

# REVENGE OF THE SYNTH



TEACHER GUIDE

LAUNCH



# PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time. Time required for each lesson may vary.

ACTIVITY INFORMATION	SECTION	TIME REQUIRED	DAY/ LESSON
<b>ACTIVITY 1: IS PHOTOSYNTHESIS JUST FOR PLANTS?</b>  Observe organisms and categorize them as photosynthetic or non-photosynthetic.  <b>Time required: 30 min</b>	☐ Photosynthesizing Organisms	30 minutes	Day 1
<b>ACTIVITY 3: MICROSCOPIC ORGANISMS</b>  Watch microorganisms form bands of like species.  <b>Time required: 4 h</b>	☐ Microbial Medley (Making Agar Plates)	30 minutes	Day 2
	☐ Microbial Medley (Brushing Bacteria)	30 minutes	Day 3
<b>ACTIVITY 2: ABNORMAL ANIMALS</b>  Dive deep into the research of photosynthetic animals  <b>Time required: 2 h 15 min</b>	☐ Chlorophyll Chromatography	45 minutes	Day 4
	☐ Photosynthesizing Animals	90 minutes	Day 5
<b>ACTIVITY 3: MICROSCOPIC ORGANISMS (CONTINUED)</b>	☐ Microbial Medley (Day 1)	30 minutes	Day 6
	☐ Many Kingdoms of Microorganisms		
<b>ACTIVITY 4: ...</b>			

Full schedule  
available with  
purchase

## MULTIPLE AGES AND ABILITIES:

There are several other terms in this section that are not bolded vocabulary terms. These terms are support vocabulary, meaning they are important for your student to understand conceptually, but not required to define. If your student is advanced in or passionate about the topic of photosynthesis, you can shift the following terms from support vocabulary to required vocabulary:

- Anthocyanins
- Carotenoids
- Thylakoid
- Thylakoid membrane
- Stroma
- Xanthophyll

## PREPARATION AND SUPERVISION



**WARNING!** Contains chemicals that may be harmful if misused. Do not eat or drink. Wash your hands after use.

**WARNING!** Contains flammable chemicals that can easily catch fire. **DO NOT BRING NEAR HEAT OR FLAMES.**

**WARNING! CHOKING HAZARD - Small parts.**  
Not for children under 3 years.

- This experiment will allow the pigments found in the leaves to separate and be seen in rows.
- While spinach leaves are suggested as the leaf of choice, your student can use any leaves they would like and have access to.
- Students will use their gloves twice in this experiment. Between uses, they can clean them with dish soap and set them aside to dry. When cleaning the gloves, they should be wearing them and acting like they are washing their hands.

**? Question: Which pigments are found in the leaves you used?**

**Answer:** Answers will vary.

**How to Help:** *Students should find chlorophyll and will likely see xanthophyll, but the presence and quantity of other pigments will be determined by the leaves used.*

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## PHOTOSYNTHESIZING ANIMALS

### Kleptoplasty

- This subsection introduces your student to two photosynthesizing animals – *Elysia timida* and *Ambystoma maculatum*.
- Students will learn about an unusual behavior known as kleptoplasty, which both species, as well as most of the genus *Elysia*, can perform.
- The following vocabulary terms are defined: kleptoplasty, phagocytosis, and symbiosis.

## REFLECT

**? Question:** How did your prediction compare to your results?

**Answer:** Answers will vary.

**How to Help:** Even if results were what students expected, encourage them to read the information about lactose hydrolysis and use new terminology to describe what happened.

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## ENZYME ACTION

### CONTENT

- In this section, students will learn about the process of amino acid synthesis.
- Students may have learned about amino acids previously if they have gone through material about DNA replication.
- The citric acid cycle is discussed. In other text, it may be referred to as the Krebs cycle or tricarboxylic acid (TCA) cycle.
- These vocabulary terms will be defined for your student: adenosine triphosphate (ATP), amino acid, amino acid synthesis, and photosystem.
- Some amino acids are essential and some are non-essential. Which amino acids are essential or non-essential and why they are classified that way is explained to your student.

## REFLECT

**? Question 1:** Return to the KWLQA chart and add to the L (Learned) and Q (Questions) sections to account for your new knowledge about photosynthesis. Then, for any unanswered questions, complete the A (Actions) section to brainstorm ways you might get your remaining questions answered.

**Answer:** Answers will vary.

**How to Help:** As with previous revisits to the chart, encourage your student to add big ideas and small details, including vocabulary terms, examples, and new questions.

**? Question 2:** What patterns do you see in the relationships between the amino acids and enzymes used in their production?

**Answer:** Students should find that some enzymes are used in the production of multiple amino acids. This is connected back to amino acid synthesis which they learned about in a previous section.

**How to Help:** While not required, students can list specific enzymes and amino acid that are correlated.

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## STORY TIME

### CONTENT

- In this section, students will be telling the story of a non-essential amino acid, starting from photosynthesis through the time the amino acid of their choosing is formed.
- Students should indicate enzymes, chemical reaction, and processes required, including any products formed that are not later used in the storyline of the amino acid.
- You will want your student to first choose a non-essential amino acid and then perform research to determine the storyline for it. Students may find that as they put together their storyline, they need to perform additional research.





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