



Feed Lipids: Nomenclature & Analysis

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Feed Lipids: Nomenclature & Analysis

6 Basic Nutrient Classes

- Water
- Protein
- Carbohydrates
- Vitamins
- Minerals
- Lipids





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Class Objectives

- Define simple and compound lipids and give examples of each.
- Describe how feeds are analyzed for lipids.
- Describe the difference between fatty acid content and fatty acid composition.
- Describe the basic structure of fatty acids and how they are named.



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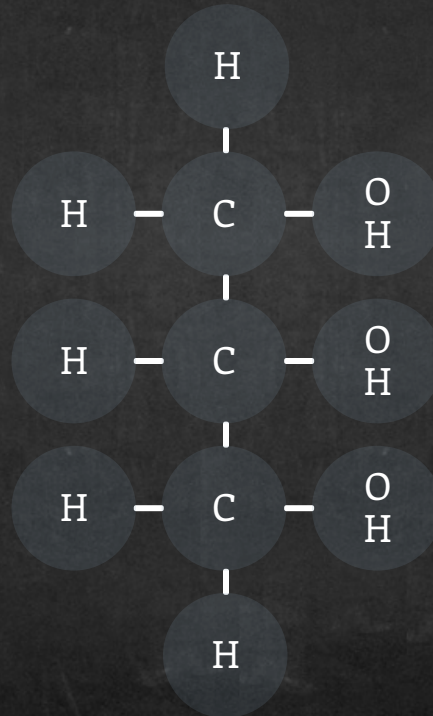
Lipid Classes

- Nonglycerol-based
 - Waxes, Alkanes
- Glycerol-based
 - Simple – glycerol + fatty acids
 - Compound – glycerol + fatty acids + other nutrient



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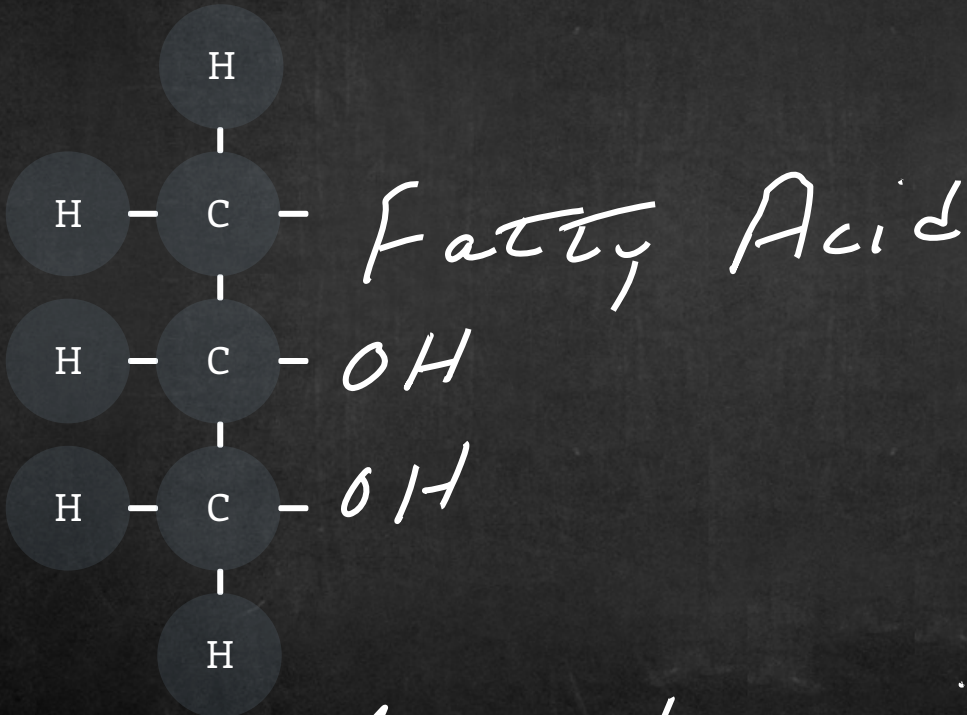
Glycerol – anchor to build lipids





