1. Define a lipid

2. Which of the following has the lower melting point:
   a. \[ \text{COOH} \quad \text{COOH} \]

   b. \[ \text{COOH} \quad \text{COOH} \]

3. What essential fatty acids are these?

   \[ \text{COOH} \quad \text{COOH} \]

4. Palmitic acid (hexadecanoic acid) is a saturated fatty acid. How many moles of acetyl-CoA and malonyl-CoA are required to make 1 mole of palmitic acid?

5. If the biosynthesis of palmitic acid were carried out with CD$_3$COSR and non deuterated malonyl thioester, how many deuteriums would be incorporated into palmitic acid?

6. If the biosynthesis of palmitic acid were carried out with \(^{18}\text{OCCD}_2\text{COSR}\) and non deuterated acetyl thioester, how many deuteriums would be incorporated into palmitic acid?
6. Draw an example of a wax.

7. What is the difference between a fat and an oil?

8. Draw phosphatidylcholine and a sphingomyelin

9. Draw the ring system for steroids.

10. Draw an isoprene unit and label the head and the tail.

11. Mark off the isoprene units in β-carotene

12. How many carbons are in a monoterpenes and a diterpene?
13. Give the mechanism for the following reaction:

\[2 \rightarrow \text{Reaction Product}\]

14. Show how fatty acids become rancid:

15. Which terpene is the precursor to cholesterol?

1. Define a lipid

\[ \text{H}_2\text{O soluble organic molecule} \]

2. Which of the following has the lower melting point:

a. \[ \text{COOH} \]
   \[ \downarrow \text{C} \]
   \[ \downarrow \text{IMF} \]
   \[ \downarrow \text{HP} \]

b. \[ \text{COOH} \]

3. What essential fatty acids are these?

\[ \text{Omega 3 FA} \]

\[ \text{Omega 6} \]

4. Palmitic acid (hexadecanoic acid) is a saturated fatty acid. How many moles of acetyl-CoA and malonyl-CoA are required to make 1 mole of palmitic acid?

\[
\frac{16 + 16}{2} = 8 < 1 \text{ acetyl} \]

\[
7 \text{ malonyls} \]

5. If the biosynthesis of palmitic acid were carried out with \( \text{CD}_3\text{COSR} \) and non deuterated malonyl thioester, how many deuteriums would be incorportated into palmitic acid?

3

6. If the biosynthesis of palmitic acid were carried out with \( \text{OOC}\text{CD}_2\text{COSR} \) and non deuterated acetyl thioester, how many deuteriums would be incorporated into palmitic acid?

7 malonyls \( \Rightarrow \) 7 D
6. Draw an example of a wax.

\[ R - \text{CH}_2 - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH} - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \]

7. What is the difference between a fat and an oil?

- **Saturated FA**: Solid at room temp
- **Liquid at room temp**

8. Draw phosphatidylcholine and a sphingolipid.

\[ \text{CH}_2 - \text{CH}_2 - \text{O} - \text{P} - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{NH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \]

9. Draw the ring system for steroids.

![Steroid Ring System]

10. Draw an isoprene unit and label the head and the tail.

![Isoprene Unit]

11. Mark off the isoprene units in \( \beta \)-carotene.

![\( \beta \)-carotene]

12. How many carbons are in a monoterpen and a diterpene?

<table>
<thead>
<tr>
<th>Terpene Type</th>
<th>Number of Carbons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoterpenes</td>
<td>10</td>
</tr>
<tr>
<td>Diterpenes</td>
<td>20</td>
</tr>
<tr>
<td>Sesquiterpenes</td>
<td>15</td>
</tr>
<tr>
<td>Sesterpenes</td>
<td>25</td>
</tr>
</tbody>
</table>
13. Give the mechanism for the following reaction:

$$\text{farnesyl} + \text{farnesyl pyrophosphate} \rightarrow \text{squalene}$$

14. Show how fatty acids become rancid:

$$\text{CH}_2-\text{CH}=\text{CH}-\text{CH} = \text{CH}$$

remove H from CH₂ b/w

15. Which terpene is the precursor to cholesterol?

Squalene

What is the precursor to prostaglandin?

Arachidonic acid