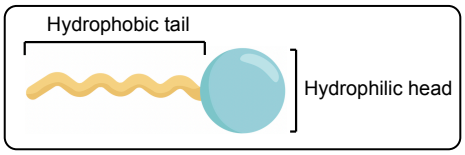
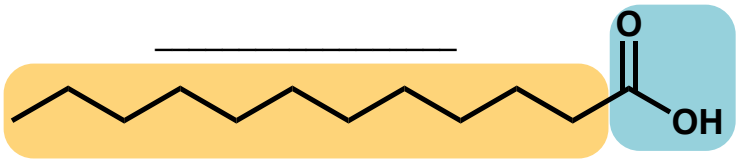
CONCEPT: FATTY ACIDS

- Most **fatty acids** contain even number of Carbons (_____) with a general formula $CH_3(CH_2)$___COOH.
- Fatty Acids are **amphipathic** molecules, having _____ nonpolar and polar parts.
  - □ Hydrocarbon tail is _____ and hydrophobic.
  - □ Carboxylic acid head is _____ and hydrophilic.





Lauric acid

- The _____ the hydrocarbon tail, the _____ nonpolar the fatty acid.
  - □ Overall fatty acids are _____.

EXAMPLE: Which of the following statements about fatty acid structure is correct?

a) Carboxylic acid group of the fatty acid is polar and does not interact with aqueous environments.

b) Fatty acids contain a nonpolar head with a polar tail.

c) Fatty acids are amphoteric.

d) Fatty acids consist of a hydrophilic head and a hydrophobic tail.

PRACTICE: Which of the following fatty acids would you expect to be more soluble in cyclohexane?

a) Palmitic acid (16 Cs)

b) Stearic acid (18 Cs)

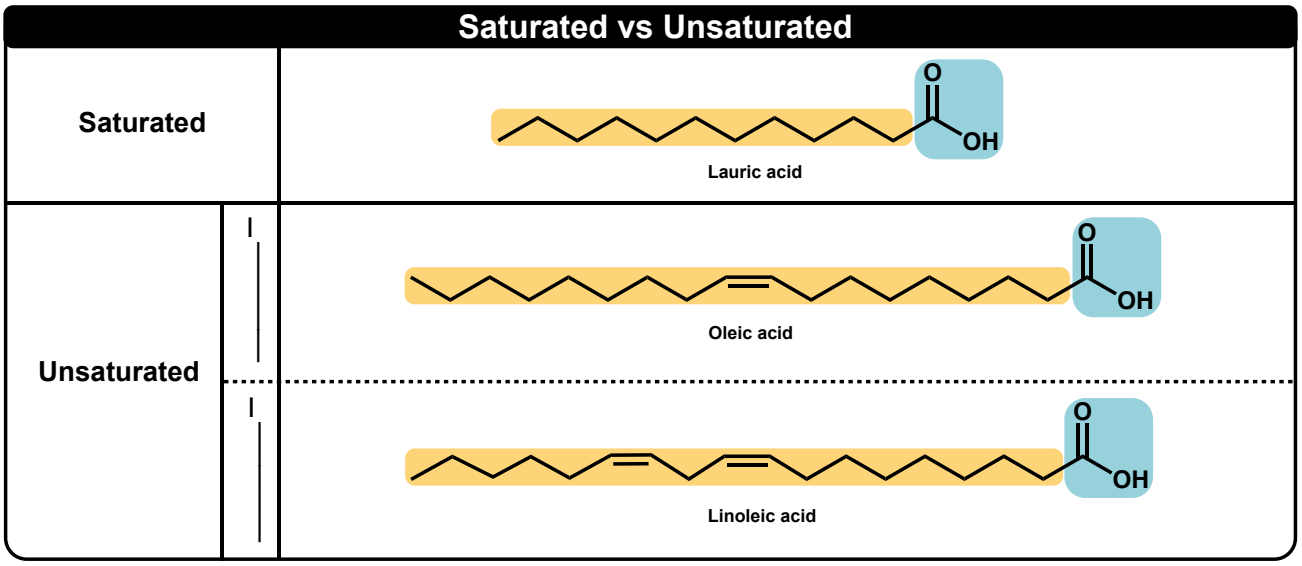
c) Lauric acid (12 Cs)

d) none of the above

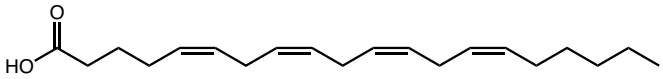
CONCEPT: FATTY ACIDS

Saturated vs Unsaturated Fatty Acids

- **Saturated:** fatty acids contain only _____ bonds.
- **Unsaturated:** fatty acids contain at least one _____ bond.
  - □ *Mono-* and *poly-* prefixes indicate one and multiple _____ bonds respectively.
  - □ Naturally occurring fatty acids contain _____ double bonds.



