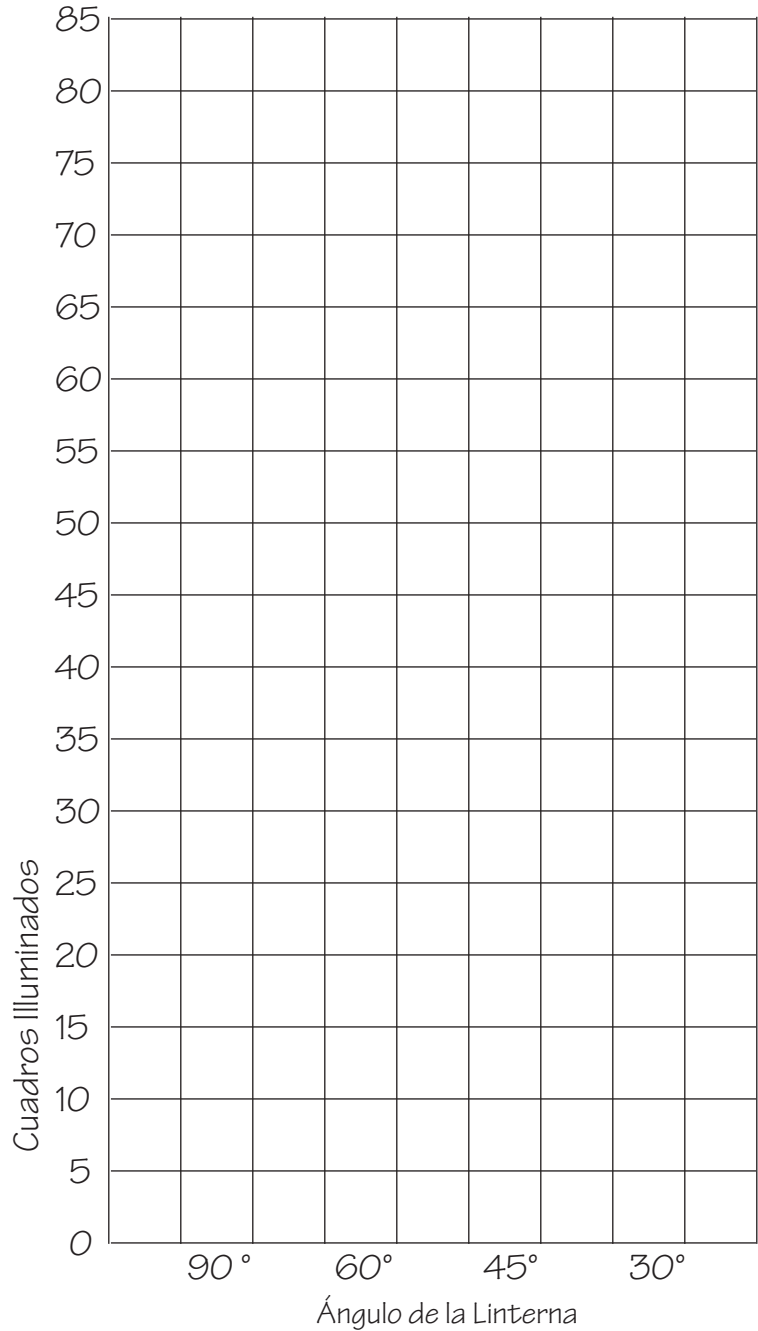
Nombre: _____

Registra los cuadros cubiertos por la luz:

Muestra los resultados de tu investigación aquí:

| Cuadros Iluminados: | |
|---------------------|----|
| Grado del Ángulo: | 90 |
| | 60 |
| | 45 |
| | 30 |

| CLAVE | |
|--------------------------|-------|
| <input type="checkbox"/> | dia |
| <input type="checkbox"/> | noche |



HOURS OF SUNSHINE



OUTCOME: Students learn that there are more daylight hours in the summer than in the winter. This is one of the causes of seasons.

