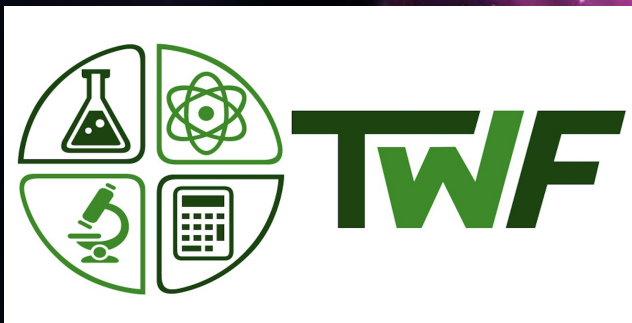


Carbohydrates and Lipids

5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



Complete Teacher Instructions

Carbohydrates and Lipids 5E Lesson

Grades 7-12 Carbohydrates and Lipids Ongoing Lesson

Lesson Objective:

Students will learn about:

- Carbohydrates
- Lipids
- Simple and Complex Carbohydrates
- Refined and Unrefined Carbohydrates
- Fatty Acids
- Unsaturated, Saturated, and Trans Fats
- Phospholipids
- Steroids
- Waxes
- Energy Storage
- Glycemic Index
- Cholesterol

Possible Student Misconceptions:

- Carbohydrates are bad for you
- Carbohydrates are found only in grains
- Carbohydrates are the most fattening nutrient
- All fats are unhealthy
- Diabetes is caused by eating sugar
- Carbohydrates are not needed in the diet
- Fat is the same as cholesterol
- Cholesterol is bad for you
- Carbohydrates make you gain weight
- All carbohydrates are the same

Materials:

- 1 device (smartphone, Chromebook, laptop, tablet, or computer) per 3 students
- A means of projecting a PowerPoint presentation
- Internet access
- General classroom objects

Teacher Notes:

- All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If for any reason, right-click on the image and click **Edit Hyperlink** or something similar.
- I've created a video walkthrough if needed. It can be accessed here - <https://youtu.be/oCIKIP9SaDQ>
- I don't believe in long lessons. If you feel your students are losing their focus, stop the PowerPoint and give them a 5-minute break. If you'd like to see more of my video collection here - <http://www.teachwithfergy.com> are tons of brain-break videos to choose from all grouped by category.

Carbohydrates and Lipids – 5E Lesson

Engagement Phase

Your students will watch the video 'Carbohydrates' and complete the questions found in the file – [Engagement – Carbohydrates Video](#).

Teacher Notes:

- The video is about two minutes long
- You may need to show the video more than once or pause when an answer is given to one of the questions.

Exploration Phase

Exploration – Lab Station Activity

- In groups of 2-3, have your students complete [Exploration – Lab Station Activity](#). Once they're done, they will submit their passport to you.

Teacher Notes:

- The complete instructions for my Lab Station activity can be found in the [START HERE – Instructions](#) file.

Explanation Phase

PowerPoint Lessons

- The lesson is found in the folder – [Explanation – Lesson](#)
- This lesson is designed to be completed over one day
- There are multiple embedded videos and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson
- The lesson covers the following topics:
 - Carbohydrates
 - Isomers
 - Mono-, Di-, and Polysaccharides
 - Lipids
 - Fatty Acids
 - Fats
 - Phospholipids
 - Steroids
 - Waxes

Teacher Notes:

- All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select **Edit Hyperlink** or something similar.
- I've created a video walkthrough if needed. It can be accessed

here - <https://youtu.be/oCIKIP9SaDQ>

- I have also enclosed a .PDF version of both the teacher and student versions.

Elaborate Phase

Elaborate – Reading

Your students will complete – [Elaborate – Reading](#). This reading will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.

Teacher Notes:

- Students will work individually or in small groups
- This reading contains 14 comprehension questions and 3 extension questions. It is fully editable so I encourage you to remove any question(s) in order to meet the needs of your students as well as your time frame.

Evaluate Phase

Quiz

Have your students complete – [Evaluate – Carbohydrates and Lipids Quiz](#)

Teacher Notes:

- It's sometimes best to have the students peer evaluate
- Placing students in small groups and having them exchange papers to mark will accomplish two things
- 1) Provide immediate feedback on the questions they just completed
- 2) Significantly reduce your marking time
- Peer evaluation is not needed, only suggested when appropriate

Duration: 1 hour

Teacher Role – Facilitate learning and keep students focused

Goal

- ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations

Duration: 30 min

Teacher Role – Distribute and collect evaluation

Goal

- ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress

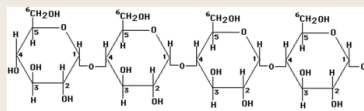
Students are able to connect the content presented to previous experiences

