

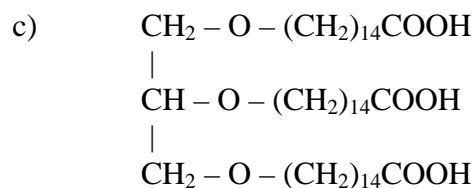
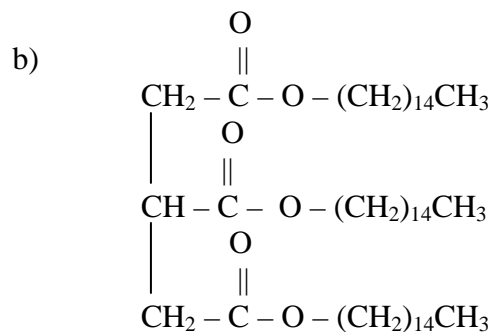
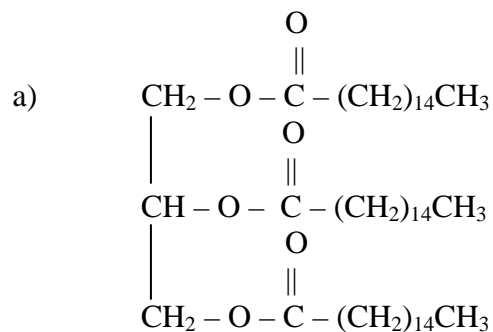
Question- Lipids

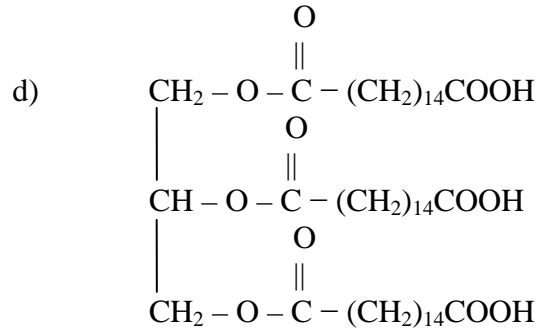
A. The structures of different types of lipids are studied and compared. (Questions 1-8)

1. \_\_\_\_\_ Which of the following molecules is a typical fatty acid?
- A molecule that has an even number of carbon atoms in a branched chain.
  - An amphipathic dicarboxylic acid with unconjugated double bonds.
  - A molecule that has one cis double bond in a linear carbon chain.
  - A polar hydrocarbon with that reacts with NaOH to form a salt.

2. \_\_\_\_\_ Which of the following structures is a 20:2 ( $\Delta^{4,9}$ ) fatty acid?
- $\text{CH}_3(\text{CH}_2)_9\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_2\text{COOH}$
  - $\text{CH}_3(\text{CH}_2)_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_9\text{COOH}$
  - $\text{CH}_3(\text{CH}_2)_{10}\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CHCH}_2\text{COOH}$
  - $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}(\text{CH}_2)_3\text{CH} = \text{CH}(\text{CH}_2)_{10}\text{COOH}$

3. \_\_\_\_\_ Which of the following structures is a triglyceride?





4. \_\_\_\_\_ Which of the following is a characteristic of both triacylglycerols and glycerophospholipids?

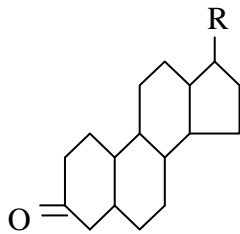
- a) Both contain carboxyl groups and are amphipathic
- b) Both contain fatty acids and are saponifiable.
- c) Both contain glycerol and ether bonds.
- d) Both can be negatively charged at cellular pH.

5. \_\_\_\_\_ Which of the following is a characteristic of both waxes and terpenes?

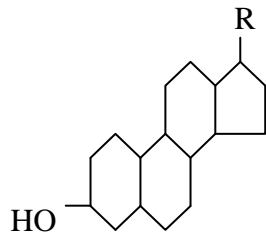
- a) Both can contain an amino alcohol.
- b) Both can contain a fatty acid.
- c) Both can be non-saponifiable.
- d) Both can contain oxygen.

6. \_\_\_\_\_ Which of the following structures is a sterol?

