Model

Think: What comes to mind when you hear the word “model”?

Pair: Introduce yourself to your neighbor. Share your thought.

Share: Share you definition/example of what a “model” is.



Science and Engineering Practices

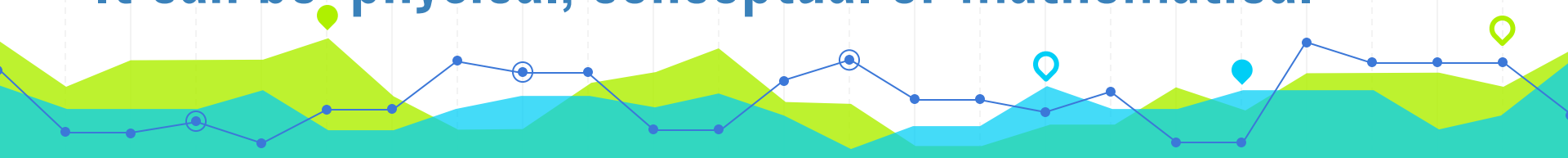
Engineers use models to analyze systems and build a prototype of see if it works.





Scientific Model

- In **science**, a **model** is a representation of an idea, an object or even a process or a system that is used to **describe** and **explain** phenomena.
- It is an **objective** and **simplified** model of reality. It might not always be complete but have only the important parts.
- It can be: physical, conceptual or mathematical



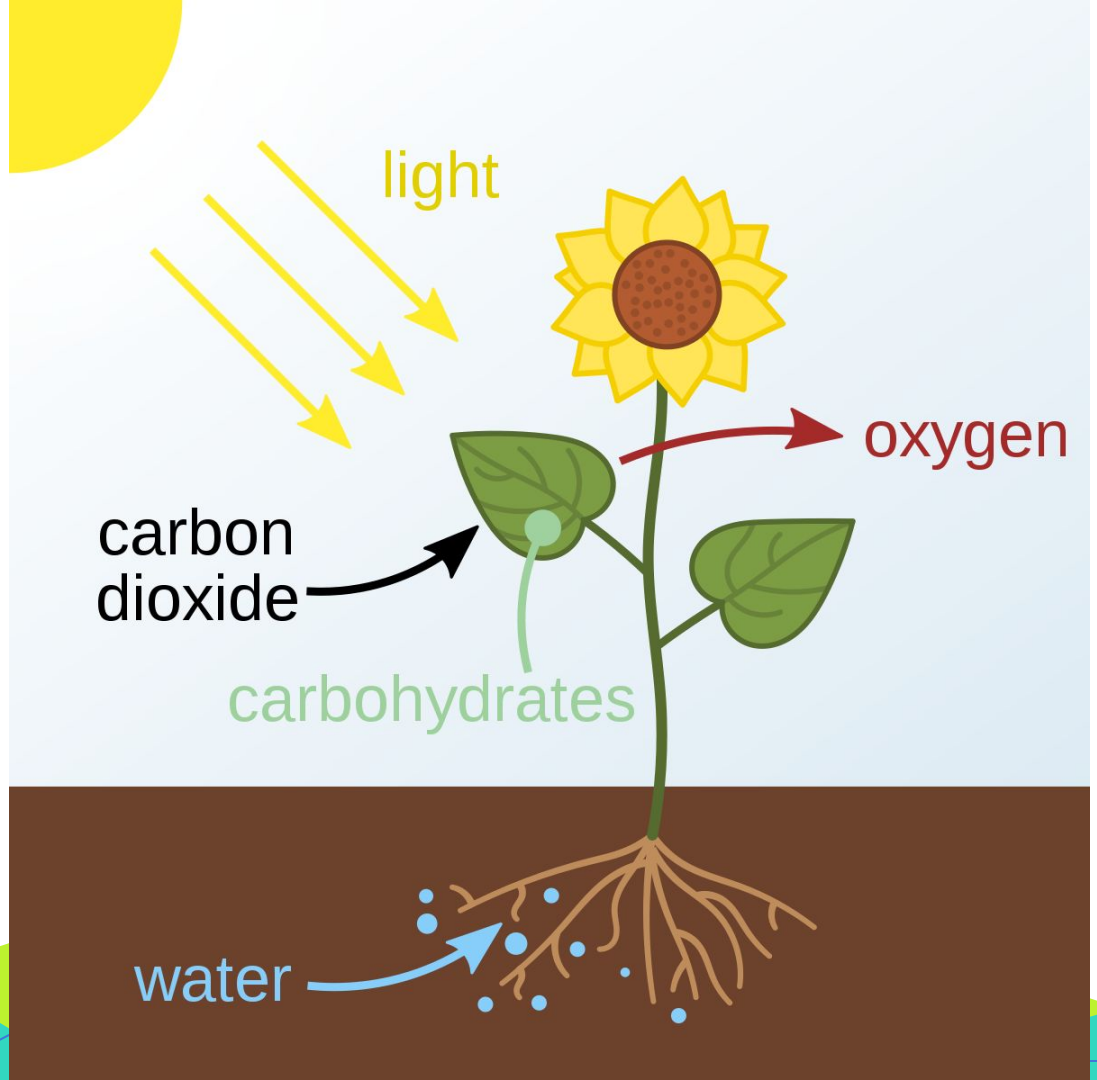
How do we use models?

