Bio 12

Name: Key

**Carbohydrates Worksheet**

Name: _____

a) Which elements do carbohydrates contain, and in what ratio?

C : H : O  1 : 2 : 1

b) If a sugar compound has 11 oxygen atoms, how many hydrogen atoms does it contain?

22 H

c) Based on their molecular formulas, which of the following are NOT carbohydrates?

a) $C_3H_8O_3$

b) $C_{10}H_{18}O_9$

c) $C_{18}H_{32}O_{16}$

d) $C_4H_8O_2$

e) $C_{16}H_{32}O_2$

f) $C_6H_{12}O_6$

d) For each molecule below, determine if it is a monosaccharide, a disaccharide, or a polysaccharide:

a) Fructose - monosaccharide

b) Ribose - monosaccharide

c) Cellulose - polysaccharide

d) Glucose - monosaccharide

e) Sucrose - disaccharide

f) Glycogen - polysaccharide

g) Chitin - polysaccharide

h) Starch - polysaccharide

i) Maltose - disaccharide

e) Describe a biological function for each of the following carbohydrates

a) Cellulose - structural support in cell walls of plants. Polysacch

b) Ribose - pentose, used in body for energy production, sugar component of RNA + ATP. Monosaccharide

c) Starch - storage form of glucose in plants, long chains of ~4000 glucose units

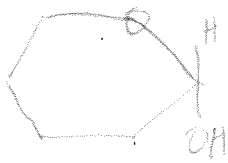
d) Glycogen - short term energy storage for animals, in liver - more side branches than starch. Polysac

e) Deoxyribose - sugar component of DNA (backbone of DNA molec) binds to N-base

f) Fructose - simple carbohydrate, pentose, monosac. found in fruit.

g) Sucrose - disaccharide formed when glucose + fructose join via dehydration synthesis. Table sugar. Derived from sugar cane or sugar beets

f) Draw the molecular structure of the following carbohydrates:

| GLUCOSE | CELLULOSE |
|---|---|
|  |  |
| Monosaccharide (one glucose unit) | Polysaccharide (many glucose units) |

g) Complete these word equations

a) Glucose + glucose → maltose + water

b) Glucose + fructose → sucrose + water

c) Monosaccharide + monosaccharide → disaccharide + water

d) Lactose + water → glucose + galactose

e) Disaccharide + water → monosaccharide + monosaccharide

h) Briefly describe the process of the condensation reaction for carbohydrates.

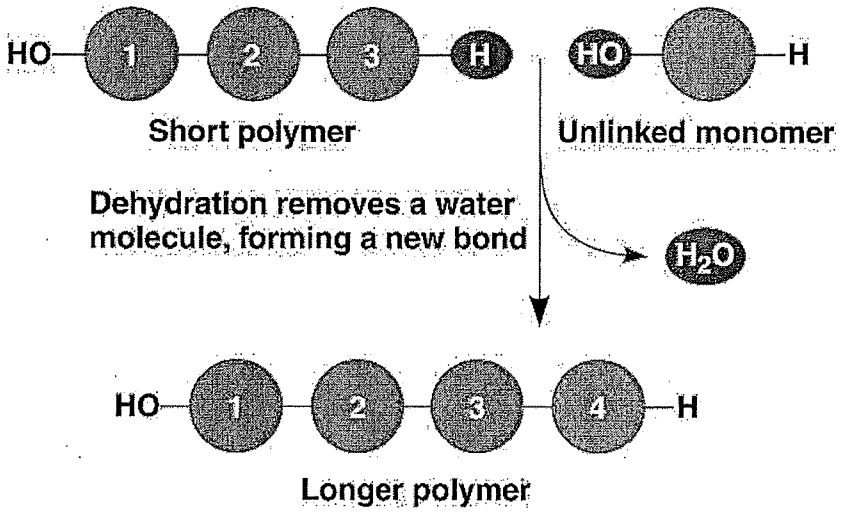
= Dehydration Synthesis: An H of one monosac and OH of another monosaccharide are removed to form water as the two monosac's bind to each other.

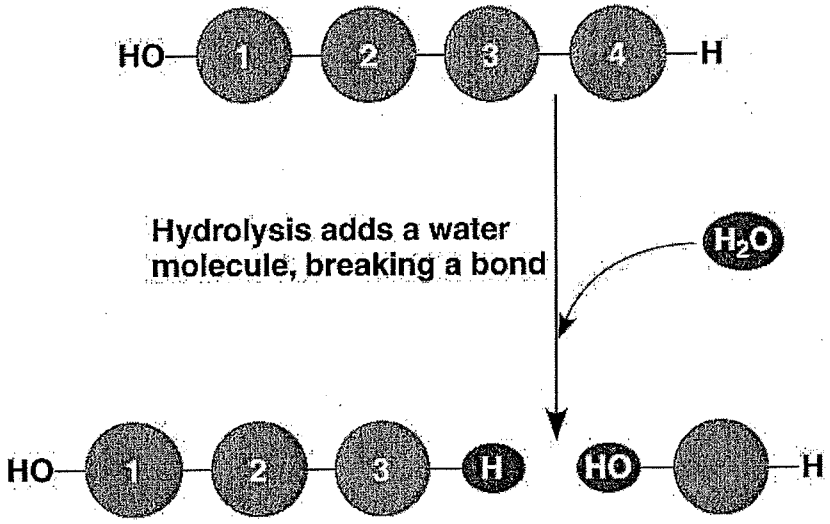
i) Briefly describe the process of the hydrolysis reaction for carbohydrates.

Opposite reaction: Water is used to break the bond between two sugar subunits

**QUESTION:** What comparison can be made between dehydration synthesis and hydrolysis?

They are opposite reactions




HO
1
2
3
4
H
Hydrolysis adds a water molecule, breaking a bond
H2O
HO
1
2
3
H
HO
H