CODE:

Summer Science 2008—"Way to Go"

Student Assessment

It's Illuminating!

Please read each item carefully. Then circle the correct answer to the question (A, B, C, D)***. For each answer, also circle whether you are—***
A. Very sure, B. Somewhat sure, or C. My best guess.

Some questions may ask you to explain your answer in words.

1a. In Figure 1 below, a beam of light first strikes nearly straight on to a surface and lights up an area on the surface.

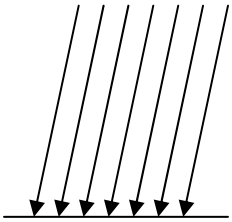


Figure 1 Striking nearly straight on

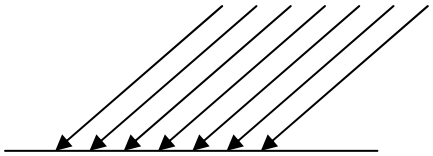


Figure 2. Striking more slanted

In Figure 2 above, the direction of the light beam is more slanted to the surface. What will happen to the area lighted by the beam?

A. It will be smaller.
B. It will be the same.
C. It will be larger.
D. One cannot say from this information alone.

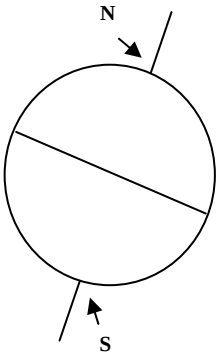
1b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

1c. When the beams of light strike at more of a slant (as in Figure 2 above) what will happen to the intensity (brightness) of the lighted surface area?

A. It will be less.
B. It will be the same.
C. It will be greater.
D. It is not possible to say.

1d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

2a. The diagram shows the earth with the equator and the axis marked. Temperatures on earth are hotter near the equator and colder toward the poles. The reason for the differences in temperatures is that . . .



A. the sun's light beams are more straight on to the ground at the equator and more slanted toward the poles.
B. regions near the equator are much closer to the sun than regions near the poles.
C. the length of daylight is always greater near the equator than the poles.
D. the earth's axis is tilted.

2b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

3. At a particular city "X" at noon, the sun's rays come in directly downward as shown in Fig.1 below.

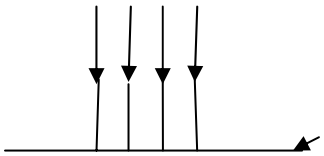


Figure 1

Figure 2 below shows a view of the earth as a globe, with light rays coming from the sun.

Figure 2

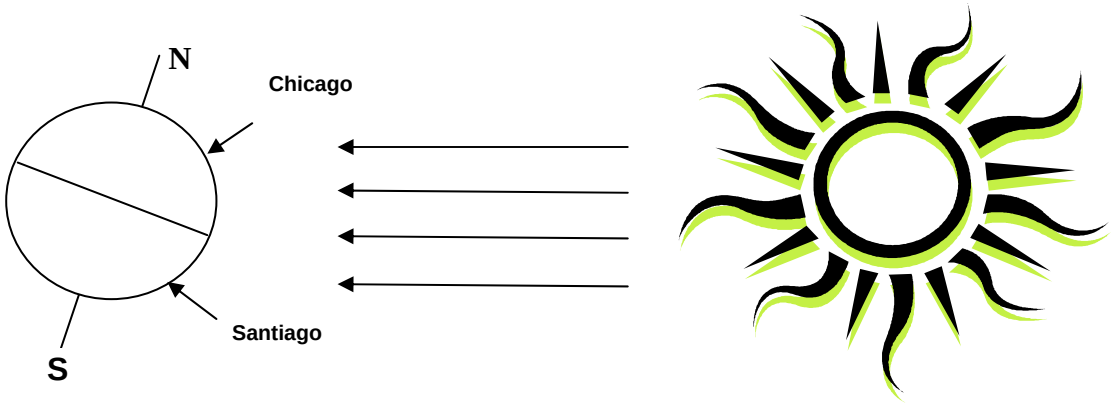
3a. Where must city "X" be located (on Figure 2), in order to have the sun's rays come in as shown in Figure 1?

A. location A C. location C
B. location B D. location D

3b. In Figure 2 above, which location would have the highest average temperature?

