

## Lesson 2, Part 1 - Teacher Instructions for *Photosynthesizers or Not?*

To review photosynthesis and remind students of which organisms transform light into chemical energy, have them sort pictures of a variety of organisms. The pictures the students will use include the microorganisms that are used in subsequent lessons.

- Please see the directions described in the Lesson Plan ([Google Doc](#) | [Webpage](#)). This document is a shortened instruction version for just this activity within the lesson. Directions are also on the slides linked below before and after the 26 organism pictures. There is a key for the ‘photosynthesizer’ and ‘non-photosynthesizer’ categories in the [slide notes](#) and also a key with organism names in the [“Photosyn or Not Card Sort KEY” document](#).
  - [Organisms slideshow with one image per frame](#) - This slideshow also has notes for each organism.
  - [Organisms slideshow with six images per frame](#).
  - [Print this PDF](#) in color (or request cards from ISB by emailing [see@isbscience.org](mailto:see@isbscience.org)) and cut the squares into cards for student use. Laminating them is also recommended since it will allow you to reuse them for years.
    - [Printable images for making student flash cards.docx](#)
    - Choose double-sided printing for auto card numbering and student groups by letter. The numbers align with images in the slide show and in the worksheet. The numbers also are useful after the activity when you want to quickly gather cards to be re-organized and used again with another class.
    - Color is important so if a color printer is not available, there are two variations to consider:
      - *If a color printer is not available, use [Photosynthesizer or Not? Single image/frame.ppt](#). Or [Photosynthesizer or Not? \(six images per frame\).ppt](#) and sort as a class.*
      - ***Or if doing this digitally, have students drag and drop photos into categories using this [slideshow](#), outside of presenter mode, and/or this [worksheet](#).)***
- Divide the students into small groups (2-4) and give each group a set of the pictures. Ask the students in each group to work together to sort the pictures into 2 sets: photosynthesizers and non-photosynthesizers.
  - If in-person, with cards, use this [student worksheet for recording ideas](#). Or have them record ideas in their notebooks. If working remotely and/or digitally, use this [worksheet](#).)
  - Have students discuss the value and challenge of sorting organisms based on physical characteristics. In this case, the coloration or size of an organism may make it difficult to decide if it is a photosynthesizer or not. *(Classifying based on physical or external characteristics ignores everything going on internally. For example, in order to classify organisms based on a functional trait, other information is required. This is where an understanding of metabolism and/or DNA comes in.)*

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- Students may need a review of photosynthesis and the webquest is designed to do this. A rudimentary understanding of the chemistry involved in photosynthesis and cellular respiration will be helpful to students when completing the metabolism exercise.
- Here is a [visual KEY to slideshow Photosynthesizer or Not?](#)
- Once all groups have finished sorting their pictures, have one group share ‘who’ they put in each group. Allow students from other groups to ask questions or challenge the placement of an organism.
  - As mentioned above, have students discuss the value and challenge of sorting organisms based on physical characteristics. In this case, the coloration or size of an organism may make it difficult to decide if it is a photosynthesizer or not. *(Classifying based on physical or external characteristics ignores everything going on internally. For example, in order to classify organisms based on a functional trait, other information is required. This is where an understanding of metabolism and/or DNA comes in.)*
  - Be sure to EMPHASIZE the chlorophyll is the common feature of the photosynthesizers (autotrophs) shown.
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