

# 26.1 Limiting Reactions and Percent Yield

Chemistry

Summarize main points from each video.

Video Title / topic \_\_\_\_\_

Video Title / topic \_\_\_\_\_

Video Title / topic \_\_\_\_\_

# Topic Introduction



**Summarize your understanding of each paragraph.**

The limiting reagent (or limiting reactant, LR) in a chemical reaction is the substance that is totally consumed when the chemical reaction is complete. The amount of product formed is limited by this reagent, since the reaction cannot continue without it.

Percent yield =  $\text{actual yield} / \text{theoretical yield}$ . The actual yield is a product that is obtained by experimentation. The theoretical yield is obtained through stoichiometric calculation. If the two yields are equal, you have 100 % yield. Usually you obtain less than 100 %.

Percentage yield is important because: chemical reactions very often form by-products as well as the intended product. In most reactions, not all of the reactants actually react.

Remember, the calculated or expected amount of product is called the theoretical yield. The amount of product actually produced is called the actual yield. When you divide actual yield by theoretical yield you get a decimal percentage known as the percent yield.

# Read/Summarize Text



1. Read the passage.
2. Underline key expressions in each sentence.
3. Re-write each word (or expression) you underlined.
4. Summarize the passage.

*Title of Passage.*

1

## **Calculating Theoretical Yield**

2

1. Identify your desired product.
2. Write down the number of moles of your limiting reactant.
3. Find the ratio of molecules in your product and reactant.
4. Multiply the ratio by the reactant's quantity in moles.
5. Convert the result to grams.

<https://www.wikihow.com/Calculate-Percent-Yield-in-Chemistry>

*Re-write words you underlined*

3

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*Using a complete sentence, summarize or rephrase the passage*

4

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# Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

## EXAMPLE 1

For example, to determine the number of moles of water produced from 2 mol  $O_2$ , the balanced chemical reaction should be written out:



There is a clear relationship between  $O_2$  and  $H_2O$ : for every one mole of  $O_2$ , two moles of  $H_2O$  are produced. Therefore, the ratio is one mole of  $O_2$  to two moles of  $H_2O$ , or  $\frac{1 \text{ mol } O_2}{2 \text{ moles } H_2O}$ . Assume abundant hydrogen and two moles of  $O_2$ , then one can calculate:

$$2 \text{ moles } O_2 \cdot \frac{2 \text{ mol } H_2O}{1 \text{ mol } O_2} = 4 \text{ moles } H_2O$$

Therefore, 4 moles of  $H_2O$  were produced by reacting 2 moles of  $O_2$  in excess hydrogen.

Each stoichiometric conversion factor is reaction-specific and requires that the reaction be balanced. Therefore, each reaction must be balanced before starting calculations.

## EXAMPLE 2

If 4.44 mol of  $O_2$  react with excess hydrogen, how many moles of water are produced?

The chemical equation is  $O_2 + 2H_2 \rightarrow 2H_2O$ . Therefore, to calculate the number of moles of water produced:

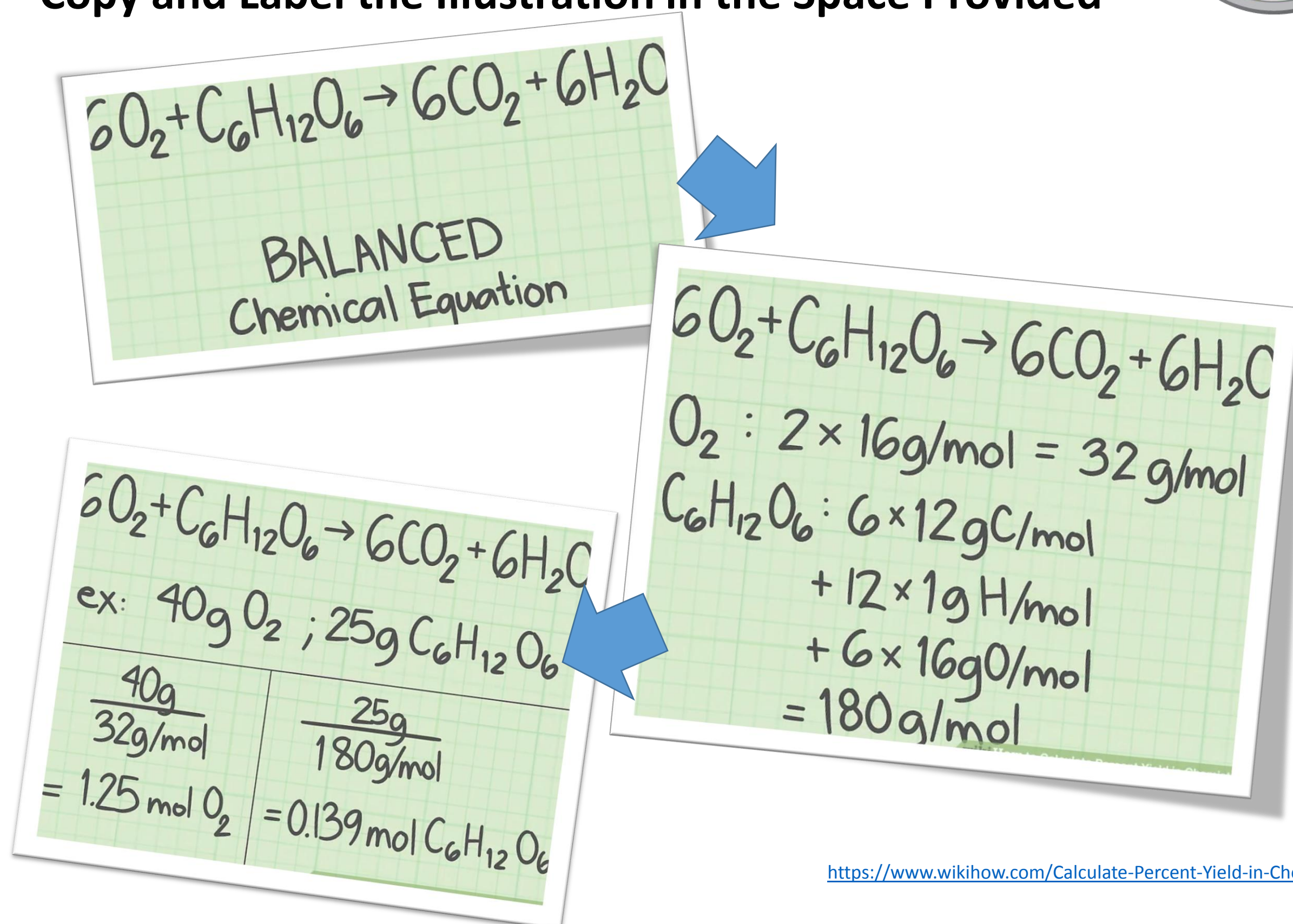
$$4.44 \text{ mol } O_2 \cdot \frac{2 \text{ moles } H_2O}{1 \text{ mole } O_2} = 8.88 \text{ moles } H_2O$$