A. location A C. location C
B. location B D. location D

4a. The diagram below shows the earth in relation to the sun at a particular time of the year. The earth's axis, equator and the locations of Chicago in North America and Santiago in South America are shown.



In the diagram above, what season is it in Chicago?

A. summer
B. fall
C. winter
D. spring

4b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

4c. In the diagram above, what season is it in Santiago?

A. summer
B. fall
C. winter
D. spring

4d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

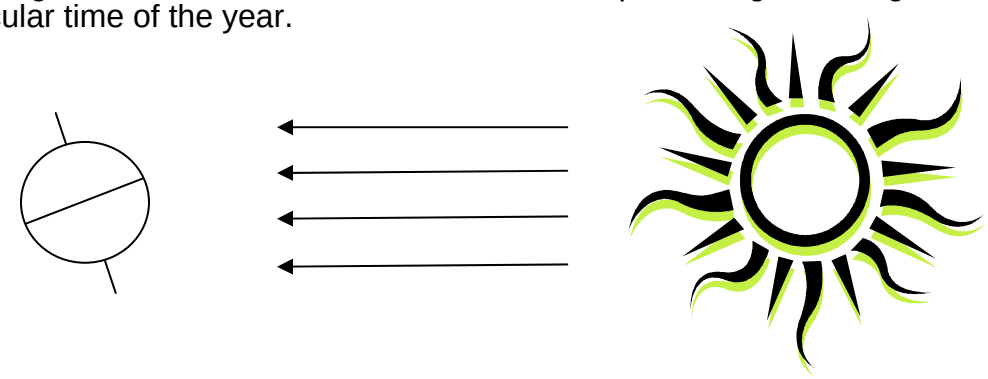
---

5a. In Chicago, it is colder in January than in July. The reason is that in January . . .

A. the earth is further from the sun.
B. the earth is nearer to the sun.
C. the sun is lower in the sky during the day.
D. the sun is higher in the sky during the day.

5b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

6a. The diagram below shows the earth in relationship to the light coming from the sun at a particular time of the year.



At this particular time of the year, what season(s) will be occurring in the northern and southern hemispheres?

A. *Summer* in the northern hemisphere and *Summer* in the southern hemisphere
B. *Summer* in the northern hemisphere and *Winter* in the southern hemisphere
C. *Winter* in the northern hemisphere and *Winter* in the southern hemisphere
D. *Winter* in the northern hemisphere and *Summer* in the southern hemisphere

6b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

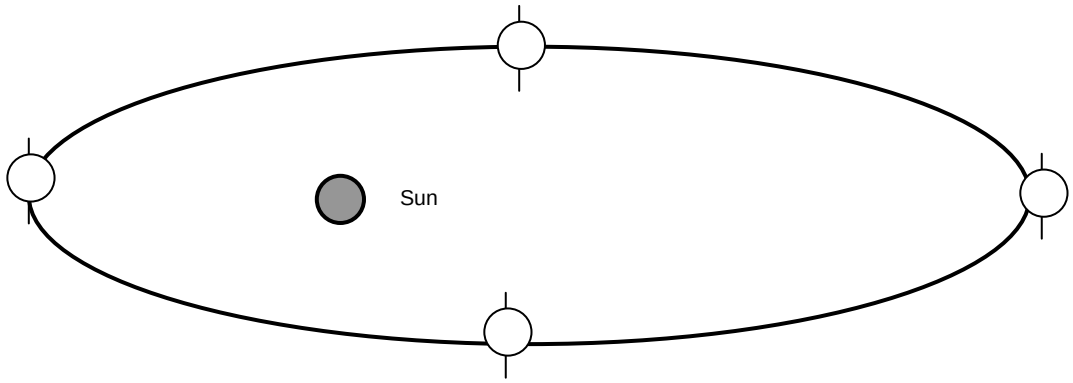
7a. The earth travels around the sun in a nearly circular orbit, while spinning on an axis which is tilted.

If earth's axis was **NOT** tilted, then . . .

A. there would be no seasons.
B. there would be no night and day.
C. temperature would not vary with latitude.
D. there would be no noticeable effect.

7b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

8a. Imagine that instead of being nearly circular, the earth's orbit was oval shaped, with the sun toward one end as shown in the picture below. Then as the earth orbits around the sun, it's distance from the sun would vary. Also imagine that the earth's axis has no tilt (as in the picture below).