Introduce one cause of the seasons, hours of sunlight each day, with a student worksheet.

SUPPLIES: worksheets, overhead transparency of worksheet

PROCEDURE:

Ask students if the time for sunrise and sunset are the same all year long. When they get up for school at the beginning of the year is it dark? How about in December? In July?

We're going to use a chart to calculate the length of the day in Oregon on the twenty-first day of each month for a year.

Hand out the charts for the year.

Show how to calculate the first month or two.

Sunrise and sunset change through the year. The Earth's tilt causes the length of the day to change in our state. Due to this difference in the length of day, we have more daylight in the summer than we do in the winter.



The simplest method might be to count out loud from sunrise 6:15, 7:15, 8:15, etc. until the sunset.

Continue to process the data while students each complete a chart. Some students may calculate on their own; others may simply copy your work.

The information for this activity was found at:

http://aa.usno.navy.mil/AA/data/docs/RS_OneYear.html

MATH CONNECTION: Information can also be graphed on a bar and line graph using the worksheets provided.

Name: _____



Calculate the hours of daylight given the sunrise and sunset times for the twenty-first day of each month in Oregon:

| Month | Sunrise | Sunset | Hours of daylight |
|-----------|---------|---------|--------------------|
| January | 7:43 am | 5:04 pm | 9 hours 21 minutes |
| February | 7:04 am | 5:48 pm | |
| March | 6:12 am | 6:27 pm | |
| April | 5:17 am | 7:06 pm | |
| May | 4:37 am | 7:41 pm | |
| June | 4:26 am | 8:02 pm | |
| July | 4:46 am | 7:50 pm | |
| August | 5:22 am | 7:08 pm | |
| September | 5:59 am | 6:11 pm | |
| October | 6:36 am | 5:16 pm | |
| November | 7:18 am | 4:38 pm | |
| December | 7:47 am | 4:34 pm | |

Nombre: _____

Calcula las horas de luz del día dando la hora del amanecer y del atardecer los días 21 de cada mes en Oregon:



| mes | Amanecer | Atardecer | horas de luz |
|------------|----------|-----------|--------------------|
| enero | 7:43 am | 5:04 pm | 9 horas 21 minutos |
| febrero | 7:04 am | 5:48 pm | |
| marzo | 6:12 am | 6:27 pm | |
| abril | 5:17 am | 7:06 pm | |
| mayo | 4:37 am | 7:41 pm | |
| junio | 4:26 am | 8:02 pm | |
| julio | 4:46 am | 7:50 pm | |
| agosto | 5:22 am | 7:08 pm | |
| septiembre | 5:59 am | 6:11 pm | |
| octubre | 6:36 am | 5:16 pm | |
| noviembre | 7:18 am | 4:38 pm | |
| diciembre | 7:47 am | 4:34 pm | |