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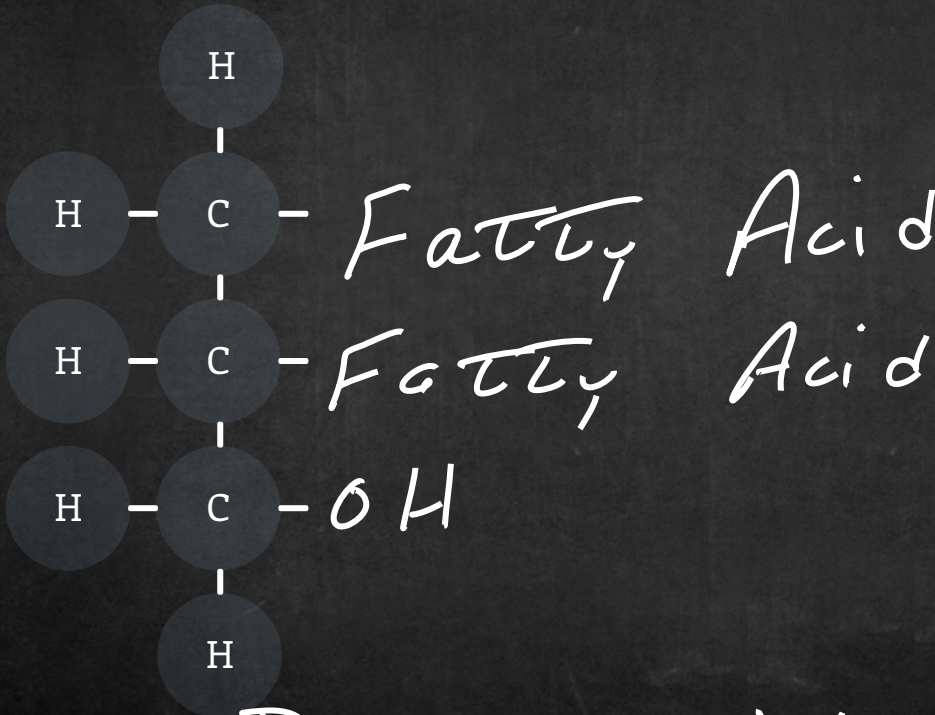
Simple





