Walk About Reflections

Insights		
Name →		
Applications		
Name →		
Challenges		
Name →		

Practice: Identify One Main Learning Goals

for Grade 5 Sun's Effect on Climate and Seasons

Determine if each of the following candidate statements represent a main learning goal

Candidate	Yes	No	Reason
1. Climate and seasons			
2. Students analyze maps to identify patterns in average temperature in the US.			
3. Average temperatures are higher near the equator than near the poles at all times of the year.			
4. Climate and weather are equivalent terms.			
5. How does the tilt of Earth impact climate and seasons?			
6. Earth is closer to the Sun in the July than in the January.			
7. Differential heating of Earth's surface is due to the spherical shape of Earth which changes the angle at which the Sun's light strikes the surface.			

ANALYSIS GUIDE A:
IDENTIFY ONE MAIN LEARNING GOAL

Record the main learning goal being analyzed in the space below.

CRITERIA FOR MAIN LEARNING GOAL	YES	NO
1. Is the learning goal stated in a complete sentence that represents a science idea that students could take away with them at the end of a lesson(s) (i.e., not a topic, phrase, activity, or question)?		
2. Do the students already know it? If yes, you need to make the learning goal more challenging.		
3. Is the main learning goal an important science idea? a. It is worthy of 50 minutes or more of time being spent on it. b. It has important connections to other science ideas and/or crosscutting concepts and can be used to explain a variety of phenomena. c. It is a “big” idea, a key concept, and not just a supporting fact, example, or detail.		
4. Do students have confusions or misconceptions about this science idea?		
5. Does this learning goal advance students’ thinking and/or clarify misconceptions? If there is evidence that students already understand the learning goal, it is not a meaningful learning goal.		
6. Is the learning goal grade-level appropriate and matched to state and/or national standards?		
7. Is the learning goal scientifically accurate?		

Suggest how to improve the main learning goal:

Candidate Focus Questions

for Grade 5 Sun's Effect on Climate and Seasons

MLG: Because Earth is a sphere, the Sun's light hits Earth's curved surface more directly close to the equator and less directly closer to the poles. The difference in the angle of sunlight striking Earth's surface at different latitudes creates uneven heating.

Candidate	Yes/No	Justification
1. What causes differential heating of Earth's surface?		
2. Why are temperatures in the northern US higher than temperatures in the southern US?		
3. What causes average temperatures near the equator to be higher than average temperatures near the poles at all times of the year?		
4. What is weather?		
5. What causes the average temperatures on Earth near the equator to be higher than the average temperatures on Earth far from the equator?		
6. What is the tilt of Earth?		
7. What are the phases of the moon?		
8. What causes the average temperature of Lagos, Nigeria to be higher in July when it gets ~12 hours of sunlight than the average temperature in Anchorage, AK when it gets ~24 hours of sunlight/day in July?		

ANALYSIS GUIDE B:
SET THE PURPOSE WITH A FOCUS QUESTION

Record the main learning goal in the space below.

CRITERIA FOR STRATEGY B: SETTING THE PURPOSE	YES	NO
1. Does the focus question help students anticipate one main learning goal of the lesson? If yes, write the implied main learning goal here:		
2. Does the focus question use everyday language that students will understand at the beginning of the lesson? If no, what words need to be changed? Write them here:		
3. Is the focus question presented in a scientifically accurate way? If not, what is inaccurate? Write ideas here:		

ANALYSIS GUIDE I:
SUMMARIZE KEY SCIENCE IDEAS

CRITERIA FOR STRATEGY I: SUMMARIZING KEY SCIENCE IDEAS	YES	NO
1. Is there some kind of summary statement or activity in the lesson?		
2. Does the summary focus on conceptual understanding and is not just a listing of facts or procedures from activities?		
3. Do the science ideas in the summary match the main learning goal and the focus question or goal statement?		
4. Is the summary statement scientifically accurate?		
5. Are students engaged in making sense of the summary statement?		
6. Could the summary be improved? Write suggested modifications on the back of this page.		

Teacher/Video	Mawlawi_473_SECL2_Strategy A
Content Area	Sun’s Effect on Climate and Seasons
STeLLA Strategy	Strategy A: Identify the main learning goal
Context	This is Lesson 2 of a 6 lesson unit on Sun’s Effect on Climate and Seasons. In this clip, the teacher presents the focus question and then talks with a student about question he has about day/night. She asks him to hold his question til next week.

00:00:00	T	Using our July graph, where did we decide is going to be the warmest? Vanessa.
00:00:03	SN	The Northern Hemisphere.
00:00:05	T	The Northern Hemisphere in July would be the warmest. So where’s it going to be the absolute hottest?
00:00:14	SN	(Inaudible).
00:00:16	SN	Oh, Southern-
00:00:17	T	Ava, where’s it going to be the absolute hottest?
00:00:22	SN	Closer to the equator.
00:00:24	T	Closer to the equator, which is why our numbers get higher- hotter as we get closer to the equator. All right, let’s look at our January.
00:00:38	T	All right, on our January bar graph, where is it the absolute hottest? Where is it the absolute hottest? Jolie.
00:00:46	SN	Southern Hemisphere.
00:00:48	T	The Southern Hemisphere, and where- so yep, we have warmer temperatures in the Southern Hemisphere. And in general, where on earth is it the most hot? Where do we get the most heat?
00:00:57	SN	(Inaudible).
00:00:58	SN	Seven degrees-
00:01:00	T/SN	Vanessa./By the equator.
00:01:01	T	By the equator. So, right? We still have 79 and 80. So this is what? Brought up Jesus’ question, why is it that these temperatures by the equator don’t change, right? They pretty much stay really hot.