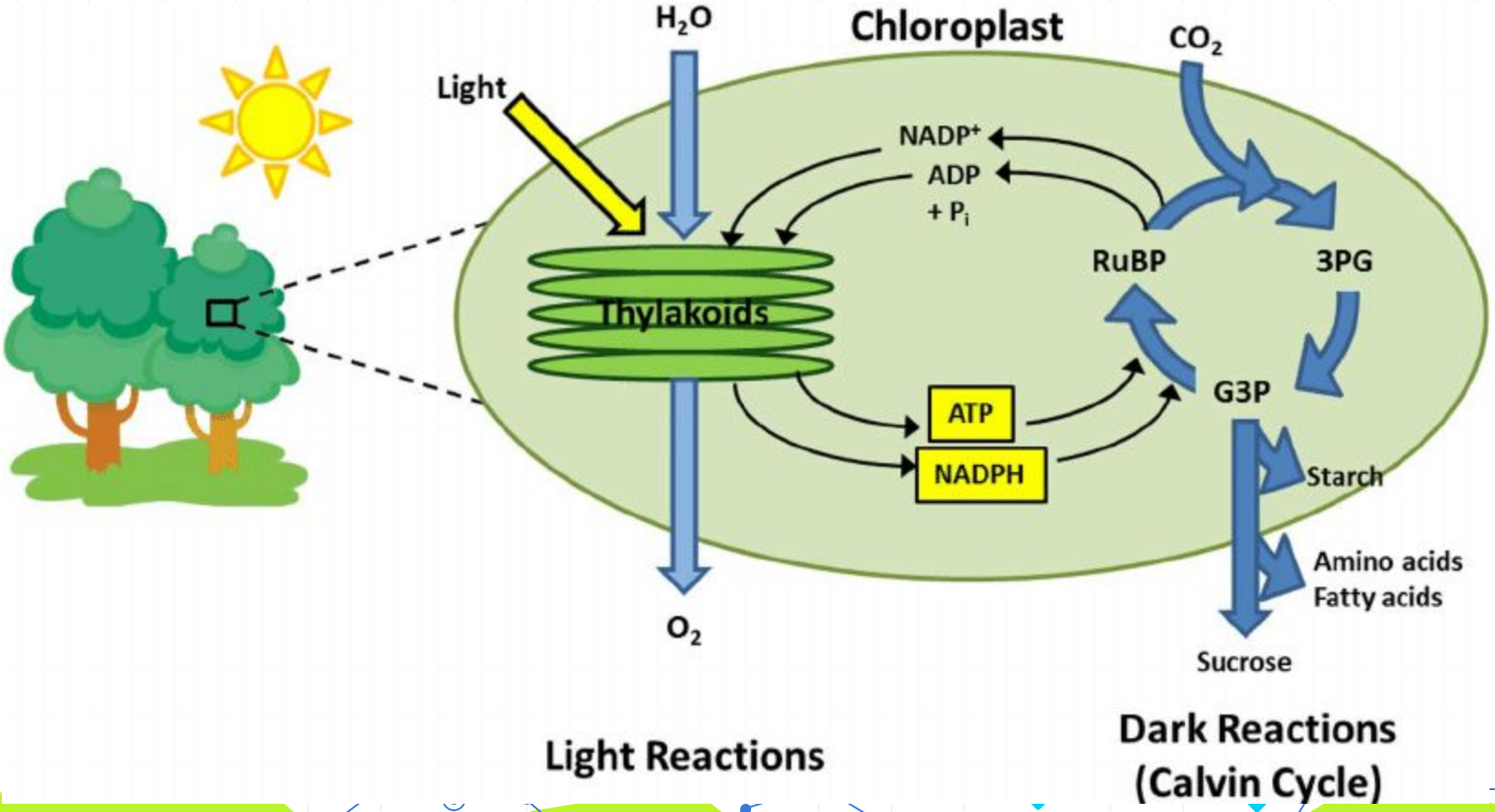
Provide a clear understanding of mental models.