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Simple





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Simple



Seeds

Corn

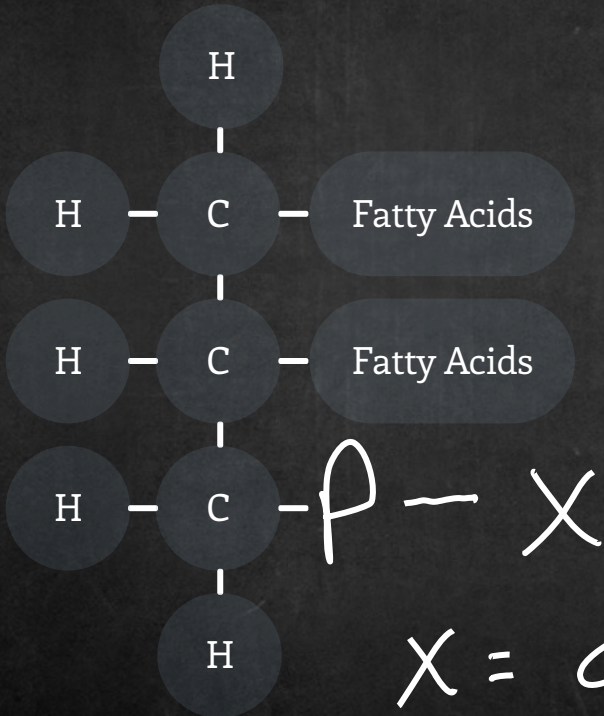
Soybeans

Cottonseed

Triglyceride



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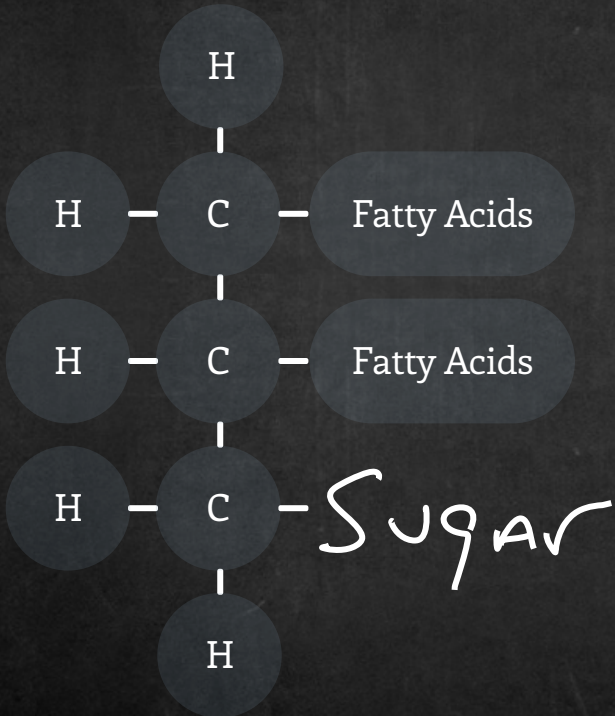


Phospholipid

*X = choline (lecithin)
= serine*



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Forages

Glycolipid



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Solvent Extraction



Soxhlet



Ankom



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Compounds Extracted in Fat Test?

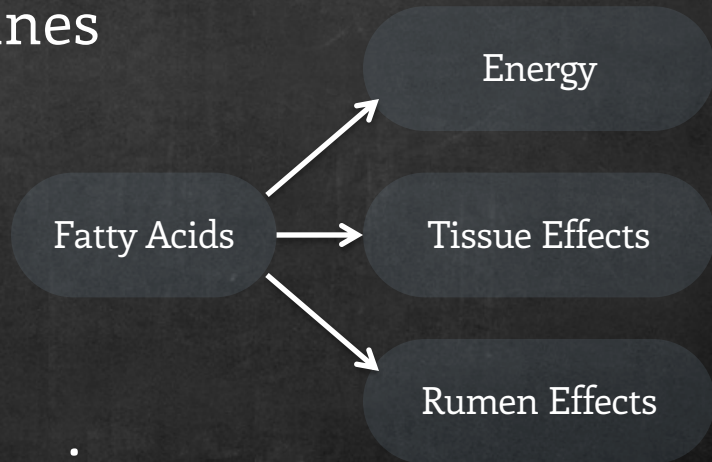
- Lipids
 - Nonglycerol-based
 - Waxes, Alkanes
 - Glycerol-based
 - Simple
 - Compound
- Non-lipid
 - Water
 - Fat-soluble vitamins
 - Pigments



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Compounds Extracted in Fat Test?

- Lipids
 - ❑ Nonglycerol-based
 - Waxes, Alkanes
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 - ❑ Water
 - ❑ Fat-soluble vitamins
 - ❑ Pigments





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Ether Extract vs. Fatty Acids

Feed	Ether Extract (%)	Fatty Acid (%)
Alfalfa	3.50	2.28
Corn Grain	4.23	4.03
Corn Silage	3.19	2.21