00:01:17	T	So can- so what I want you to do now, go back to your notes. Go back to your notes, please. And under where you answered our three questions, I want you to use this diagram to explain why did that happen?
00:01:32	T	Why did these temperatures by the equator not change very much from one season to another? Okay? So use our diagram here and try and answer that question, please.
00:01:53	SN	You know how, like, I think it's the last or somewhere around there. They say it's 20 days, not even 20 days- day.
00:02:01	T	Mm-hm.
00:02:02	S	What do they mean, 20 days? Like, they have to stay 20 days all night?
00:02:06	T	So for 20 days in a row, they don't see the sun.
00:02:09	S	But why? How?
00:02:11	T	That's a really good question. You should keep it in the back of your mind for next week. Okay?
00:02:17	SN	But what is it about, like-
00:02:20	SN	I've got to get that into (inaudible).
00:02:24	T	Okay. So you should be writing your answer to this question right now.
00:02:27	S	Hold my keys.
00:02:28	T	So explain-
00:02:30	S/T	Hold my keys./Explain, please, thank you, I'll hold your key. Explain, please, using our diagram, why is it that the closer you are to the equator, the- it just kind of stays hot all year round? Explain that, please.
00:02:41	S	But it still-
00:02:42	T	In a sentence.
00:02:43	SN	Can I do it on here?
00:02:44	T	Yeah.

Teacher/Video	SSUP_SEC_GR 5_ACharles_L2_C1-3
Content Area	Sun's Effect on Climate
STeLLA Strategy	Strategy 9: Engage students in making connections by synthesizing and summarizing key science ideas Strategy B: Set the purpose with a focus question Strategy I: Summarize key science ideas
Context	This clip is from Lesson 2 of 6 from the Sun's Effect on Climate unit. The teacher reminds students of the Unit Central question and calls on students to recall what was learned from the previous lesson. She then introduces them to the lesson focus question. At the end of the lesson, after reminding students of the lesson's focus questions, the students are asked to complete a hand-out with sentence stems to summarize their answers to the focus. Finally, the teacher begins to summarize the science ideas learned from the activities of the day.

00:00:00 Teacher: All right. So lesson 2 focus question is this. Eyes here. This is what we're gonna work on today. What causes the average temperatures on earth near the equator to be higher than the average temperatures on earth far from the equator. So it's exactly what Megan just said is our pattern. We identified the pattern and we noticed it, but our goal today is to figure out what causes that, what causes it to be warmer right there on average than anywhere else on the earth when it's farther. So that's what we're gonna look at today. Okay. So that was the focus question we just read.

All right. So let's revisit, today's focus question over here or look in your notebook. What causes the earth's temperatures on-- Let me start over again. What causes the average temperatures on earth near the equator to be higher than average temperatures on earth farther from the equator. Do you think we could answer that? Can you answer that focus question now?

00:01:14 SN: Yea-yeah.

00:01:15 Teacher: You know the answer don't you? What causes that to happen?

00:01:19 Pupil: Cause the sun is more focused on the, uh, equator.

00:01:22 Teacher: The sun is more focused on the equator. Why does it love the equator more?

00:01:26 Pupil: No.

00:01:27 Teacher: No. Why?

00:01:28 Pupil: It's cause-

00:01:29	Teacher:	Bentley, why? Doesn't love the equator more than any other places, why is it more concentrated right there?
00:01:37	Bentley:	Because it doesn't move [crosstalk]
00:01:39	Teacher:	It-it's more direct. It's straight on, right? Straight on there. Ainsley, is that what you're gonna say?
00:01:46	Ainsley:	No. Um, like it--like-like, uh, like it-it's more concentrated because it's in the middle of the earth.
00:01:56	Teacher:	Yes.
00:01:57	Bentley:	It's in the middle of the earth
00:01:59	Teacher:	And it's straight on right there, right?
00:02:01	Pupil:	And it's straight on.
00:02:02	Teacher:	Okay. So here's what I want you to do. Put all your supplies down.
00:02:06	Bentley:	Okay.
00:02:07	Teacher:	I want you to open up your notebook right back to where you were writing before you may even wanna turn to the next blank page. And I want you to capture your thinking right now in your science notebook, by completing these sentence stems. Because this is not our ultimate goal, remember. Our ultimate goal is to figure out why some places on earth are hotter than others at different times of year. This is just one step. So right now sunlight strikes the earth directly at ______. I want you to put that down in your notebook. Levi sentence stems. All you're gonna do is write them and fill in the end of it. Get out pencil right now. Open your notebook. Sunlight strikes the earth directly at ______. Where does it hit the earth directly at? Therefore the light is more what? That's the word Lily used today. Use Lily's word. It's a good one.
00:03:03	Ainsley:	Concentrate--
00:03:05	Teacher:	This causes what? So fill in these blanks right now in your notebook. I'm gonna give you plenty of time to do that. Keep working. So today we focused on the angle of the sun's light, right, Levi? We sho-- we've shown our flashlight just like it was the sun, right? And we use two different models to focus on what happens at that angle. We used the tray and the flashlight. All right. And then we also used the globe and we looked at a paper representation of that. We used our data to explain that when the angle of sunlight is direct, it's more intense, right? It's concentrated. And it's-- the surface is gonna get warmer. So where is it usually warmer at on earth?
00:03:53	Ainsley:	Equator.