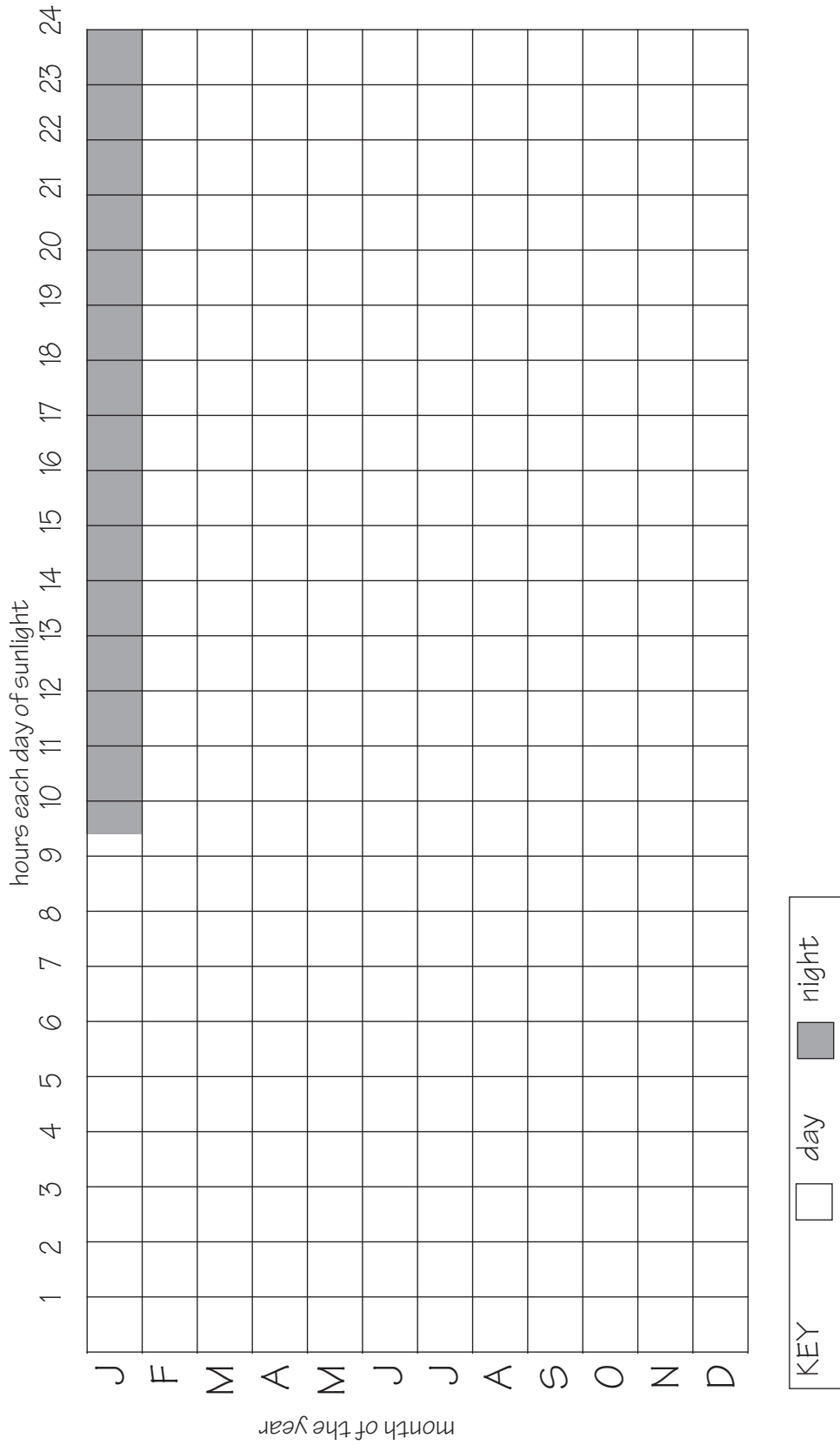
ANSWER KEY

Calculate the hours of daylight given the sunrise and sunset times for the twenty-first day of each month in Oregon.

| Month | Sunrise | Sunset | Hours of daylight |
|-----------|---------|---------|-------------------|
| January | 7:43 am | 5:04 pm | 9 h 21 m |
| February | 7:04 am | 5:48 pm | 10 h 44 m |
| March | 6:12 am | 6:27 pm | 12 h 15 m |
| April | 5:17 am | 7:06 pm | 13 h 49 m |
| May | 4:37 am | 7:41 pm | 15 h 4 m |
| June | 4:26 am | 8:02 pm | 15 h 36 m |
| July | 4:46 am | 7:50 pm | 15 h 4 m |
| August | 5:22 am | 7:08 pm | 13 h 46 m |
| September | 5:59 am | 6:11 pm | 12 h 12 m |
| October | 6:36 am | 5:16 pm | 10 h 40 m |
| November | 7:18 am | 4:38 pm | 9 h 20 m |
| December | 7:47 am | 4:34 pm | 8 h 47 m |