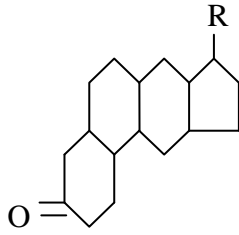
a)



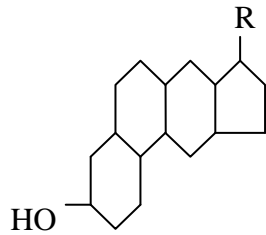
b)



c)



d)



7. \_\_\_\_\_

Which is a characteristic of sphingolipids?

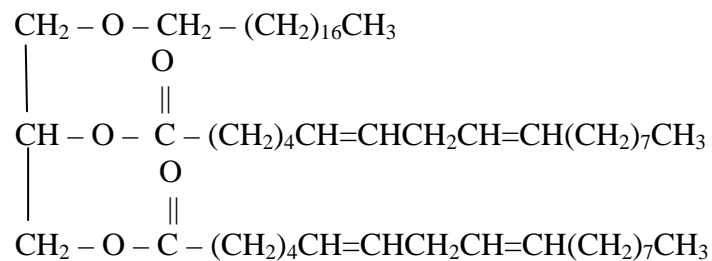
- a) They all contain a fatty acid joined to glycerol.
- b) They all contain a long-chain alcohol joined to isoprene.
- c) They all contain ceramide joined to a polar group.
- d) They all contain a carbohydrate joined to a phosphate group.

8. \_\_\_\_\_

Which is a property of eicosanoids?

- a) All eicosanoids contain three conjugated double bonds.
- b) All eicosanoids contain arachidonic acid and sphingosine.
- c) Prostaglandins and leukotrienes both contain a ring structure.
- d) Thromboxanes and prostaglandins both contain a carboxyl group.

B. A lipid has the following structure:



(Questions 9-15)

9. \_\_\_\_\_ Which is a characteristic of all the fatty acid components in this lipid?
- They all contain an unbranched carbon chain.
  - They all contain unconjugated cis double bonds.
  - They all are joined to glycerol through an ester bond.
  - They all are hydrophilic because they contain oxygen.
10. \_\_\_\_\_ What is the proper designation for the unsaturated fatty acids in this lipid?
- 18:2 ( $\Delta^{9,12}$ )
  - 18:2 ( $\Delta^{6,9}$ )
  - 17:2 ( $\Delta^{9,12}$ )
  - 17:2 ( $\Delta^{5,8}$ )
11. \_\_\_\_\_ Which property does this lipid share with a typical triacylglycerol?
- Both contain an ether bond.
  - Both contain a long-chain alcohol.
  - Both are amphipathic.
  - Both are saponifiable.
12. \_\_\_\_\_ Which characteristic does this lipid share with a wax?
- Both contain a polar head.
  - Both contain three fatty acids.
  - Both contain one or more ester bonds.
  - Both contain one or more carboxyl groups.
13. \_\_\_\_\_ Which characteristic is shared by this lipid and an eicosanoid?
- This lipid and a leukotriene are both polyunsaturated molecules.
  - This lipid and a thromboxane can both be hydrolyzed in base to produce soaps.
  - This lipid and a prostaglandin can both be hydrolyzed in acid to create fatty acids.
  - This lipid and an arachidonic acid both contain glycerol and hydrocarbon chains.
14. \_\_\_\_\_ Which property can be shared by this lipid and a terpene?
- Both can contain isoprene.
  - Both can form micelles.
  - Both can contain a saturated fatty acid.
  - Both can be very hydrophobic molecules.
15. \_\_\_\_\_ Based on its structural similarity to other lipids, this lipid most likely functions as
- a membrane component.
  - an energy storage molecule.
  - a sex hormone.
  - a vitamin required for vision.
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C. The structure of an animal cell membrane is analyzed. (Questions 16-23)