00:03:54	Teacher:	Near the equator. When sunlight strikes Earth's surface at an angle, okay? When we move from the equator toward the poles, that's when it gets less concentrated and it's not as warm, right? It gets cooler. So do you notice from our bar graphs, anything, when we think about that? Here's the equator. What does it look like? Ainsley? What do you see? What do you observe? [crosstalk] Huh? Yeah.
00:04:29	Ainsley:	I noticed that, um, like-like here like it like--
00:04:37	Teacher:	Yeah.
00:04:37	Ainsley:	-It's like the equator is like right here in the middle.
00:04:40	Teacher:	The equator is right here in the middle. Yeah.
00:04:43	Ainsley:	And, um, both of them--
00:04:44	Teacher:	Yeah.
00:04:45	Ainsley:	-It's zero and zero on both.
00:04:46	Teacher:	Right.
00:04:47	Ainsley:	But on, I noticed on each one, like on this side, it's warmer.
00:04:53	Teacher:	Mm-hmm.
00:04:54	Ainsley:	And on this, um, in the northern hemisphere it's, um, bigger and this size is smaller--
00:05:02	Teacher:	Mm-hmm.
00:05:03	Ainsley:	-if the equator stays the same.
00:05:04	Teacher:	Yep. And which is the same. And it's always warmer where?
00:05:08	Ainsley:	Like here.
00:05:10	Teacher:	Yeah, near the equator.
00:05:12	Ainsley:	And, um, on this side, like it gets warmer right here.
00:05:17	Teacher:	Uh-huh.
00:05:19	Ainsley:	Like it gets cooler. It's cooler over here. The equator stayed the same--
00:05:22	Teacher:	Mm-hmm.

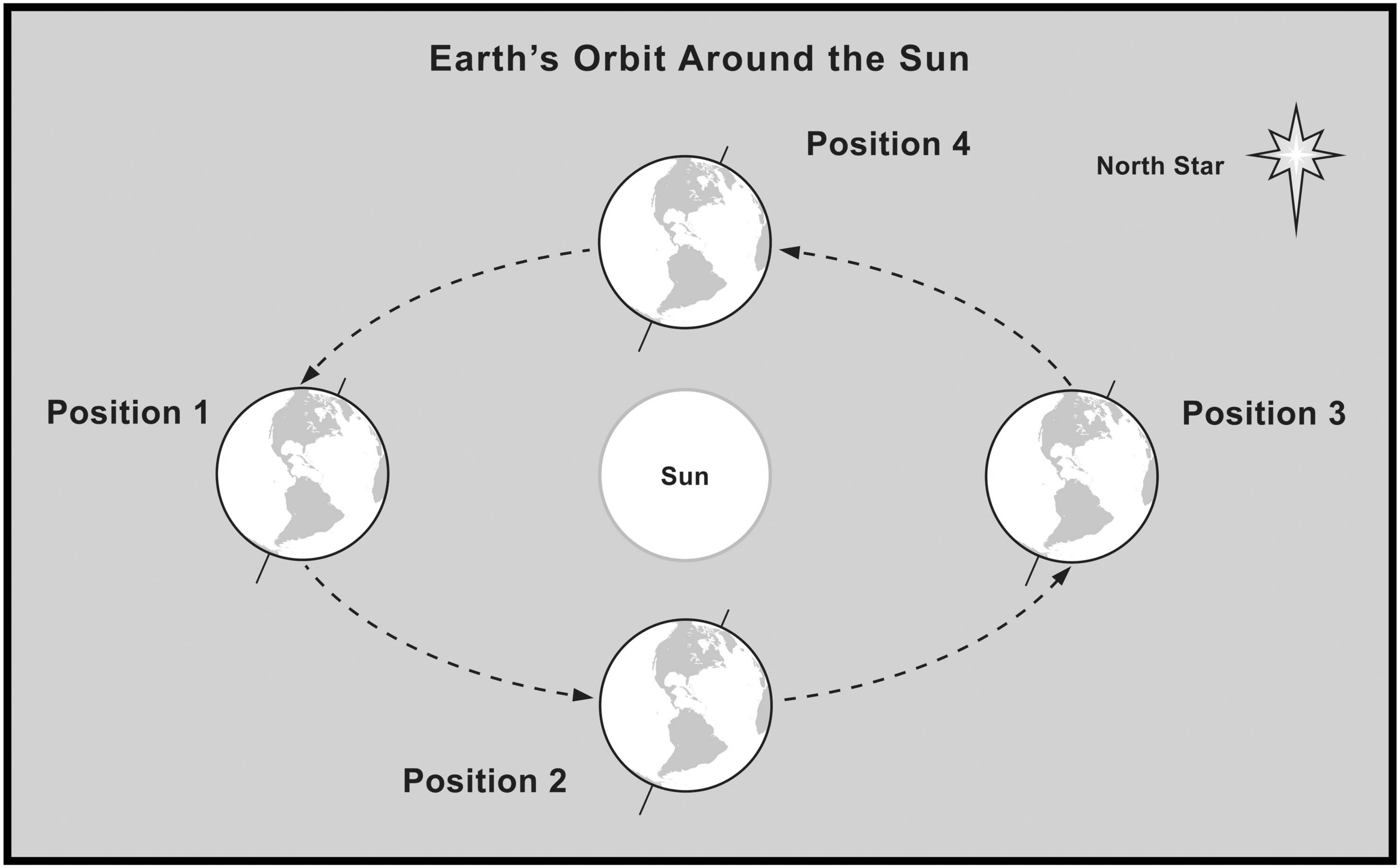
00:05:23	Ainsley:	-but over here it gets warmer.
00:05:25	Teacher:	Mm-hmm. Okay.
00:05:26	Ainsley:	But only in January.
00:05:28	Teacher:	You're right. Only in January. Well, in July, it's the opposite. What you were just saying, right? Just Maria.
00:05:33	Maria:	Oh, I want to come up.
00:05:34	Teacher:	Sure.
00:05:36	Maria:	Um, I noticed that thing it's getting colder [crosstalk]. It-- the color is very darker, but so getting very hotter and, uh, it's lighter and it's the colors changed.
00:05:51	Teacher:	Okay, oh, they chose to use darker colors. Colder. Yeah. But it gets, um, it's warmer in the southern hemisphere, right, in January? Okay. Yeah, okay. So here's-here's what I want you to think about, what are some driving questions you still have? We talked about why it's warmer at the equator, but are there still some questions you have even based on this data?

