Organic molecules that contain carbon, hydrogen, and small numbers of oxygen atoms.

All living things require lipids for stored energy and cell membranes. Humans must consume lipids in order to survive.

By the end of this unit of study, you should be able to do the following.

1. Compare the structure of a carbohydrate to a lipid.
2. Compare the function of lipids and carbohydrates.
3. List the two types of lipid.
4. List, describe, and explain the function of each type of lipid.
5. Be able to demonstrate your understanding of the following words:

<table>
<thead>
<tr>
<th>Lipid</th>
<th>Carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fats</td>
<td>Long-term energy</td>
</tr>
<tr>
<td>Phospholipids</td>
<td>storage</td>
</tr>
</tbody>
</table>
Lipids

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Lipids are also organic molecules and are similar to carbohydrates. Both lipids and carbohydrates are used by organisms for energy, but lipids also serve many other purposes. Like carbohydrates, all lipids contain carbon, hydrogen, and oxygen.

We will be studying 2 types of lipid: fats, and phospholipids. Although lipids have many functions, we will concentrate on 4 major functions:

1) long-term stored energy (fats)
2) cell membrane building materials (phospholipids)
3) Insulation from cold for animals (fats, oils, blubber)
4) Cushion for organs (fats and blubber)

REMEMBER THIS!!

Lipids are like carbohydrates but they store energy long term. Both are made from carbon, hydrogen, and oxygen.

Questions 1. What are the 4 functions of lipids?
**Types of Lipids:**

1) **Fats** are a particular type of lipids that you are probably familiar with. Fats are used for storing energy. In a living organism, when the supply of carbohydrates is low, fats are converted into energy. (Oils and waxes are also lipids)

**Interesting Scientific Fact:** Humans use their carbohydrates for energy before we use the lipids (fats) as energy. In some cases, stored lipid energy (fat) is seldom used. That is why it is so difficult for some people to lose weight.

2) **Phospholipids** are also a type of lipid. This molecule has a **polar head** and a **nonpolar fatty acid tails** so it is used to make cell membranes in plants, animals, and a particular type of animal known as humans.

**Question 2.** What are the 4 kinds of lipids?

Lipids are made of two parts. There is a **polar head**, which is polar and can dissolve in water. Then there are **fatty acid** tails. These are non-polar and do not dissolve in water. Most lipids contain 3 fatty acid tails. **Phospholipids**, which make up **cell membranes** (which is the skin of the cell), only have 2 fatty acid tails. **Fatty acids** can be thought of as the building blocks of lipids.

*Example of A Triglyceride*  
*Example of a Phospholipid*
Interesting Scientific Fact: Every living thing is composed of one or more cells.

The cell membrane contains the cell and determines what goes into and out of every cell. Healthy cells have healthy cell membranes. Diseases often occur when the cell membrane is attacked.

Questions 3. What is the building block of a lipid molecule?

Question 4. What are the two parts of a phospholipid and what do they make?

Diagram of a healthy cell membrane. The cell membrane is a bilayer because the polar glycerol head can touch the water environment inside and outside the cell. But the non-polar fatty acid tails are non-polar so they are repelled by water. Therefore, they form the inside of the bilayer facing away from the water inside and outside of the cell.

Question 5. Why is the cell membrane a bilayer instead of a single layer?
Lipids
Self Test

True or False

_____ 1. Lipids are used only for energy in a cell.
_____ 2. Lipids are used for many different functions.
_____ 3. Lipids contain carbon, nitrogen, and oxygen.
_____ 4. Fats are a type of carbohydrate.
_____ 5. Fats are a source of long-term stored energy.
_____ 6. Phospholipids are used to make cell membranes.
_____ 7. Phospholipids are organic molecules.
_____ 8. All lipids are organic molecules.
_____ 9. Lipids are similar to carbohydrates.
_____ 10. Lipids are required to make new cells.

Short Answer:
1) What is the building block of a lipid called?

2) What are the four functions of lipids?

3) Describe what a phospholipid does?
Lipids
Answer Sheet

Questions 1. What are the four functions of lipids?

Question 2. What are the four kinds of lipids?

Questions 3. What is the building block of a lipid molecule?

Question 4. What are the two parts of a phospholipid and what do they make?

Question 5. Why is the cell membrane a bilayer instead of a single layer.