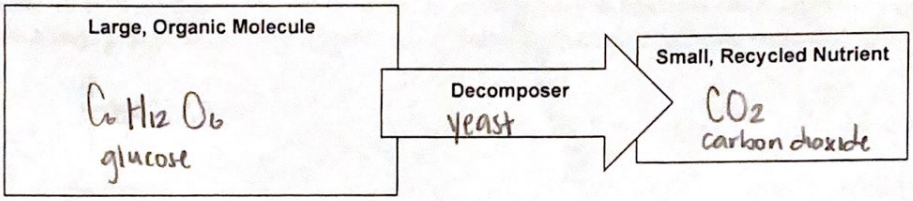
Carbon Dioxide Balloons: Visualizing Decomposition + Nutrient Cycling

Record the amount of carbon dioxide for each group.

Group	1	2	3	4	5	6	7	8
Amount of CO_2	29cm	29cm	31cm	35cm	14cm	12cm	30cm	32cm

CONCLUSION:

1. Out of yeast, sugar, and atmospheric CO_2, **determine** the (1) decomposer at work, the (2) organic molecule being broken down, and the (3) nutrient being recycled.



2. Using the observations made, **describe** how you know carbon dioxide (CO_2) was produced from the chemical reaction between yeast and sugar.

I know that CO_2 was produced because the ballon filled up and got bigger with the molecule.

3. Which group produced the most CO_2? Use the data collected as evidence to **justify** your answer.

Evidence shows that group 4 produced the most carbon dioxide with 35cm of the nutrient. Compared to the other groups including group 1 with 29, group 2 with 29, group 3 with 31cm, group 4 with 35cm, group 5 with 14cm, group 6 with 12cm, group 7 with 30cm and lastly group 8 with 32cm respectively, group 4 has more carbon with 35 cm.

4. **Explain**, in your own words, why decomposers are important for ecosystems.

Decomposer are important for ecosystems because they recycle dead organisms, allowing them to turn into new nutrients. Without them ecosystems would fail and be filled with dead plants, no new nutrients would be produced resulting in dead ecosystems.

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VIDEO: https://youtu.be/em6s0TiyRuM

INTRODUCTION:

The recycling of major nutrients such as carbon (C), hydrogen (H), nitrogen (N), phosphorus (P), and oxygen (O) is an important process that helps sustain generations upon generations of life on Earth. Without nutrient cycling, these resources would be finite, running out long before humans ever existed.

Decomposers are responsible for a significant portion of nutrient cycling. These organisms consume and break down dead organic matter into nutrients that can be reincorporated into the atmosphere, soil, and water. Bacteria, fungi, earthworms, and flies are common examples of decomposers.

Yeast are single-celled, eukaryotic, fungi that play a crucial role in converting sugar ($C_6H_{12}O_6$) into atmospheric carbon dioxide (CO_2). Sugar, or glucose, is a macromolecule present in various forms of life. It contains an abundance of C, H, and O that can be reused to support more life on Earth when organisms decompose. Below is the chemical reaction for yeast's breakdown of glucose into atmospheric CO_2:

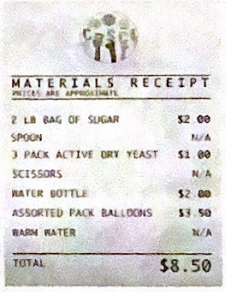
$$\underset{\text{glucose}}{C_6H_{12}O_6} \xrightarrow{\text{yeast}} \underset{\text{ethanol}}{2C_2H_5OH} + \underset{\text{carbon dioxide}}{2CO_2}$$

PURPOSE:

To visualize the decomposition of sugar by yeast to recycle atmospheric carbon dioxide.

PROCEDURE:

1. Stretch out a balloon by continuously blowing it up and down. Set it aside until step 5.
2. Pour one inch of very warm water into an empty and clear plastic bottle.
3. Dissolve one teaspoon of sugar in the warm water. Cap bottle and rigorously shake to ensure sugar has dissolved.
4. Dissolve one packet of active dry yeast in the sugar water solution. Cap bottle and GENTLY stir the yeast to mix with the sugar.
5. Place the balloon securely over the mouth of the bottle. Tape around to secure and seal.
6. Let the balloon-bottle model sit for at least one hour.



MATERIALS RECEIPT
PRICES ARE APPROXIMATE

2 LB BAG OF SUGAR	$2.00
SPOON	N/A
3 PACK ACTIVE DRY YEAST	$1.00
SCISSORS	N/A
WATER BOTTLE	$2.00
ASSORTED PACK BALLOONS	$3.50
WARM WATER	N/A
TOTAL	$8.50

DATA/OBSERVATIONS:

Sketch the model. **Label** the yeast, sugar, and atmospheric CO_2 on each.

Beginning (0 hours)	End (1 to 24 hours)