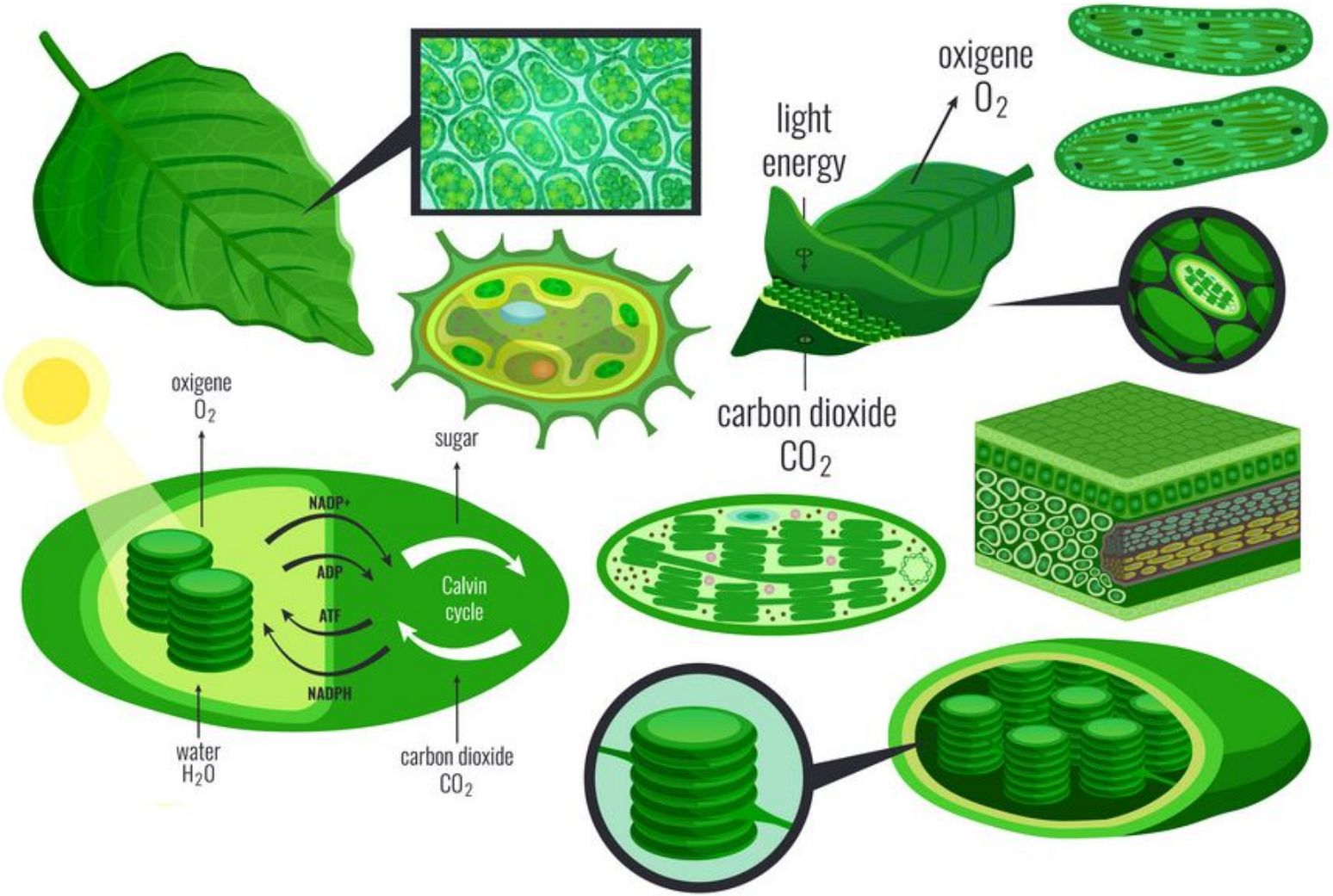
Refine as you learn more.