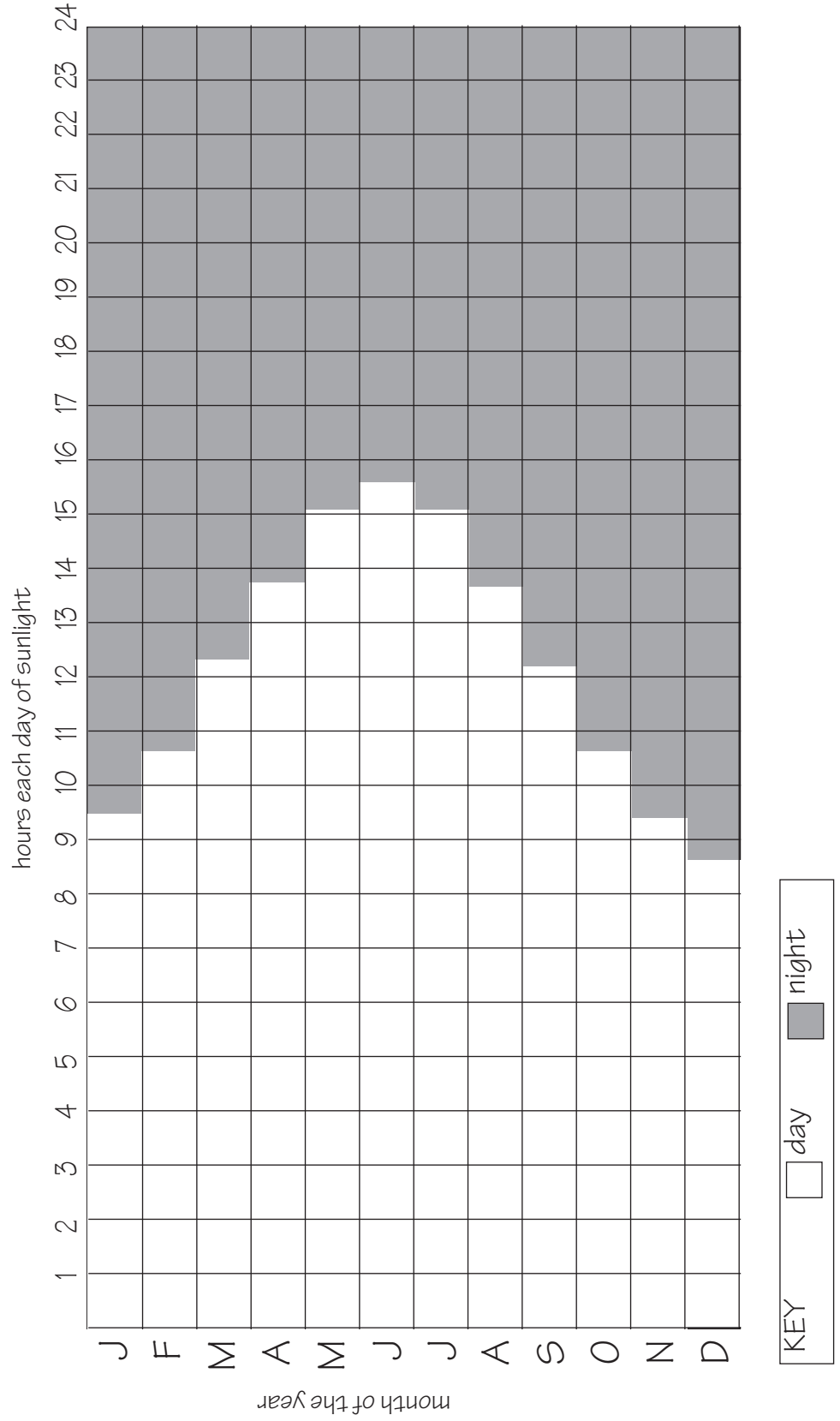
Name: _____

Hours of Sunlight and Darkness on the Twenty First Day of the Month in Oregon



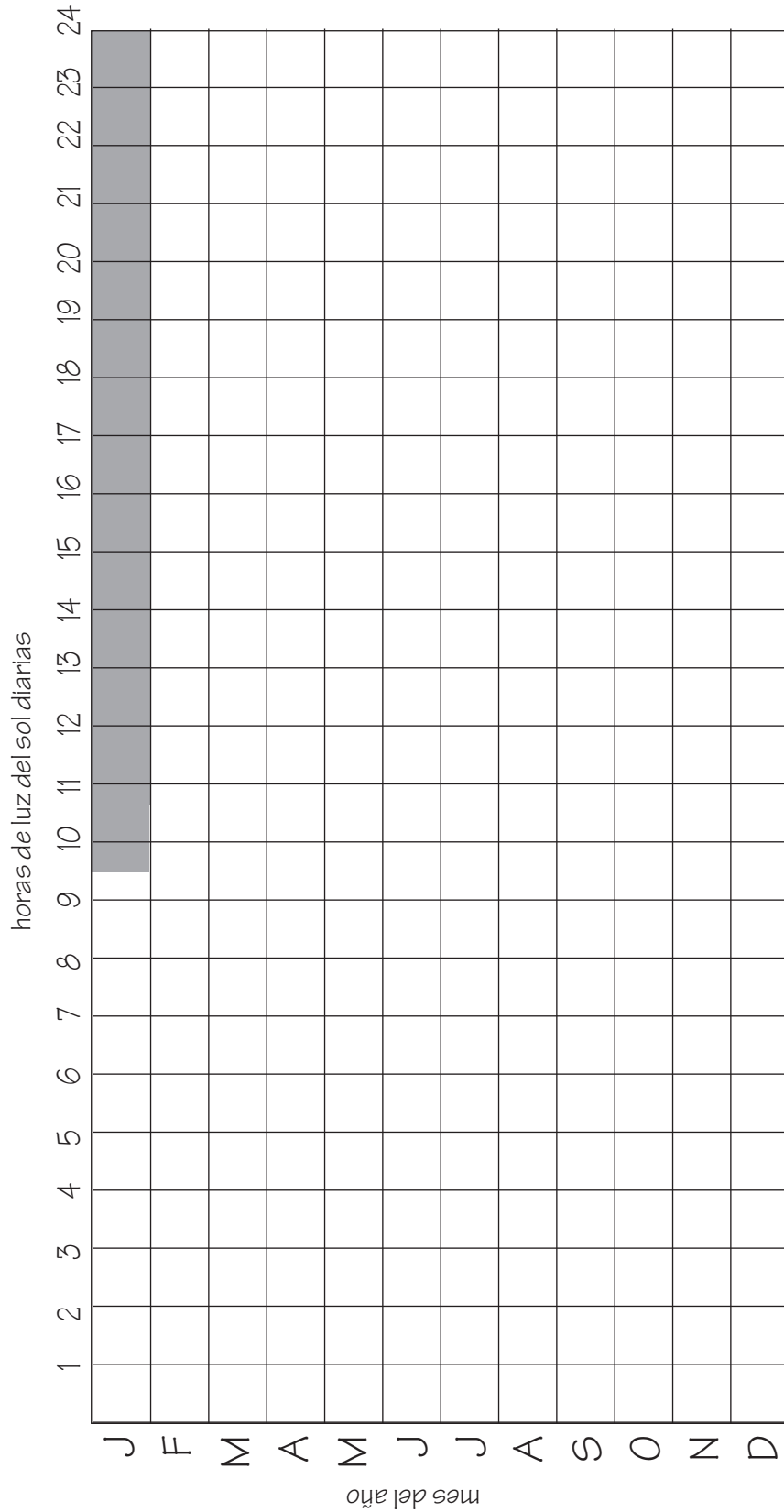