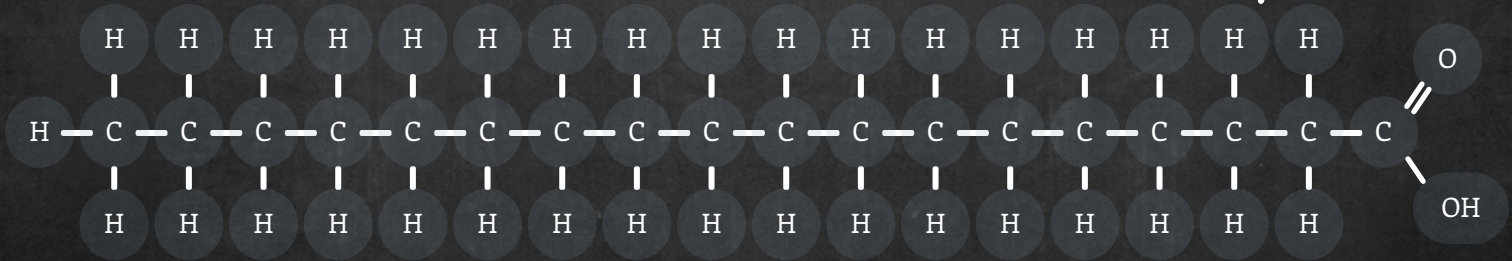


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Structure of Fatty Acids?

Methyl End

Acid end





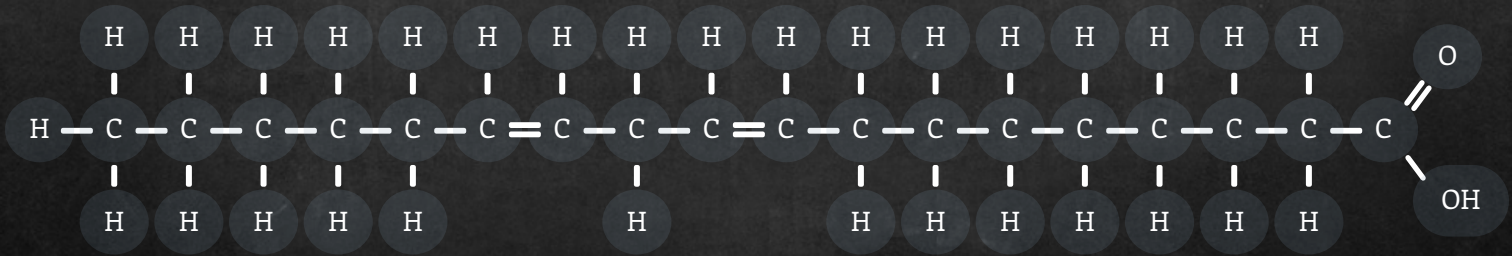
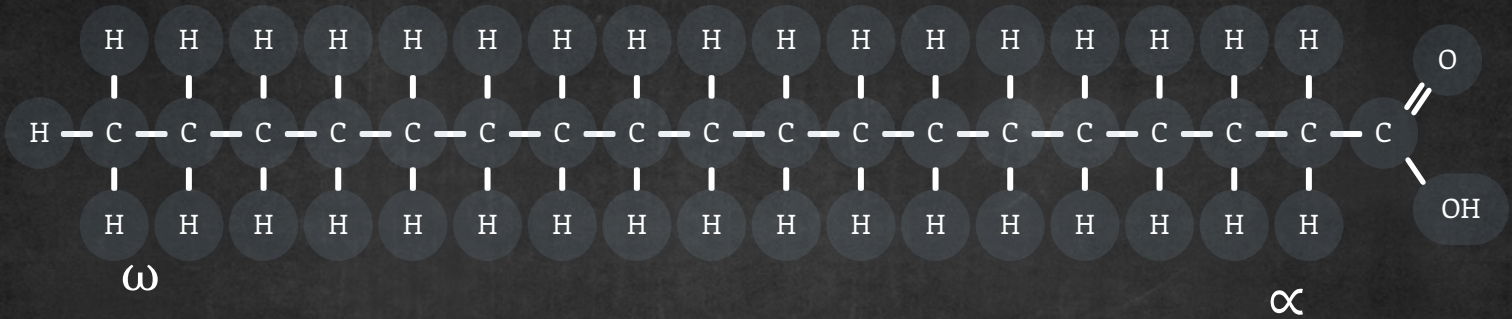
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Classifying Fatty Acids