With this oval orbit and no tilt, which one of the following statements would be true?

A. Temperatures on earth would not vary with time of year, i.e. there would be no seasons.

B. Temperatures would vary during the year, with seasons being opposite in the northern and southern hemispheres

C. Temperatures would vary during the year, with seasons being the same in the northern and southern hemispheres .

D. It is not possible to say without more information.

8b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

9a. Tom turns on a flashlight in his bedroom and shines it on the wall 2 feet away to produce a small circle of light. He then shines the flashlight on his ceiling 6 feet away to produce a larger circle of light.

Does more light reach the ceiling or the wall?

A. More light reaches the ceiling.
B. More light reaches the wall.
C. Equal amounts of light reach the ceiling and the wall.
D. The amounts cannot be compared.

9b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

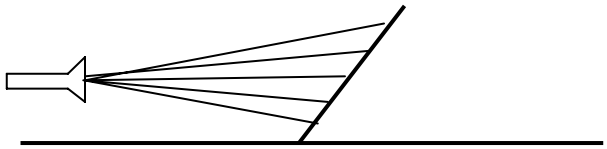
10a. A plastic globe and a flashlight can be used as a "model" to represent the earth-sun system. We can move the globe and flashlight around to show how sunlight strikes the earth and explain how the seasons occur. However, the distances and sizes in this model are NOT the same as in the real earth-sun situation. Should a scientist use a model like this?

A. No, because models should include ALL aspects of the real thing as accurately as possible.
B. Yes, models can be a way of showing the important aspects of the real thing and may ignore other aspects.
C. No, a model of this kind should not be used at all because it can be misleading.
D. No, because models must be made to an accurate scale.

10b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

11a. Light from a flashlight strikes a surface, as shown in the picture below.

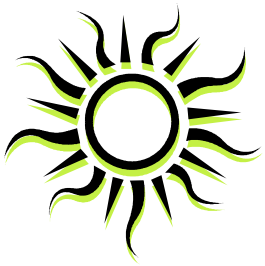


The intensity of light (brightness) on the surface depends . . .

A. only on the distance from the source of light.
B. only on the angle of the surface.
C. both on the distance and the angle.
D. neither on the distance nor the angle.

11b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

12a. The planet mars is further from the sun than is the earth, as shown in the drawing below. Both planets receive light energy from the sun.



Earth

Mars

How will the temperature on mars compare with that on earth?

A. Mars will be colder than earth.
B. Mars will be warmer than earth.
C. Both planets will have the same temperature.
D. Their temperatures cannot be compared without knowing the exact distances.

12b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

13. In Kalamazoo, Michigan, it is colder in January than in July. People give various reasons for this difference. **Circle True (T) or False (F) after each reason.**

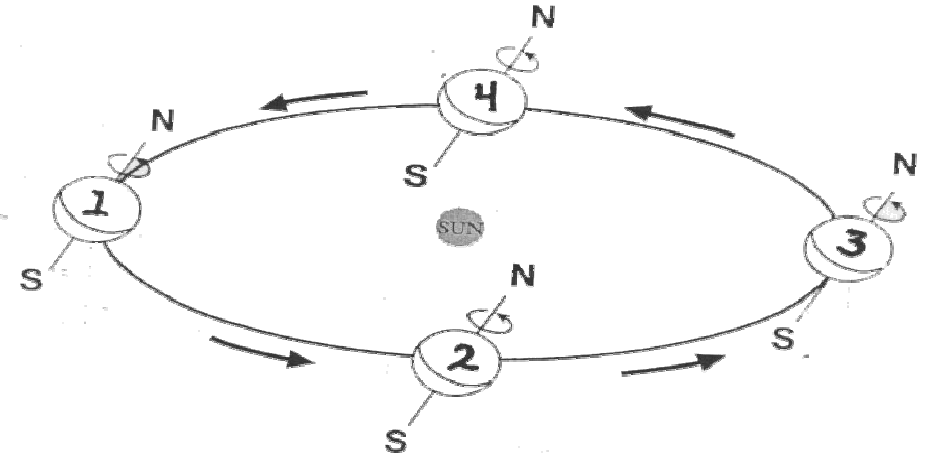
13a. The sun's rays strike the ground at more of a slant in January. **T** **F**

13b. Daytime is shorter in January. **T** **F**

13c. The earth is farther from the sun in January **T** **F**

13d. How sure are you of your answers? A. Very sure B. Somewhat sure C. My best guess

14a. The diagram shows a perspective view of the earth orbiting the sun, with four positions marked with numbers. Arrows show the direction of movement. The north-south (NS) line through the earth shows the "tilt" of the earth's axis.