Each phase is clearly described

A Complete Lesson

Chemistry of Carbohydrates

- Made up of C, H, and O
- C:H:O = 1:2:1
- Empirical formula is $(CH_2O)_n$ or $C_nH_{2n}O_n$ where n represents the number of carbon atoms
- Includes many isomers (compounds that have the same chemical formula but different arrangement of atoms)

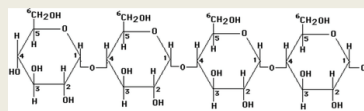


← Make sure your students are on track

Student copies with blanks
Videos embedded right into
your slideshow

Chemistry of Carbohydrates

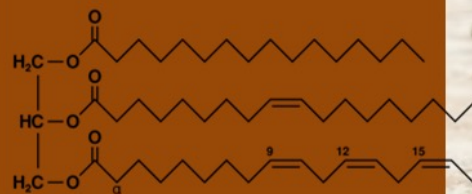
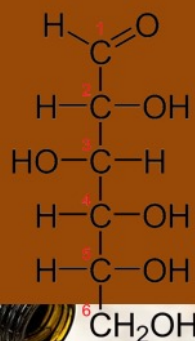
- _____
- _____
- Empirical formula is $(CH_2O)_n$ or $C_nH_{2n}O_n$ where n represents the number of carbon atoms
- Includes many isomers (compounds that have the same chemical formula but different arrangement of atoms)



Organic Molecules Carbohydrates

Interactive and Engaging Activities

Carbohydrates and Lipids Lab Station Activity



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

Carbohydrates, Lipids, and Health

Scientific Reading Comprehension Article and Extension Activity

Carbohydrates, Lipids, and Health



Carbohydrates and lipids are essential macromolecules. Our bodies use them in a variety of different ways, from energy storage to structural support and cell signaling. They are crucial for our health, but some of them can be dangerous in excess. We will explore the many roles of carbohydrates and lipids as well as how to maximize their benefits and minimize their dangers.

Carbohydrates

Carbohydrates are organic compounds of carbon, hydrogen, and oxygen. They typically take the form $(\text{CH}_2\text{O})_n$. They are the primary source of energy for our muscles, but also help power our central nervous system, assist in metabolizing fat, keep the body from using proteins as an energy source (our bodies save proteins to build muscle), and promote brain function through their effects on mood, memory, and decision-making. Furthermore, carbohydrates combined with proteins (called glycoproteins) are a crucial component of cell membranes, allowing cell types to be identified and serving as specialized attachment sites for certain proteins.

We know carbohydrates as sugars, starches, and fibers and we obtain them from certain foods like fruit, vegetables, and grains. In addition to the health benefits of carbohydrates, whole grains, fruits, and vegetables contain essential antioxidants which protect cells from damage. When we consume carbohydrates, they are broken down into small units (e.g., glucose, fructose) in our intestines, pass into the bloodstream, and are carried to the liver. The liver converts all the sugars it receives into the sugar glucose, which is our cell's primary energy source. Glucose then enters the bloodstream. As the level of sugar in the body increases, the pancreas secretes a hormone called insulin, which carries sugar throughout the body to power our muscles. If the blood glucose level is too high, this could mean that the body has difficulty producing insulin.

If we take in excess carbohydrates, our body stores them as glycogen (chains of glucose) in muscle and liver cells. We have about a day's worth of energy (in the form of calories) stored as glycogen, which our muscles can break down. The resulting glucose can be used in the muscles for exercise, within the liver, or passed back into the bloodstream to be carried to other parts of the body. Any additional carbohydrates consumed can be converted into fat for long-term storage.

The energy density of a macronutrient (how much energy it contains) is measured in calories per gram. Most carbohydrates contain 4 calories of energy per gram. Fibers, however, which we can't digest, is partially broken down by bacteria in the large intestine, producing about 1.5 to 2.5 calories per gram.

Types of Carbohydrates

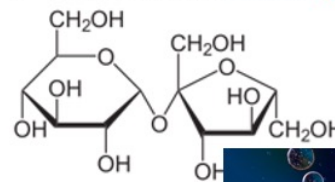
There are two kinds of carbohydrates: simple and complex.



Simple carbohydrates (sugars) are broken down and absorbed quickly, providing a fast source of energy. They are found in many foods, including fruits, vegetables, and grains.

Simple carbohydrates are found in many foods, including fruits, vegetables, and grains.

Simple carbohydrates are easily converted into energy when carbohydrate stores are depleted, such as during exercise.



Glucose is a monosaccharide.

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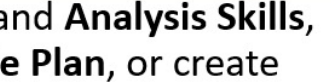
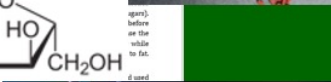
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Improve your students' Literacy and Analysis Skills, use as an Emergency Substitute Plan, or create Applicability in your classroom

Get away from tired practices and unengaged students



Provide a Scientifically-Proven means of instruction



Incorporate Technology and Increase Collaboration

