Question with Answers - 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?

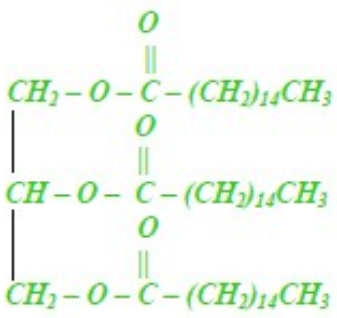
a) A molecule that has an even number of carbon atoms in a branched chain.
b) An amphipathic dicarboxylic acid with unconjugated double bonds.
c) A molecule that has one cis double bond in a linear carbon chain.
d) A polar hydrocarbon with that reacts with NaOH to form a salt.

2._____ Which of the following structures is a 20:2 ($\Delta^{4,9}$) fatty acid?

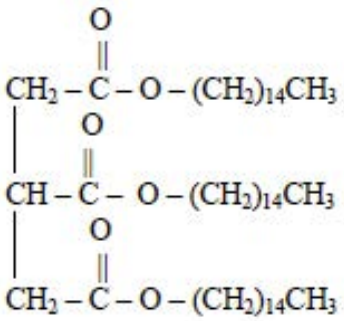
a) $CH_3(CH_2)_9CH = CH(CH_2)_3CH = CH(CH_2)_2COOH$
b) $CH_3(CH_2)_2CH = CH(CH_2)_3CH = CH(CH_2)_9COOH$
c) $CH_3(CH_2)_{10}CH = CH(CH_2)_3CH = CHCH_2COOH$
d) $CH_3CH_2CH = CH(CH_2)_3CH = CH(CH_2)_{10}COOH$

3._____ Which of the following structures is a triglyceride?

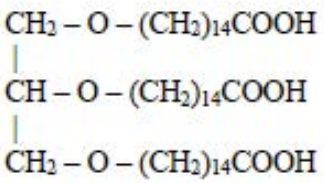
a)



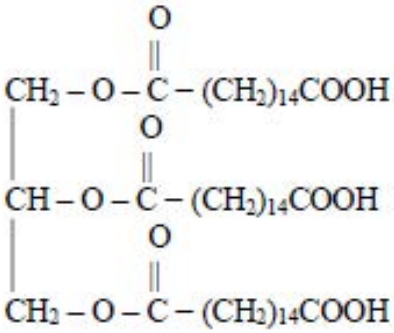
b)



c)



d)



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

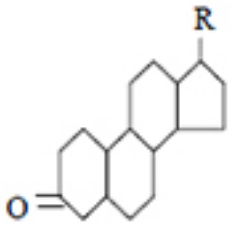
a) Both contain carboxyl groups and are amphipathic
b) Both contain fatty acids and are saponifiable.
c) Both contain glycerol and ether bonds.
d) Both can be negatively charged at cellular pH.

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

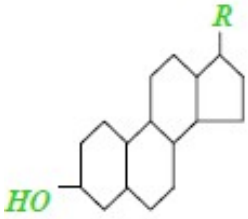
a) Both can contain an amino alcohol.
b) Both can contain a fatty acid.
c) Both can be non-saponifiable.
d) Both can contain oxygen.

6._____ Which of the following structures is a sterol?

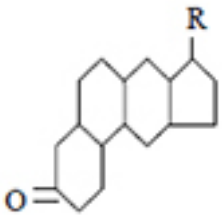
a)



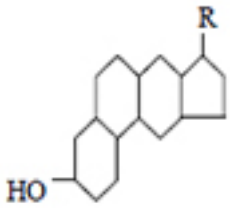
b)



c)



d)



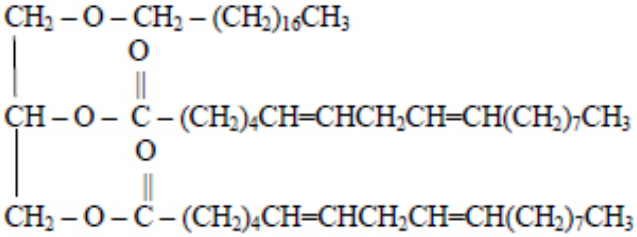
7._____ Which is a characteristic of sphingolipids?

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?
a) They all contain an unbranched carbon chain.
b) They all contain unconjugated cis double bonds.
c) They all are joined to glycerol through an ester bond.
d) They all are hydrophilic because they contain oxygen.

10._____ What is the proper designation for the unsaturated fatty acids in this lipid?
a) 18:2 ($\Delta^{9,12}$)
b) 18:2 ($\Delta^{6,9}$)
c) 17:2 ($\Delta^{9,12}$)
d) 17:2 ($\Delta^{5,8}$)

11._____ Which property does this lipid share with a typical triacylglycerol?
a) Both contain an ether bond.
b) Both contain a long-chain alcohol.
c) Both are amphipathic.
d) Both are saponifiable.

12._____ Which characteristic does this lipid share with a wax?
a) Both contain a polar head.
b) Both contain three fatty acids.
c) Both contain one or more ester bonds.
d) Both contain one or more carboxyl groups.

13._____ Which characteristic is shared by this lipid and an eicosanoid?
a) This lipid and a leukotriene are both polyunsaturated molecules.
b) This lipid and a thromboxane can both be hydrolyzed in base to produce soaps.
c) This lipid and a prostaglandin can both be hydrolyzed in acid to create fatty acids.
d) This lipid and an arachidonic acid both contain glycerol and hydrocarbon chains.

14._____ Which property can be shared by this lipid and a terpene?
a) Both can contain isoprene.
b) Both can form micelles.
c) Both can contain a saturated fatty acid.
d) Both can be very hydrophobic molecules.

15._____ Based on its structural similarity to other lipids, this lipid most likely functions as
a) a membrane component.
b) an energy storage molecule.
c) a sex hormone.
d) a vitamin required for vision.

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 α-helices and β-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.

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?

a) The hydrophobic groups of lipid molecules are found on membrane surfaces.
b) Some types of lipids are found preferentially in the outer membrane layer.
c) Most of the lipids are hydrocarbons composed of five-carbon units.
d) Most of the lipids function in transporting biomolecules into the cell.

29._____ Which is a characteristic of the components in cell membranes?

a) A protein molecule in a membrane can move laterally and can also flip from one surface to the other.
b) A lipid molecule in a membrane interacts with other membrane molecules through non-covalent forces.
c) Increasing the proportion of protein in a membrane increases the amount of membrane symmetry.
d) 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?

a) Integral membrane proteins contain mainly α-helices while peripheral membrane proteins contain mainly β-pleated sheets.
b) Integral membrane proteins often contain carbohydrates on the inner surface while peripheral membrane proteins often contain carbohydrates on the outer surface.
c) Integral membrane proteins bind to the membrane using hydrophobic forces while peripheral membrane proteins bind to the membrane using hydrophilic forces.
d) 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?

a) Both contain specific proteins.
b) Both have a bilayer structure.
c) Both contain a high proportion of triglycerides.
d) Both contain a high proportion of sterols.