In the drawing above, the time taken by the earth to travel from position 1 to position 3 is . . .

A. 1 year B. 6 months C. 3 months D. 1 month

14b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

14c. In the drawing above, when the earth is at position 1, then in the <u>northern</u> hemisphere it will be . . .

A. summer B. fall C. winter D. spring

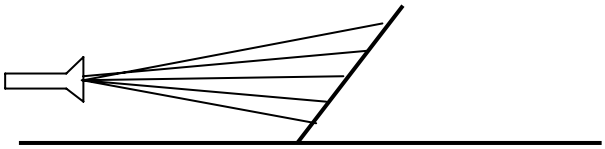
14d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

14e. In the drawing above, when the earth is at position 1, then in the <u>southern</u> hemisphere it will be . . .

A. summer B. fall C. winter D. spring

14f. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

15a. The light beam from a flashlight strikes a card and illuminates it. Simon and Sarah both think that the brightness on the card might depend on **two** things: 1) the **distance** of the card from the flashlight, and 2) the **angle** that they hold the card.



They do experiments to find out. They each make six measurements, but use different methods.

Simon's Method	Sally's Method
Simon tests six different combinations of distance and angle, changing both the distance and the angle for each measurement. He then looks for patterns in the data, that would show the effects of distance and angle on brightness.	Sally first fixes the card at one particular angle and tries three different distances, to find the effect of distance. Then she fixes the card at one particular distance and tries three different angles, to find the effect of angle.

Which of these methods is better for finding out how brightness depends on distance and on angle?

A. Simon's method is better.
B. Sally's method is better.
C. Both methods are equally good.
D. Neither method is good.

15b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

CODE:

Summer Science 2008—"Way to Go"

Student Pre-Assessment

It's Illuminating!

Please read each item carefully. Then circle the correct answer to the question (A, B, C, D)***. For each answer, also circle whether you are—***
A. Very sure, B. Somewhat sure, or C. My best guess.

Some questions may ask you to explain your answer in words.

1a. In Figure 1 below, a beam of light first strikes nearly straight on to a surface and lights up an area on the surface.

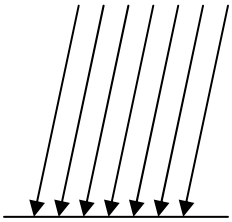


Figure 1 Striking nearly straight on

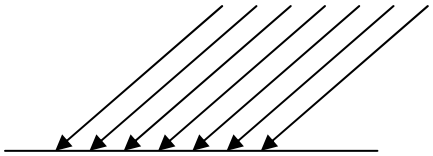


Figure 2. Striking more slanted

In Figure 2 above, the direction of the light beam is more slanted to the surface. What will happen to the area lighted by the beam?

A. It will be smaller.
B. It will be the same.
C. It will be larger.
D. One cannot say from this information alone.

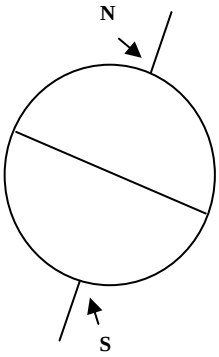
1b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

1c. When the beams of light strike at more of a slant (as in Figure 2 above) what will happen to the intensity (brightness) of the lighted surface area?

A. It will be less.
B. It will be the same.
C. It will be greater.
D. It is not possible to say.

1d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

2a. The diagram shows the earth with the equator and the axis marked. Temperatures on earth are hotter near the equator and colder toward the poles. The reason for the differences in temperatures is that . . .



A. the sun's light beams are more straight on to the ground at the equator and more slanted toward the poles.
B. regions near the equator are much closer to the sun than regions near the poles.
C. the length of daylight is always greater near the equator than the poles.
D. the earth's axis is tilted.