Reflection - Day 3 Name:___________________________

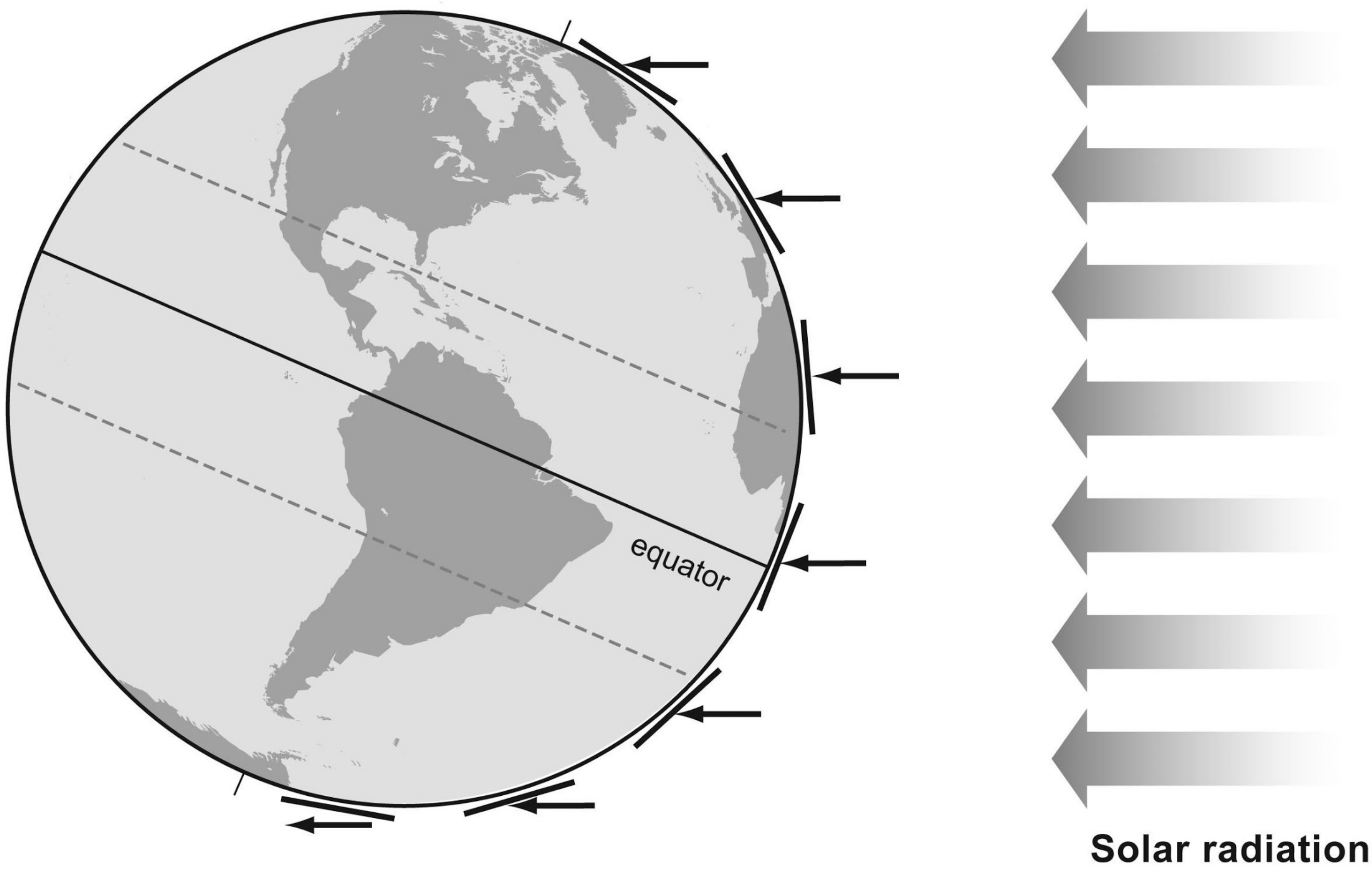
1. We are discussing the use of main learning goals, focus questions, and synthesizing/summarizing across a series of lessons. What is your current thinking about how the main learning goals and focus questions contribute to the development of a coherent content storyline for students? Please explain your thinking.