# Draw Illustration



Copy and Label the Illustration in the Space Provided



<https://www.wikihow.com/Calculate-Percent-Yield-in-Chemistry>

Draw (Copy) the Illustration Here

# Interpret a Graph



Write the title of the graph \_\_\_\_\_

Circle the type of chart this represents

*Bar Chart    Line Chart    Pie Chart    Other*

If applicable,

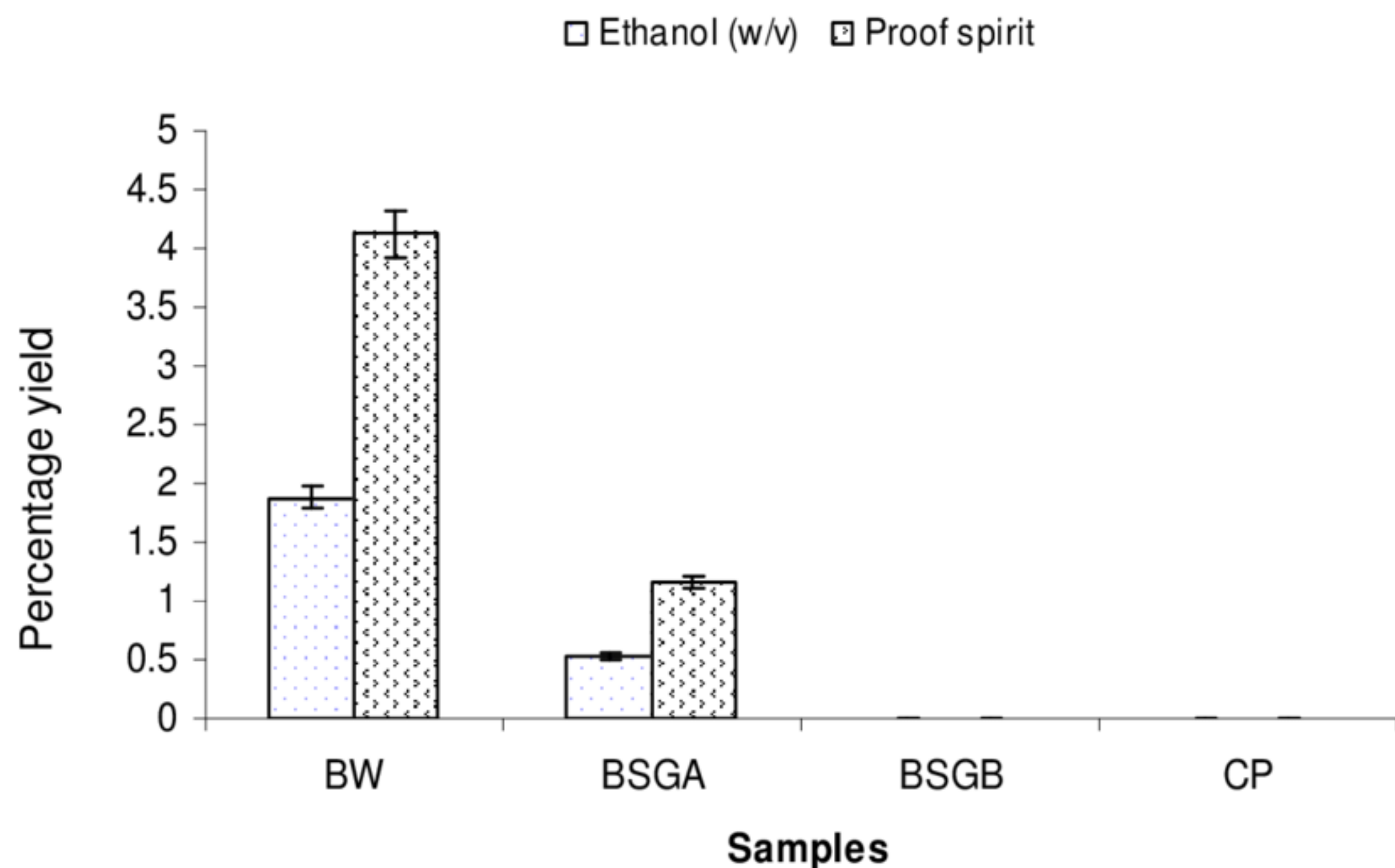
What does the X-axis represent \_\_\_\_\_

What does the Y-axis imply \_\_\_\_\_

Summarize what this graph represents or conveys

\_\_\_\_\_

<https://www.researchgate.net>



# Show-Off Your Smarts!



## Instructions

- Complete as an individual or small group.
- Discuss your ideas/answers/responses in a small group.
- Select one person to present your responses to the class.