2b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

3. At a particular city "X" at noon, the sun's rays come in directly downward as shown in Fig.1 below.

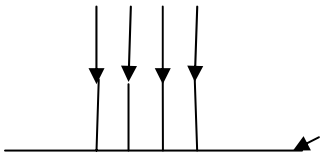


Figure 1

Figure 2 below shows a view of the earth as a globe, with light rays coming from the sun.

Figure 2

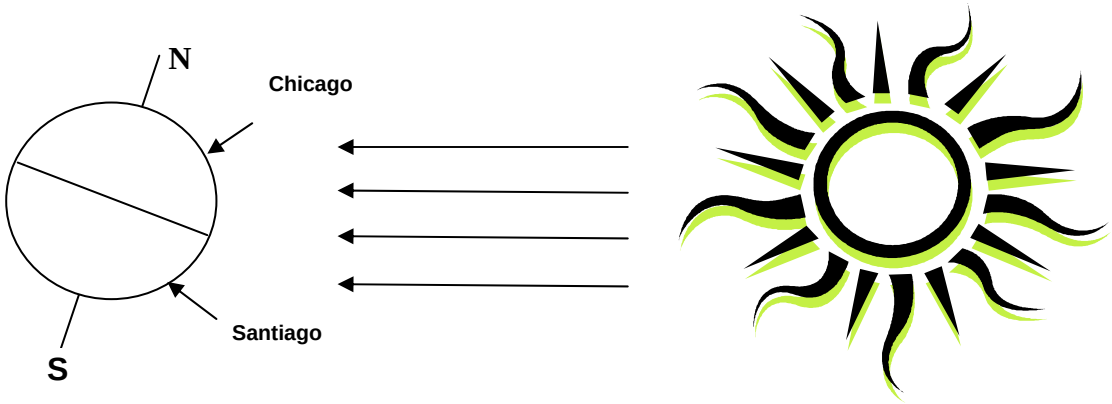
3a. Where must city "X" be located (on Figure 2), in order to have the sun's rays come in as shown in Figure 1?

A. location A
B. location B
C. location C
D. location D

3b. In Figure 2 above, which location would have the highest average temperature?

A. location A
B. location B
C. location C
D. location D

4a. The diagram below shows the earth in relation to the sun at a particular time of the year. The earth's axis, equator and the locations of Chicago in North America and Santiago in South America are shown.



In the diagram above, what season is it in Chicago?

A. summer
B. fall
C. winter
D. spring

4b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

4c. In the diagram above, what season is it in Santiago?

A. summer
B. fall
C. winter
D. spring

4d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

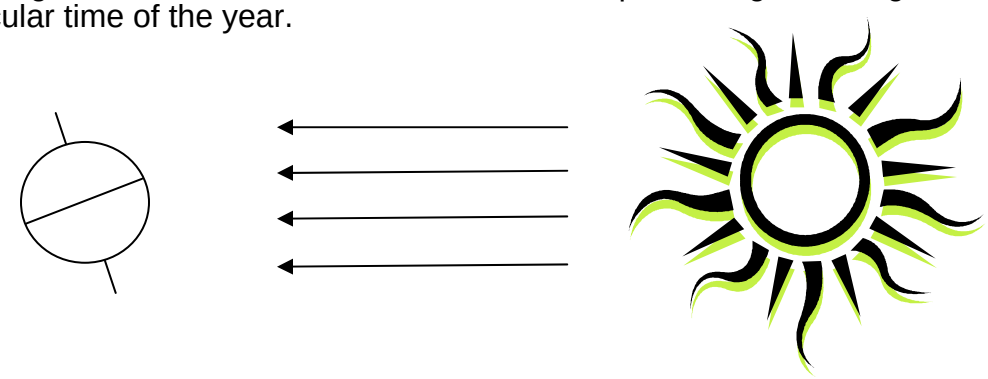
---

5a. In Chicago, it is colder in January than in July. The reason is that in January . . .

A. the earth is further from the sun.
B. the earth is nearer to the sun.
C. the sun is lower in the sky during the day.
D. the sun is higher in the sky during the day.

5b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

6a. The diagram below shows the earth in relationship to the light coming from the sun at a particular time of the year.



At this particular time of the year, what season(s) will be occurring in the northern and southern hemispheres?