light
oxygen
carbon
dioxide
carbohydrates
water


H_2O
Chloroplast
CO_2
Light
$NADP^+$
ADP
$+ P_i$
RuBP
3PG
Thylakoids
ATP
NADPH
G3P
Starch
Amino acids
Fatty acids
O_2
Sucrose
Light Reactions
Dark Reactions
(Calvin Cycle)

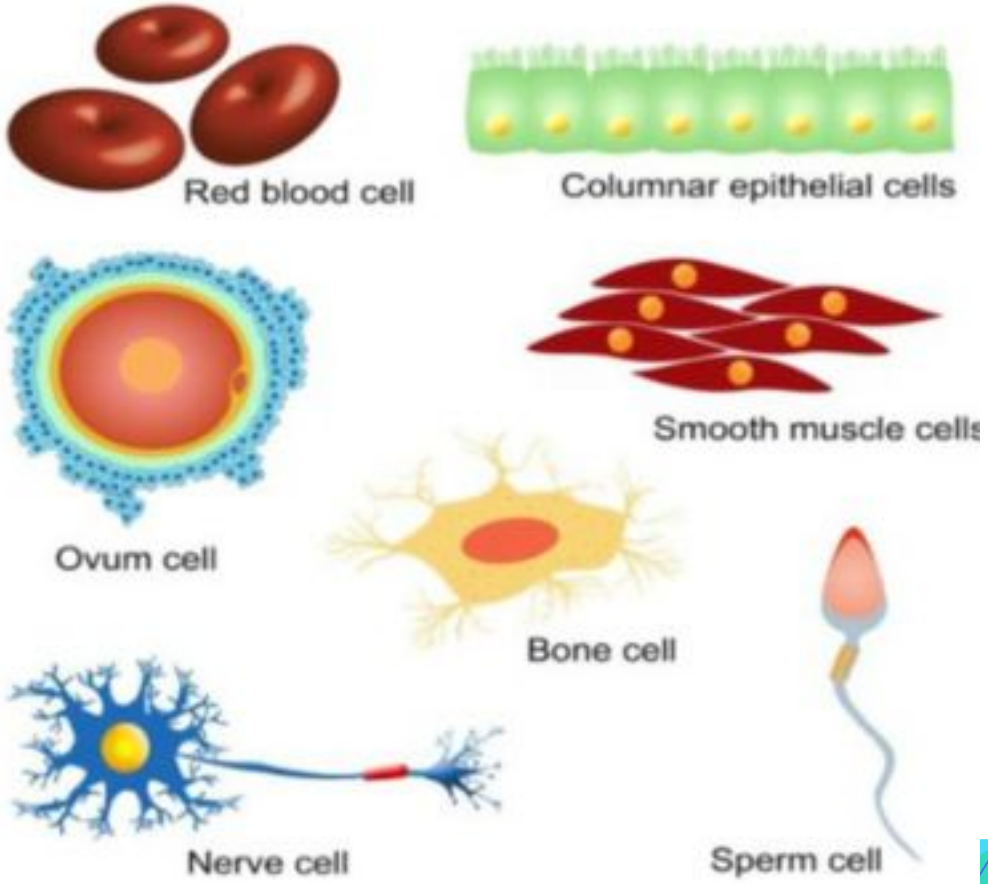

oxigene
O_2
light
energy
oxigene
O_2
carbon dioxide
CO_2
oxigene
O_2
sugar
NADP+
ADP
ATF
NADPH
Calvin
cycle
water
H_2O
carbon dioxide
CO_2

Models have limitations....