- Number of Carbons
 - C₂-C₅ *Short-chain (VFA)*
 - C₆-C₁₂ *Medium-chain (MCFA)*
 - C₁₄-C_{>20} *Long-chain (LCFA)*
- Number of Double Bonds
 - 0 - *Saturated*
 - 1 - *Monounsaturated (MUFA)*
 - 2 or more - *Polyunsaturated (PUFA)*
- Position of Double Bonds



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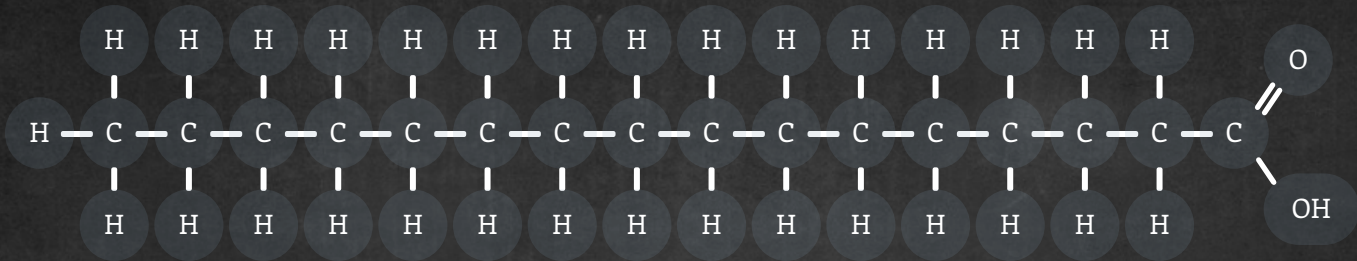


Abbreviation: *C 18:2 ω-6 linoleic Acid*



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Common Fatty Acids in Feed

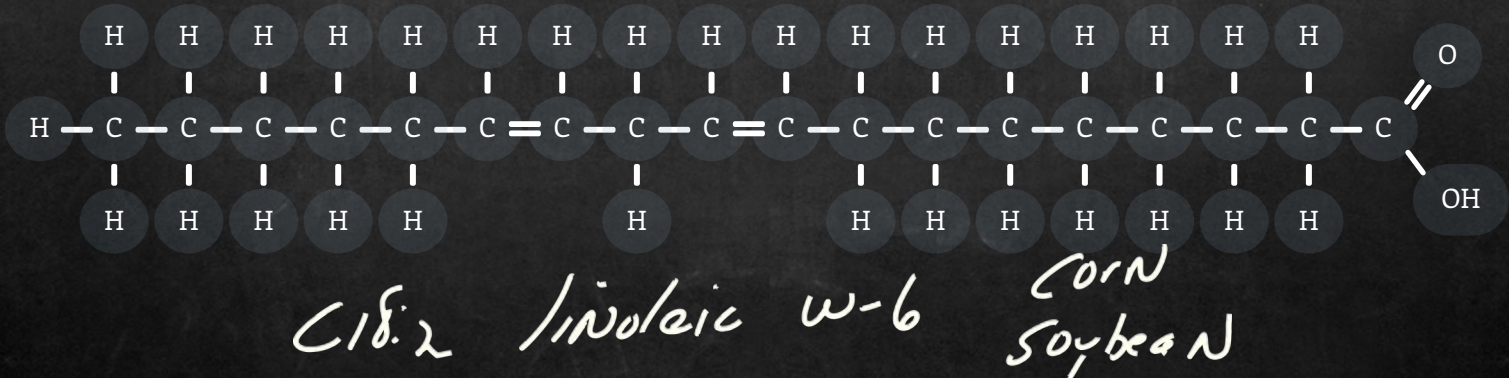
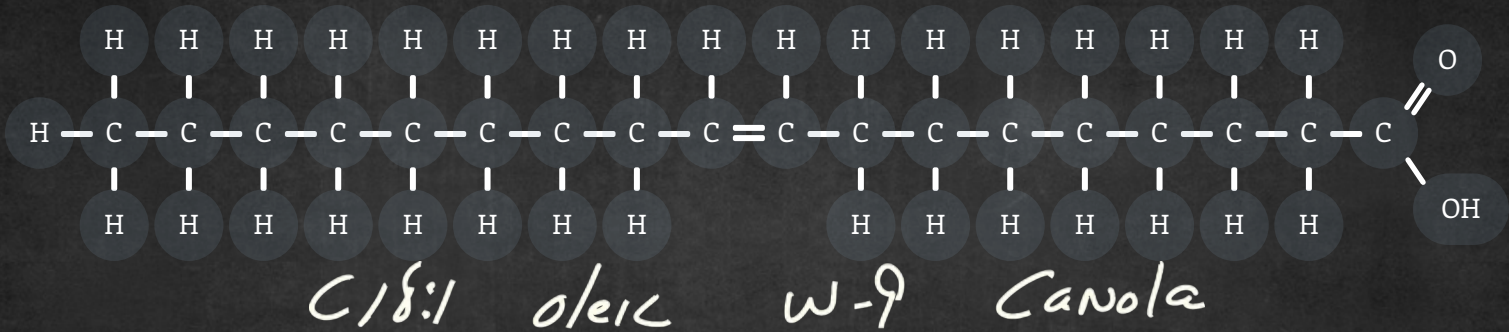