A. *Summer* in the northern hemisphere and *Summer* in the southern hemisphere
B. *Summer* in the northern hemisphere and *Winter* in the southern hemisphere
C. *Winter* in the northern hemisphere and *Winter* in the southern hemisphere
D. Winter in the northern hemisphere and Summer in the southern hemisphere

6b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

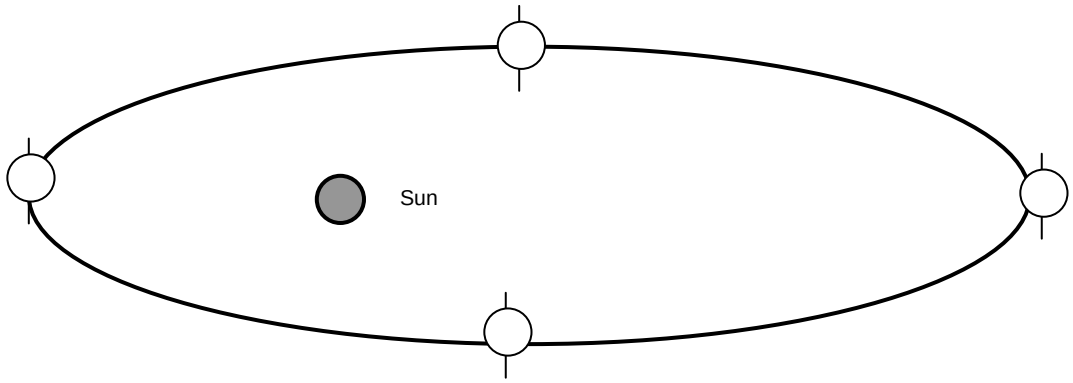
7a. The earth travels around the sun in a nearly circular orbit, while spinning on an axis which is tilted.

If earth's axis was **NOT** tilted, then . . .

A. there would be no seasons.
B. there would be no night and day.
C. temperature would not vary with latitude.
D. there would be no noticeable effect.

7b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

8a. Imagine that instead of being nearly circular, the earth's orbit was oval shaped, with the sun toward one end as shown in the picture below. Then as the earth orbits around the sun, it's distance from the sun would vary. Also imagine that the earth's axis has no tilt (as in the picture below).



With this oval orbit and no tilt, which one of the following statements would be true?

A. Temperatures on earth would not vary with time of year, i.e. there would be no seasons.

B. Temperatures would vary during the year, with seasons being opposite in the northern and southern hemispheres

C. Temperatures would vary during the year, with seasons being the same in the northern and southern hemispheres .

D. It is not possible to say without more information.

8b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

9a. Tom turns on a flashlight in his bedroom and shines it on the wall 2 feet away to produce a small circle of light. He then shines the flashlight on his ceiling 6 feet away to produce a larger circle of light.

Does more light reach the ceiling or the wall?

A. More light reaches the ceiling.
B. More light reaches the wall.
C. Equal amounts of light reach the ceiling and the wall.
D. The amounts cannot be compared.

9b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

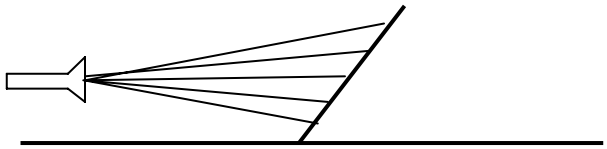
10a. A plastic globe and a flashlight can be used as a "model" to represent the earth-sun system. We can move the globe and flashlight around to show how sunlight strikes the earth and explain how the seasons occur. However, the distances and sizes in this model are NOT the same as in the real earth-sun situation. Should a scientist use a model like this?

A. No, because models should include ALL aspects of the real thing as accurately as possible.
B. Yes, models can be a way of showing the important aspects of the real thing and may ignore other aspects.
C. No, a model of this kind should not be used at all because it can be misleading.
D. No, because models must be made to an accurate scale.

10b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

11a. Light from a flashlight strikes a surface, as shown in the picture below.

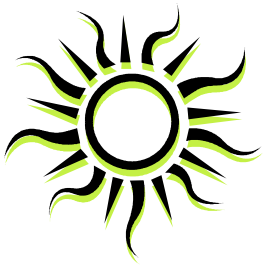


The intensity of light (brightness) on the surface depends . . .