2. The science ideas in this unit draw heavily upon learner understanding of scale, proportion, and quantity in our models. How might understanding of that crosscutting concept affect a learner's ability to explain the patterns they observe in average temperatures in the Northern and Southern Hemispheres across seasons?

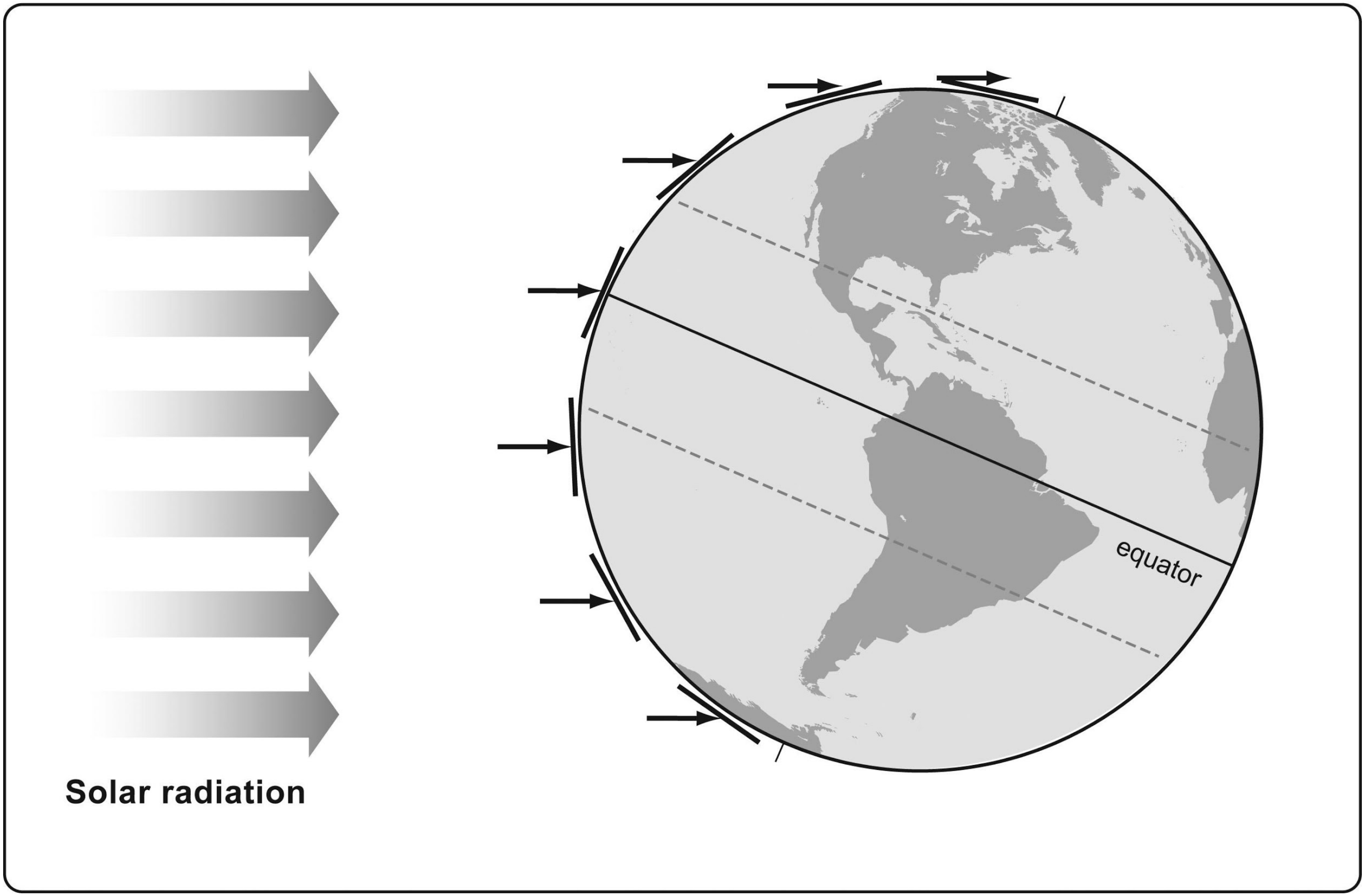
Science Content Handouts


Earth's Orbit Around the Sun
Position 4
North Star
Position 1
Sun
Position 3
Position 2

The Sun’s Incoming Energy - Angle Related to Latitude at Position 1



The Sun's Incoming Energy - Angle Related to Latitude at Position 3



Angle of Sunlight and Seasons on Earth

Purpose
This activity will help us collect evidence to answer our focus question:

Why is it winter in the US in Dec/Jan and summer in the US in Jun/Jul? What is happening in Brazil and why?