C 16:0 Palmitic Acid



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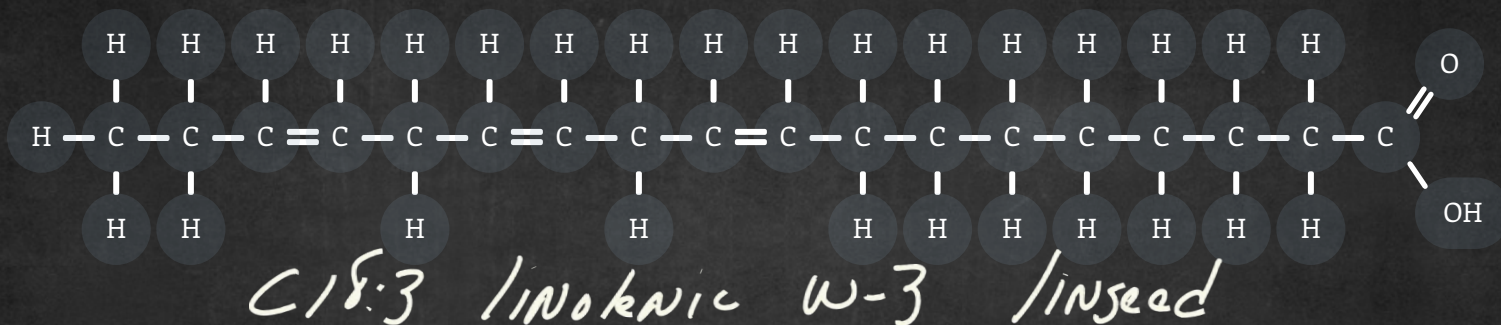
Key Omega Fatty Acids





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Key Omega Fatty Acids





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Fatty Acid Content & Composition of Some Feedstuffs

Feedstuff	FA, %DM	16:0	18:0	18:1	18:2	18:3
Barley	1.6	27.6	1.5	20.5	43.3	4.3
Corn	3.2	16.3	2.6	30.9	47.8	2.3
Dehy Alfalfa	1.4	28.5	3.8	6.5	18.4	39.0
Ryegrass	4-7	11.9	1.0	2.2	14.6	68.2
Cottonseed	18.6	25.3	2.8	17.1	53.2	0.1



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Key Points

- Fatty acids are the most important lipid fraction in feeds for animal health & production.
- Most feed fat analysis includes fatty acids plus other non-lipid compounds.
- Both fatty acid content and fatty acid composition are important.
- Wide differences in types of fatty acids and their sources.



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Questions & Answers

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