A. only on the distance from the source of light.
B. only on the angle of the surface.
C. both on the distance and the angle.
D. neither on the distance nor the angle.

11b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

12a. The planet mars is further from the sun than is the earth, as shown in the drawing below. Both planets receive light energy from the sun.



Earth

Mars

How will the temperature on mars compare with that on earth?

A. Mars will be colder than earth.

B. Mars will be warmer than earth.

C. Both planets will have the same temperature.

D. Their temperatures cannot be compared without knowing the exact distances.

12b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

---

13. In Kalamazoo, Michigan, it is colder in January than in July. People give various reasons for this difference. **Circle True (T) or False (F) after each reason.**

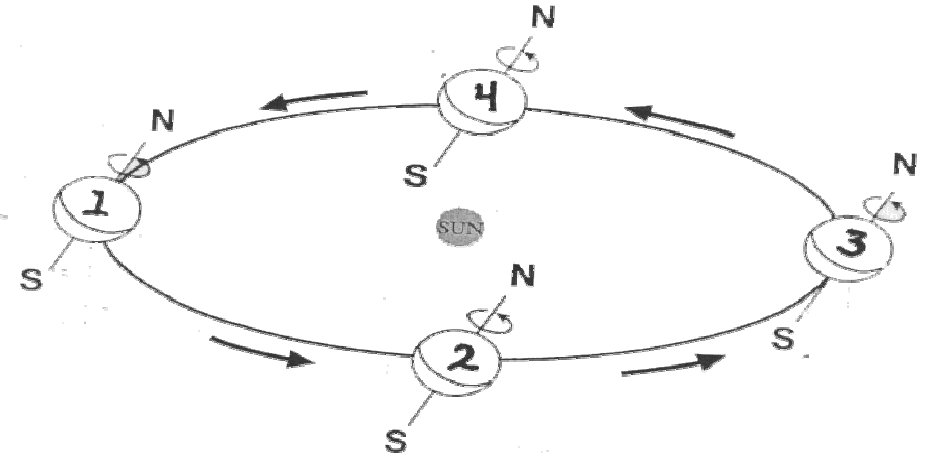
13a. The sun's rays strike the ground at more of a slant in January. *T* **F**

13b. Daytime is shorter in January. *T* **F**

13c. The earth is farther from the sun in January **T** *F*

13d. How sure are you of your answers? A. Very sure B. Somewhat sure C. My best guess

14a. The diagram shows a perspective view of the earth orbiting the sun, with four positions marked with numbers. Arrows show the direction of movement. The north-south (NS) line through the earth shows the "tilt" of the earth's axis.



In the drawing above, the time taken by the earth to travel from position 1 to position 3 is . . .

A. 1 year *B. 6 months* C. 3 months D. 1 month

14b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

14c. In the drawing above, when the earth is at position 1, then in the <u>northern</u> hemisphere it will be . . .

A. summer B. fall C. winter D. spring

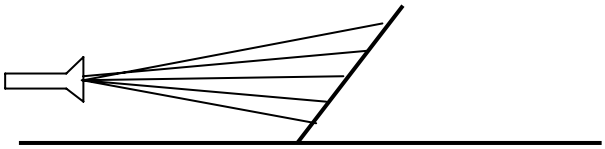
14d. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

14e. In the drawing above, when the earth is at position 1, then in the <u>southern</u> hemisphere it will be . . .

A. summer B. fall *C. winter* D. spring

14f. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess

15a. The light beam from a flashlight strikes a card and illuminates it. Simon and Sarah both think that the brightness on the card might depend on **two** things: 1) the **distance** of the card from the flashlight, and 2) the **angle** that they hold the card.



They do experiments to find out. They each make six measurements, but use different methods.

Simon's Method	Sally's Method
Simon tests six different combinations of distance and angle, changing both the distance and the angle for each measurement. He then looks for patterns in the data, that would show the effects of distance and angle on brightness.	Sally first fixes the card at one particular angle and tries three different distances, to find the effect of distance. Then she fixes the card at one particular distance and tries three different angles, to find the effect of angle.

Which of these methods is better for finding out how brightness depends on distance and on angle?

A. Simon's method is better.

B. Sally's method is better.

C. Both methods are equally good.

D. Neither method is good.

15b. How sure are you of your answer? A. Very sure B. Somewhat sure C. My best guess