EXAMPLE: Classify each fatty acid as saturated (S), monounsaturated (mono), or polyunsaturated (poly).

I) 

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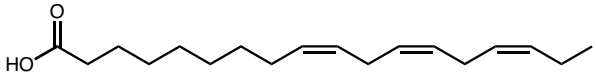
II) 

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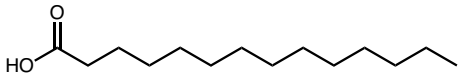
III) 

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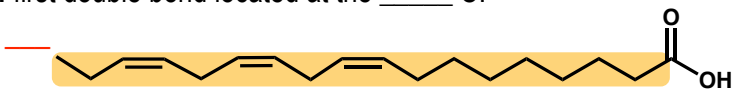
CONCEPT: FATTY ACIDS

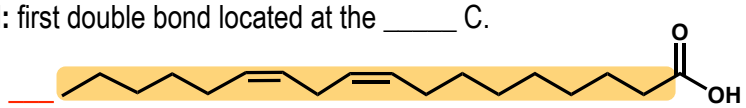
Omega (ω) Fatty Acids

- Unsaturated fatty acids can be classified by _____ double bond numbering from _____ C (ω).
  - □ **Omega-3 fatty acid:** first double bond located at the _____ C.



Linolenic acid

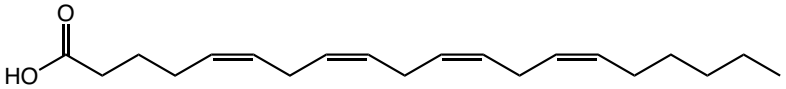
  - □ **Omega-6 fatty acid:** first double bond located at the _____ C.



Linoleic acid

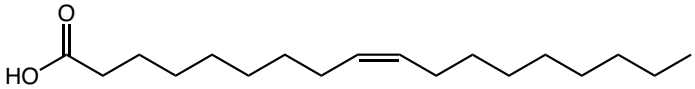
EXAMPLE: Label the following unsaturated fatty acids based on omega classification.

a)



_____

b)



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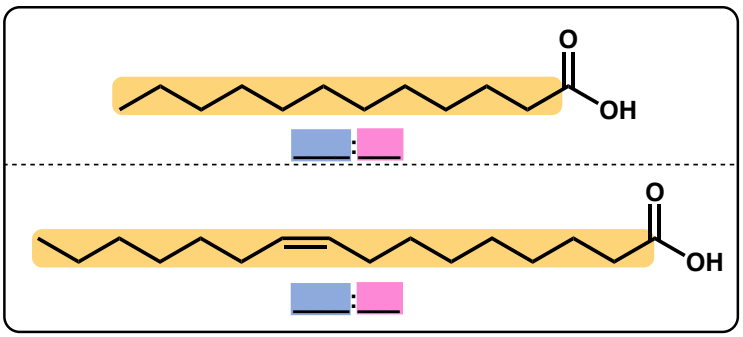
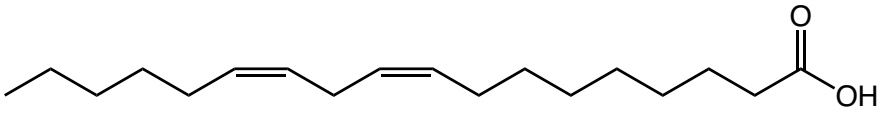
Fatty Acid Shorthand Notations

- Fatty acids are assigned shorthand _____ for easy naming.
  - □ Number of _____ followed by a _____ of double bonds, separated by a colon.



EXAMPLE: Provide a shorthand notation for the following fatty acid below.



CONCEPT: FATTY ACIDS

Remembering Fatty Acids

- To be able to draw more complex lipids, we first need to memorize structures of the _____ fatty acids.