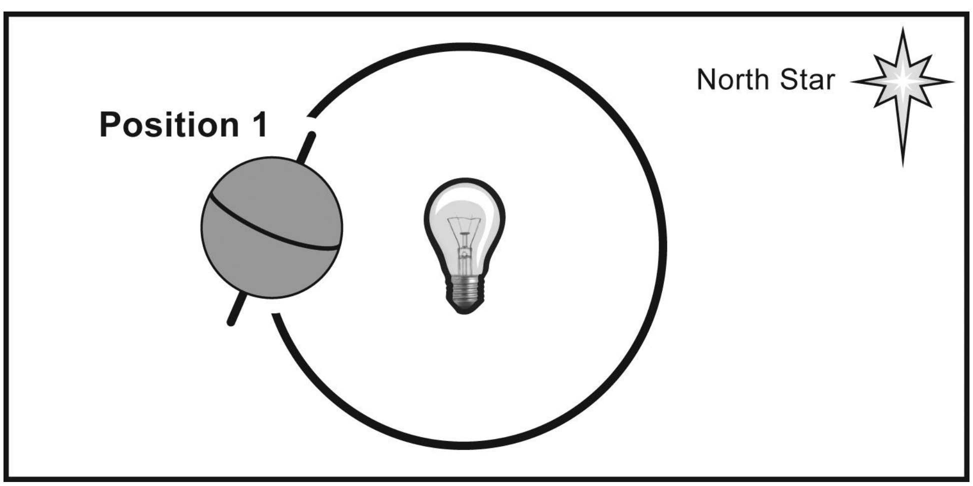
Team Task
As Earth orbits the Sun, describe what happens to the *angle of sunlight* hitting Earth at different times of the year. Focus your attention on the effect of Earth's ***orbit*** and ***axis tilt***. Be prepared to share your ideas.

Materials
Your team will need
- 1 light setup (lightbulb, socket, plug)
- 1 hoop (to represent Earth's orbit)
- 1 Styrofoam ball on a stick (to represent Earth on its axis)
- 1 rubber band (representing the equator)
- 2 push pins (locating where we are on the globe and where Brazil is on globe)

Each of you will need
- Handout: *Sun's Incoming Energy with Tilt—Position1*
- Handout: *Sun's Incoming Energy with Tilt—Position 3*
- Handout: *Data Table: Number of Sun's Incoming Rays by Season at Different Latitudes*
- Your science journals

Directions

1. Reposition your Styrofoam ball "Earth" in Position 1 in its orbit around the Sun so that the North Pole points both ***toward*** the sun and the North Star with a 23.5° tilt.

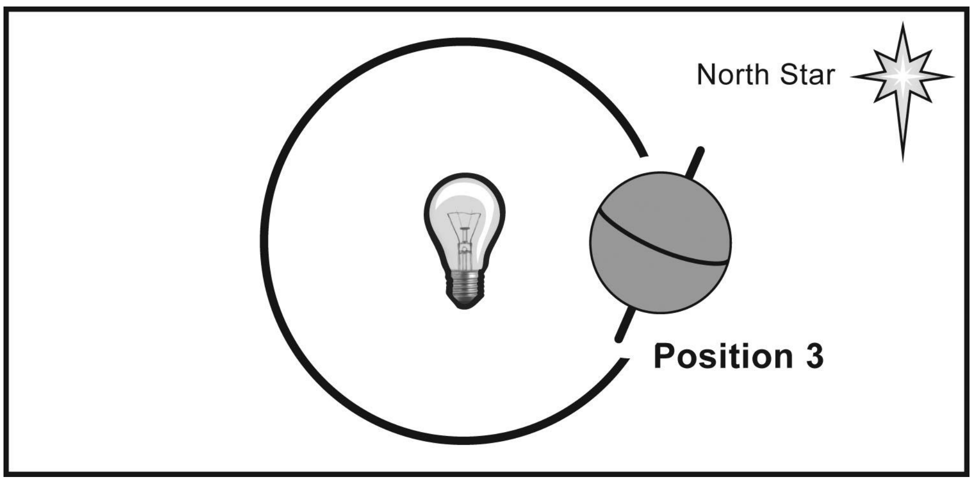


a. Place the handout *Sun's Incoming Energy with Tilt—Position 1* on the table next to your Styrofoam "Earth." Notice that the Earth on your handout is tilted at 23.5°, just like the Styrofoam "Earth," so that the North Pole points ***toward*** the sun and the North Star.

b. Count the number of lines of solar radiation hitting Earth in the following locations on Earth's surface and record the numbers in your data table:

Latitude 60°N–75°N
Latitude 30°N–45°N
Latitude 0°–15°N
Latitude 0°–15°S
Latitude 30°S–45°N
Latitude 60°S–75°S