- 16.\_\_\_\_\_ Which is a characteristic of biological membranes?
- a) Membranes contain proteins and amphipathic lipids.
  - b) Membranes have an asymmetrical micelle structure.
  - c) Membranes have hydrophobic groups on the surfaces.
  - d) Membranes contain lipids that polymerize into one large molecule.
- 17.\_\_\_\_\_ Which membrane lipid contains an amide bond?
- a) cholesterol
  - b) phosphatidylserine
  - c) phosphatidic acid
  - d) sphingomyelin
- 18.\_\_\_\_\_ Which type of membrane lipid contains an acidic oligosaccharide?
- a) phosphatidylinositol
  - b) cerebroside
  - c) ganglioside
  - d) globoside
- 19.\_\_\_\_\_ Which would be a property of all the major types of lipids in this membrane?
- a) They would be saponifiable in base and hydrolyzed in acid.
  - b) They would have polar heads and non-polar tails.
  - c) They would be composed of five-carbon units.
  - d) They would be joined to each other through covalent bonds.
- 20.\_\_\_\_\_ Which is a characteristic of the lipids in a biological membrane?
- a) Specific glycerophospholipids are distributed equally on the two membrane surfaces.
  - b) Lipid molecules are held in fixed positions by non-covalent bonds with proteins.
  - c) The fluidity of the membrane decreases with lower levels of saturated fatty acids.
  - d) The fatty acids of lipid molecules are found in the interior of the membrane.
- 21.\_\_\_\_\_ Which is a property of integral membrane proteins?
- a) All integral membrane proteins contain hydrophilic regions.
  - b) All integral membrane proteins span the entire membrane.
  - c) All integral membrane proteins contain carbohydrate groups within the membrane.
  - d) All integral membrane proteins transport non-polar molecules through the membrane.

22. \_\_\_\_\_ Which property is shared by integral membrane proteins and peripheral membrane proteins?
- a) Both can contain an unusually high proportion of hydrophobic R-groups.
  - b) Both can contain regions of  $\alpha$ -helices and  $\beta$ -pleated sheets.
  - c) Both can flip between the two sides of the membrane.
  - d) Both can form hydrogen bonds with the hydrocarbons of lipids.
23. \_\_\_\_\_ Which characteristic is most likely shared by a cell membrane and a lipoprotein particle?
- a) Both are composed of a lipid bilayer.
  - b) Both contain a high amount of triacylglycerols.
  - c) Both contain hydroxyl groups on the surface.
  - d) Both contain proteins in the interior.
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D. The structure and components of a cell membrane are studied. (Questions 24-31)

24. \_\_\_\_\_ Which is a general property of cell membranes?
- a) Membranes contain more lipid than protein.
  - b) Membrane proteins have a polar head and a non-polar tail.
  - c) Membrane lipids are amphipathic.
  - d) Membranes contain covalent bonds between fatty acids.
25. \_\_\_\_\_ Which will be a characteristic of a steroid that is part of a cell membrane?
- a) It will contain a hydroxyl group.
  - b) It will contain four aromatic rings.
  - c) It will contain choline.
  - d) It will contain an amide bond.
26. \_\_\_\_\_ Which component is found in all sphingolipids?
- a) a carbohydrate
  - b) a negative charge
  - c) a phosphate group
  - d) an amino alcohol
27. \_\_\_\_\_ Which type of membrane lipid could contain serine?
- a) a globoside
  - b) a cerebroside
  - c) a glycerophospholipid
  - d) a ganglioside

28. \_\_\_\_\_ Which is a property of lipids in cell membranes?
- The hydrophobic groups of lipid molecules are found on membrane surfaces.
  - Some types of lipids are found preferentially in the outer membrane layer.
  - Most of the lipids are hydrocarbons composed of five-carbon units.
  - Most of the lipids function in transporting biomolecules into the cell.
29. \_\_\_\_\_ Which is a characteristic of the components in cell membranes?
- A protein molecule in a membrane can move laterally and can also flip from one surface to the other.
  - A lipid molecule in a membrane interacts with other membrane molecules through non-covalent forces.
  - Increasing the proportion of protein in a membrane increases the amount of membrane symmetry.
  - Increasing the proportion of saturated fatty acids in a membrane increases membrane fluidity.
30. \_\_\_\_\_ Which is a difference between integral membrane proteins and peripheral membrane proteins?
- Integral membrane proteins contain mainly  $\alpha$ -helices while peripheral membrane proteins contain mainly  $\beta$ -pleated sheets.
  - Integral membrane proteins often contain carbohydrates on the inner surface while peripheral membrane proteins often contain carbohydrates on the outer surface.
  - Integral membrane proteins bind to the membrane using hydrophobic forces while peripheral membrane proteins bind to the membrane using hydrophilic forces.
  - Integral membrane proteins always span the entire membrane while peripheral membrane proteins are always located on one side of the membrane.
31. \_\_\_\_\_ Which characteristic is shared by a cell membrane and a chylomicron?
- Both contain specific proteins.
  - Both have a bilayer structure.
  - Both contain a high proportion of triglycerides.
  - Both contain a high proportion of sterols.