MEMORY TOOL 1:

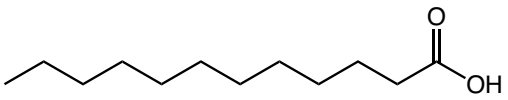
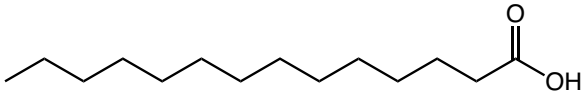
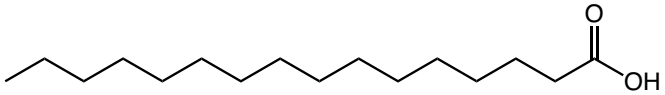
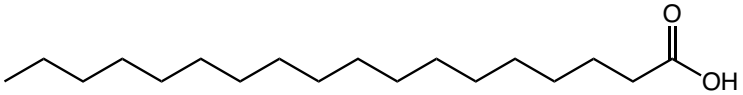
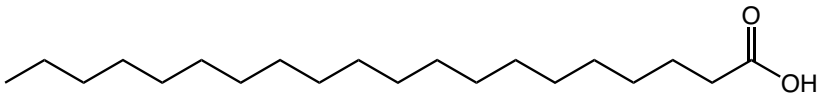
_____

_____

_____

_____

_____

Saturated Fatty Acids	
Lauric acid (___:0)	
Myristic acid (___:0)	
Palmitic acid (___:0)	
Stearic acid (___:0)	
Arachidic acid (___:0)	

EXAMPLE: Without looking at the table above, identify number of carbons present in each saturated fatty acid.

a) Myristic _____

b) Arachidic _____

c) Palmitic _____

d) Lauric _____

e) Stearic _____

PRACTICE: Provide a condensed structural formula for a fatty acid with 18 carbons (18:0) and give its common name.

CONCEPT: FATTY ACIDS

MEMORY TOOL 2:

_____

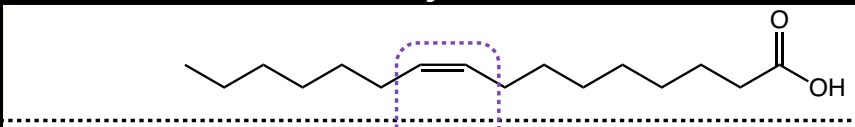
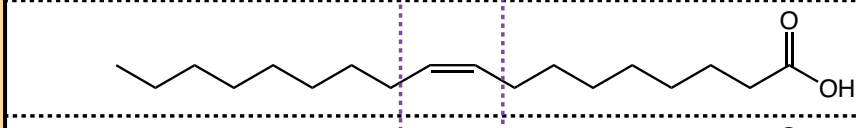
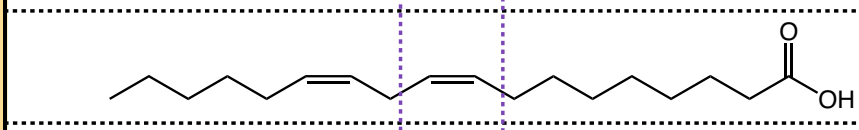
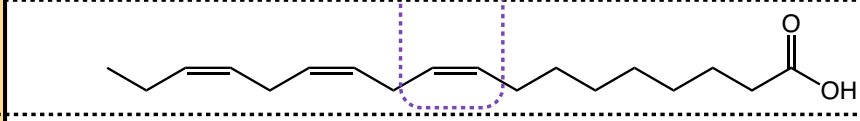
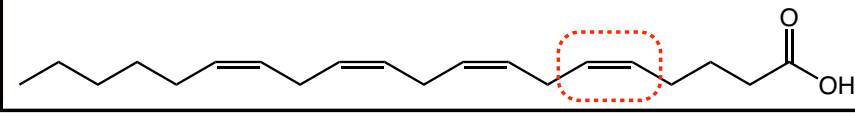
_____

_____

_____

_____

Unsaturated Fatty Acids

Palmitoleic acid (___:__)	
Oleic acid (___:__)	
Linoleic acid (___:__)	
Linolenic acid (___:__)	
Arachidonic acid (___:__)	

Double bonds start at C9 from carbonyl C.

5th acid, double bonds start at C5 from carbonyl C.

EXAMPLE: Provide shorthand notations for each fatty acid.

a) Linoleic _____

b) Oleic _____

c) Arachidonic _____

d) Linolenic _____

PRACTICE: Provide a skeletal structure for Linolenic acid.