2. Now, place your Styrofoam "Earth" at Position 3 in its orbit. The North Pole is still pointing toward the North Star, but now it's pointing at a 23.5^o angle ***away*** from the Sun and the South Pole is pointing ***toward*** the Sun.



a. Place the handout *Sun's Incoming Energy with Tilt—Position 3* on the table next to your Styrofoam "Earth." Notice that the Earth on your handout is tilted at 23.5°, just like the Styrofoam "Earth," so that the North Pole points ***away*** from the Sun but still toward the North Star. (Where is the South Pole pointing?)

b. Count the number of lines of solar radiation hitting Earth in the following segments on Earth's surface and record the numbers in your data table:

Latitude 60°N–75°N
Latitude 30°N–45°N
Latitude 0°–15°N
Latitude 0°–15°S
Latitude 30°S–45°N
Latitude 60°S–75°S

Discuss with your team

1. Where is the sun's light "straight-on" when Earth is in Position 1? (Think: Is it at the equator?)
    a. Which hemisphere experiences summer in Position 1?
    b. Which hemisphere experiences winter in Position 1?
    c. Use your data to explain why it is summer in one hemisphere and not the other.

2. Where is the sun's light "straight-on" when Earth is in Position 3?
    a. Which hemisphere experiences summer in Position 3?
    b. Which hemisphere experiences winter in Position 3?
    c. Use your data to explain why.

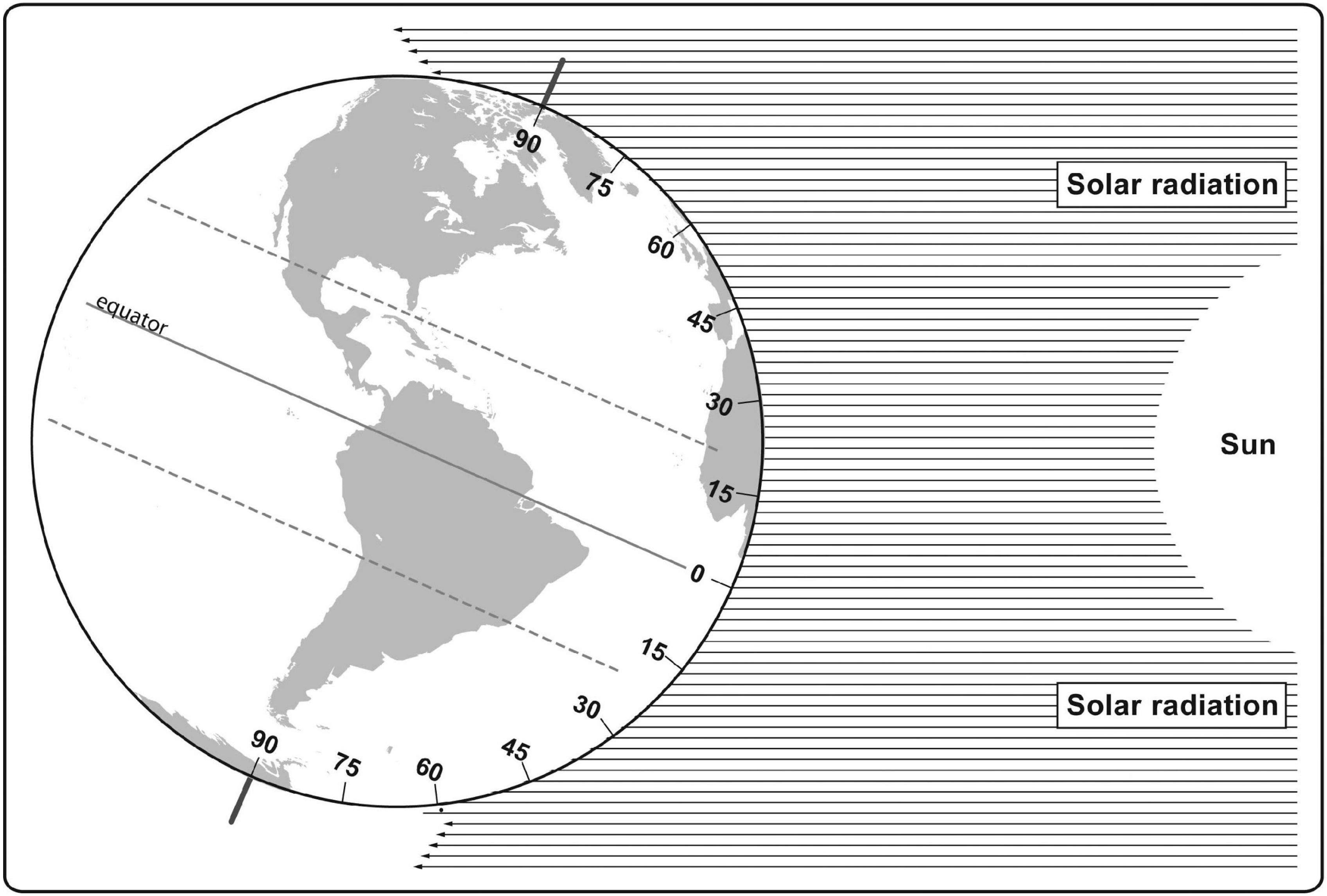
3. Compare the data in your data table to the data you collected in Lesson 2. Is the sun's energy the same intensity at the same latitudes now as in Lesson 2? Where do you find differences?