ANSWER KEY

Hours of Sunlight and Darkness
on the Twenty First Day of the Month in Oregon



Nombre: _____

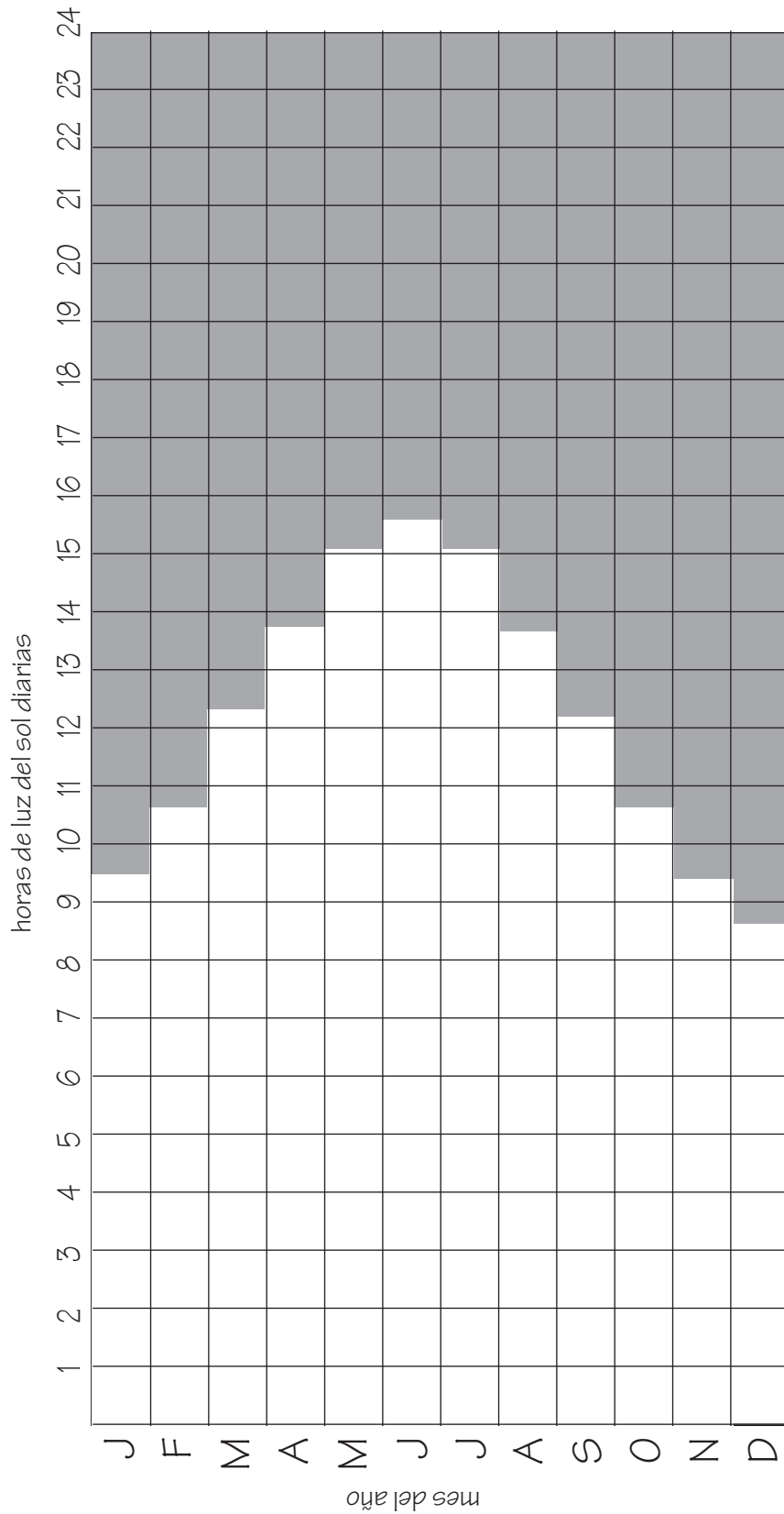
Horas de Luz del Sol y de Oscuridad
en los Días 21 de cada Mes en Oregon:



CLAVE DIA NOCHE

Nombre: _____

Horas de Luz del Sol y de Oscuridad
en los Días 21 de cada Mes en Oregon:



CLAVE DIA NOCHE