

PHOTOSYNTHESIS

Writing Activity: Cubing

Subject: Biology

Grade Level: 9-10th

SSS: SC.1.E.5.In.d, SC.2.E.7.In.b, SC.8.L.18.1, SC.912.L.18.Su.b

Student Learning Objective

Student will be able to describe, compare, associate, analyze, apply, and argue for or against the sun.

Materials

Student cubing handout (40 copies)

Agenda

- Quick Write:
- Introduction to Photosynthesis
- Form pairs and complete activity
- Lecture: How Do Plants Acquire Energy

Procedures

Quick Write (3 min): On the back of the handout students write three things they know about photosynthesis. Get responses from students and write them on the board.

Introduction to Photosynthesis (5 min): Today we begin our discussion of photosynthesis, which is defined as the production of new molecules (synthesis) with the assistance of light (photo). We start our discussion by talking about the source of light the sun. When we think of photosynthesis don't we typically just think of plants? In fact, there are many organisms capable of synthesizing sugar and other compounds from solar energy; they're called autotrophs. Before we can get into a discussion on how organisms capture and use the sun's energy, we need to understand the sun.

The sun doesn't just send visible light to our planet; it also sends gamma rays, x-rays, infrared radiation, microwaves, and radio waves as part of what's called the electromagnetic spectrum. Actually, 30% of that energy beamed at our planet is bounced back into space, our atmosphere absorbs 25%, which means only 45% is actually free to be used by life on our planet, which is still a lot when one considers that earth receives roughly 130 trillion horsepower of energy from the sun every second. Now let's explore the sun in more detail.

Activity (15 min): Using the cubing handout students will examine the “Sun” from six perspectives, but first the teacher demonstrates the cubing activity using “Football” as an example.

Teacher: “O.K. class, let’s examine a Football from six perspectives.”

- Describe it – egg shaped, lightweight, brown
- Compare it – similar to watermelon, different from soccer ball
- Associate it – with competition, sports, the NFL, the quarterback
- Analyze it – made from pigskin, filled with air
- Apply it – you can throw it, kick it, catch it, or fumble it on the ground.
- Argue for or against it – football is too rough for kids under the age of 16, promotes teamwork.

Now students use the handout to examine the sun. During this time, teacher draws two giant cubes on the board. When it looks like students have finished their cubes (approximately 5 min), teacher randomly calls on students to write two or three of their responses on the board.

Lecture: How Do Plants Acquire Energy (20 min): Briefly discuss the electromagnetic spectrum, and what plants need to facilitate photosynthesis.

Assessment

Using the cubing handout, students will examine the “sun” from six perspectives, using short phrases. Then students will compile those short phrases into complete sentences and reorganize those sentences into a short passage.

Future Lesson Plans

It might help students reinforce their understanding of the sun and what they learned from the lecture portion on photosynthesis by revisiting their cubing activity worksheets the following class period. Allow students time to add newly learned facts and concepts to their cubing worksheet. Students could even add new post-lecture concepts to their worksheet in a different color to illustrate what they knew before and what they now know.

Alternative Cubing Categories

Although we used describe, compare, associate, analyze, apply, and argue for or against as the sides of our cube, a variety of different verbs or directions can be applied to this strategy. Teachers may use any 6 terms they would like to create a better fit for their topic of study. Also, the sides of the cube could serve as 6 different assessment options or 6 different activities. The idea of the cubing exercise is to include a variety of perspectives and choices to the student, so anything goes!

CUBING HANDOUT

Instructions: Working together in pairs, examine the topic provided by the teacher (write topic here _____) from the following six perspective: (A) Describe it, (B) Compare it, (C) Associate it, (D) Analyze it, (E) Apply it, (F) Argue for or against it

Period: _____ Name(s): _____

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