4. What is the reason for the differences in your data? (Think about what is different in the diagram from Lesson 2 and these diagrams.)

5. Summarize your learning from this activity ***using specific data from your table*** and the following sentence stems.

    Winter and summer occur in each hemisphere during...
    When comparing them, I notice…
    The data that supports this is…
    This happens because...

Sun’s Incoming Energy with Tilt - Position 1



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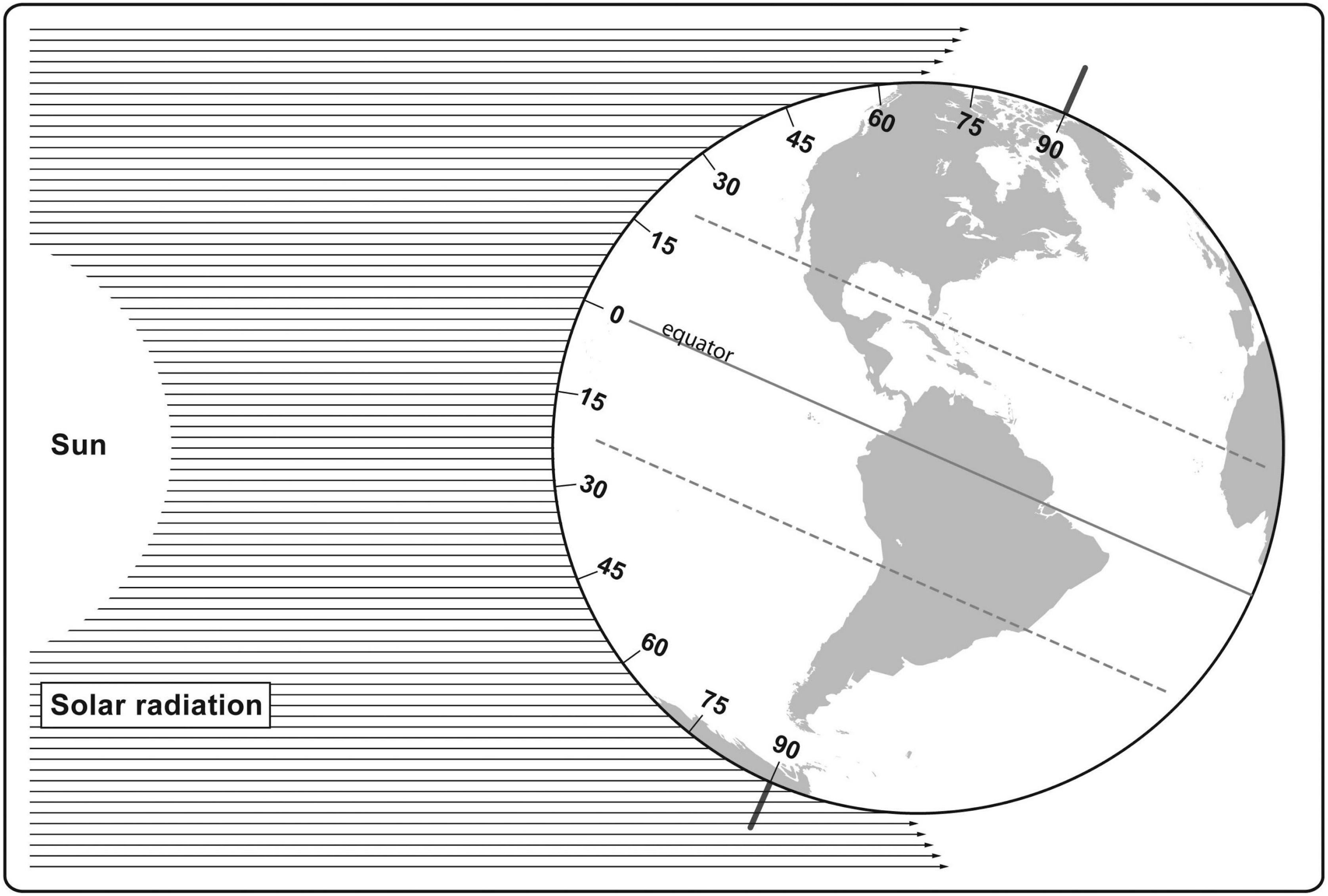
Sun’s Incoming Energy with Tilt - Position 3



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Data Table

Number of Sun's Incoming Rays by Season at Different Latitudes		
	Position 1 Season:_____________ (Northern Hemisphere) Season:_____________ (Southern Hemisphere)	**Position 3** Season:_____________ (Northern Hemisphere) Season:_____________ (Southern Hemisphere)
Latitude 60˚–75˚N (near Alaska)		
Latitude 30˚–45˚N (near Denver)		
Latitude 0˚–15˚N (north of the equator)		
Latitude 0˚–15˚S (south of the equator)		
Latitude 30˚S–45˚S (near the bottom of South America)		
Latitude 60˚S–75˚S (near northern Antarctica)		