You learned that an animal cell looks like this:

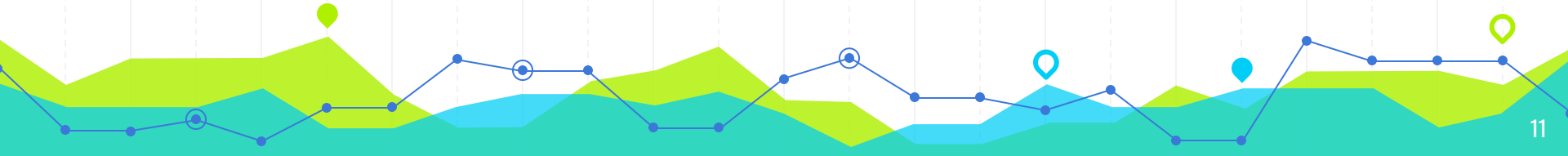


ANATOMY OF HUMAN CELLS



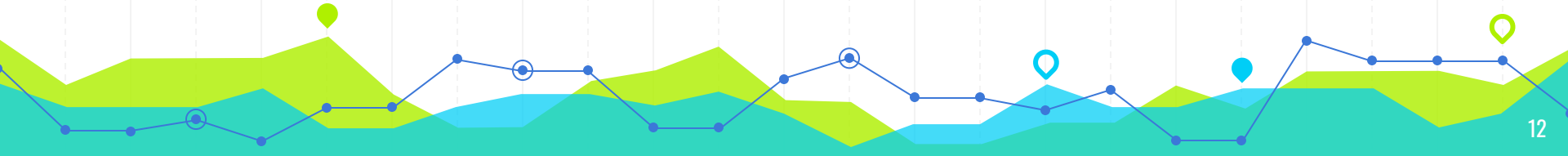
Creating A Model

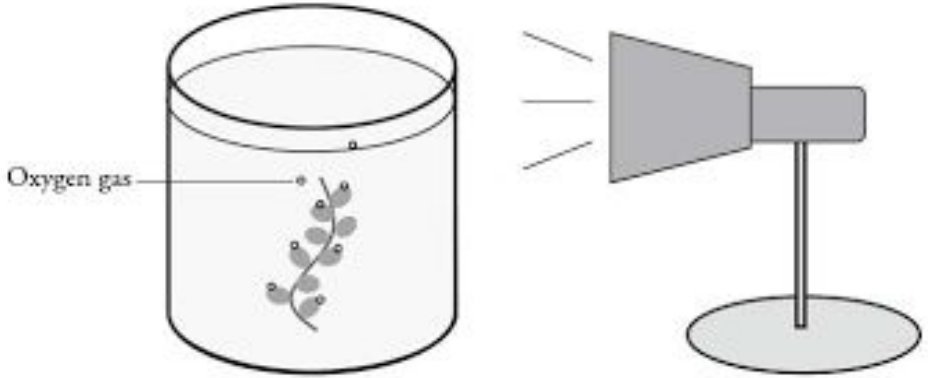
1. Be **explanatory**
2. Be **predictive**
3. Simplified: clear and concise
4. Can include arrows and labels



John Muir Laws of Model ABCDE

- Accurate
- Big
- Colorful
- Detailed
- Explained





What is the model describing above? How do you know?

What questions do you have about the model above?

What are some limitations to this model?

What are some of the things that we could do to test the idea above?

Pg. ____

What I **notice:**

What I **wonder:**

It **reminds** me of:

Initial Model

Final Model

Explain how a disruption might affect the model (ex. change/add/take away one aspect).