**Q1. How can this information be applied to a young-person's life?**

**Q2. How does this information apply to (or impact) communities?**

**Q3. When do scientists need to apply this information? How?**

**Q4. How would a person from 100 years ago view this information?**

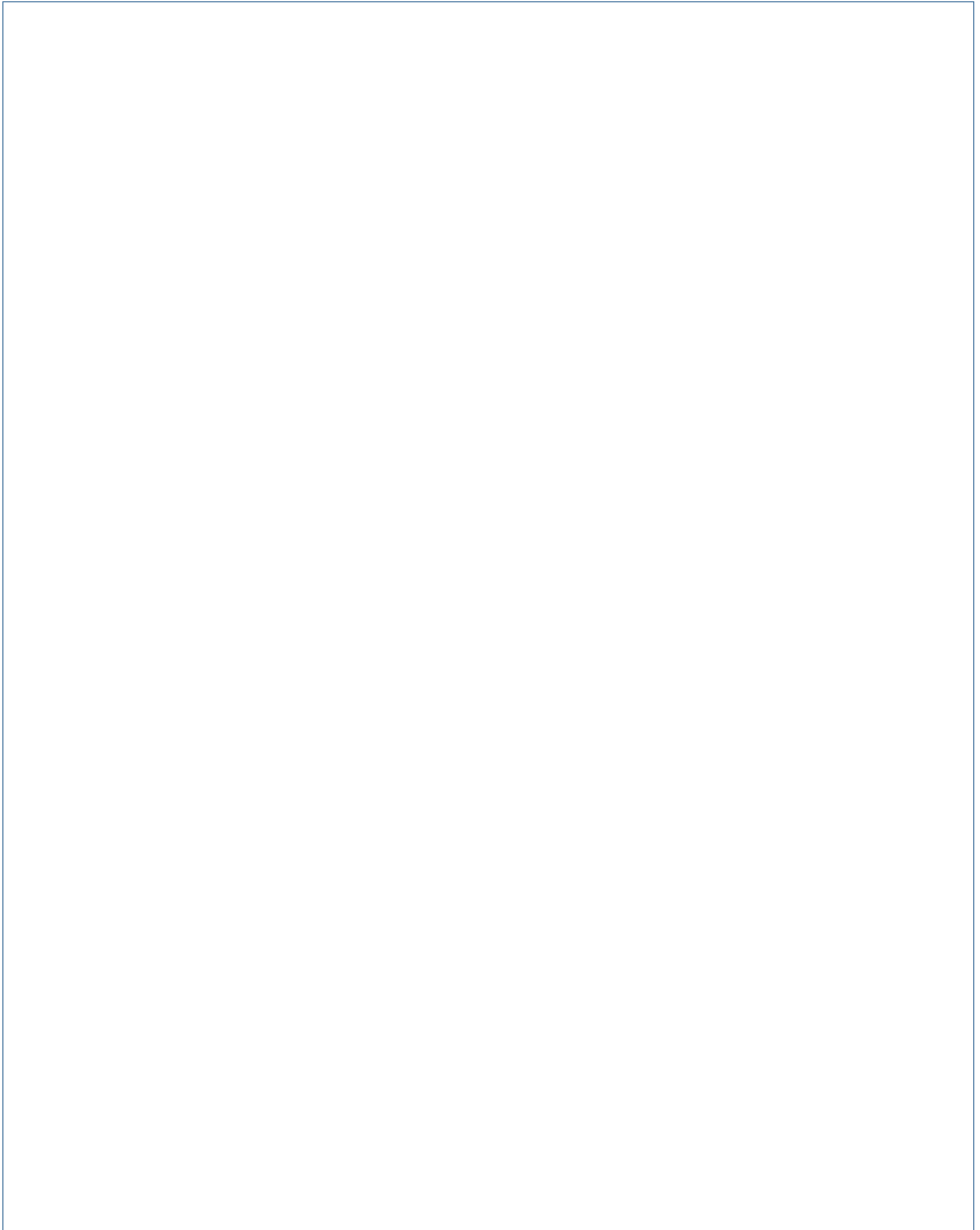
**Q5. How does this topic connect to other science topics or math?**

*Write down at least three words introduced or covered by this topic.*

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

# Make a Poster

In the space provided here, create/draw a poster which conveys the concepts you have learned on this topic.

A large, empty rectangular box with a thin blue border, intended for students to create a poster. The box occupies the majority of the page below the instructions.