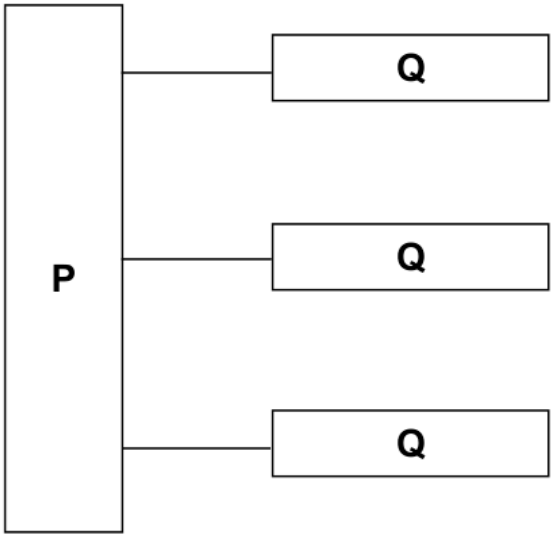
Lipids: AQA A Level Biology Exam Questions by Topic

16 questions · 36 marks · about 47 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · AS Paper 1 · June 2018 · Q05.1 · 2 marks

0 5 **Figure 4** represents a triglyceride.

Figure 4



0 5 . 1 Name the molecules represented in **Figure 4** by:

[2 marks]

Box **P** _____

Box **Q** _____

Question 2 · AS Paper 1 · June 2018 · Q05.2 · 1 mark

0 5 . 2 Name the type of bond between **P** and **Q** in **Figure 4**.

[1 mark]

_____

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Question 3 · A level Paper 1 · November 2021 · Q08.1 · 3 marks

0 8 . 1 Describe how a triglyceride molecule is formed.

[3 marks]

Question 4 · AS Paper 1 · November 2020 · Q02.2 · 2 marks

0 2 . 2 Describe how an ester bond is formed in a phospholipid molecule.

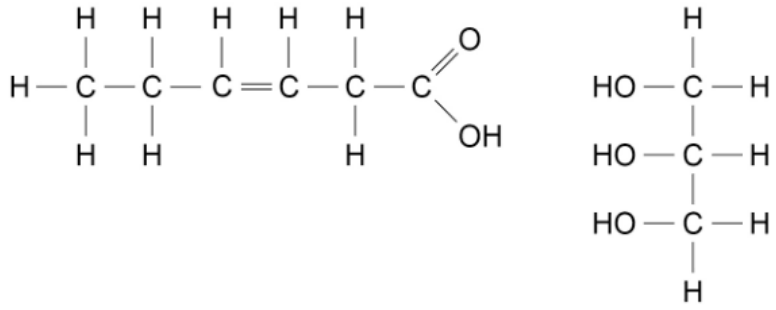
[2 marks]

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Question 5 · A level Paper 1 · June 2024 · Q01.1 · 3 marks

0 1 . 1 **Figure 1** shows the structure of a fatty acid molecule and the structure of a glycerol molecule.

Figure 1



On **Figure 1**, **draw a circle** around the part of the fatty acid molecule **and** the part of the glycerol molecule that is removed to form a bond in a triglyceride molecule.

Name the bond formed between a fatty acid and glycerol in a triglyceride molecule.

Name the reaction involved in forming a bond between a fatty acid and glycerol in a triglyceride molecule.

[3 marks]

Bond _____

Reaction _____

Question 6 · AS Paper 1 · June 2016 · Q02.1 · 1 mark

0 2 . 1 Describe the difference between the structure of a triglyceride molecule and the structure of a phospholipid molecule.

[1 mark]

_____

_____

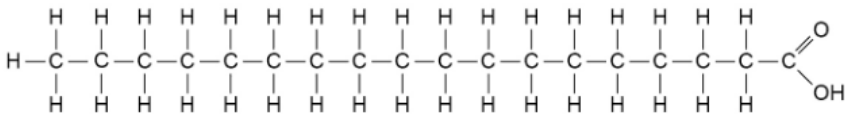
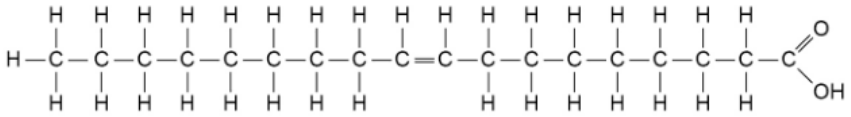
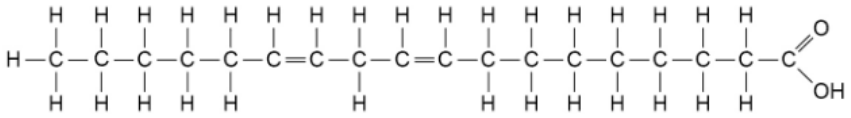
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Question 7 · A level Paper 1 · June 2024 · Q01.2 · 1 mark

Table 1 shows information about three fatty acids.

Table 1

Name of fatty acid	Diagram of fatty acid structure	Fatty acid melting point / °C
Stearic acid		70
Oleic acid		14
Linoleic acid		–5

0 1 . 2 Name the fatty acid shown in **Table 1** that is a saturated fatty acid.

[1 mark]

Question 8 · A level Paper 1 · June 2024 · Q01.3 · 1 mark

0 1 . 3 The melting point is the temperature at which a solid changes state to be a liquid.

Use **Table 1** to describe the relationship between fatty acid structure and fatty acid melting point.

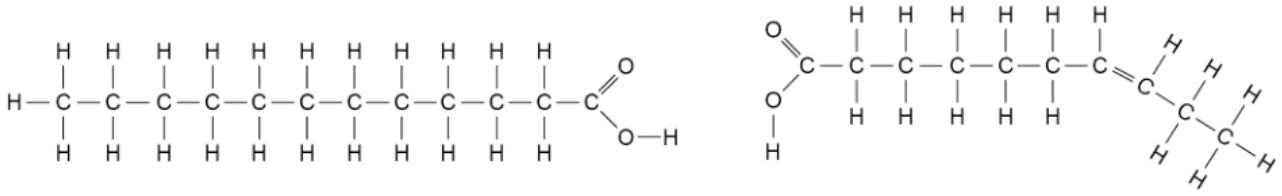
[1 mark]

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Question 9 · AS Paper 2 · June 2025 · Q03.3 · 1 mark

0 3 . 3 **Figure 5** shows two types of fatty acids.

Figure 5



Fatty acid **A**

Fatty acid **B**

State which fatty acid in **Figure 5** is unsaturated **and** explain your answer.

[1 mark]

Unsaturated fatty acid _____

Explanation _____

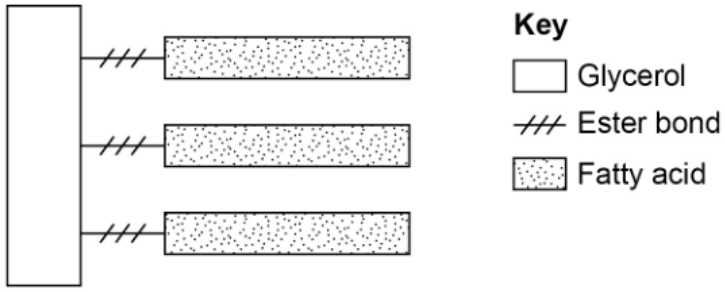
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Question 10 · AS Paper 1 · June 2023 · Q03.2 · 2 marks

0 3 . 2 **Figure 3** shows a triglyceride.

Figure 3



Describe **two** differences between the structure of the triglyceride shown in **Figure 3** and a phospholipid.

[2 marks]

1 _____

_____

2 _____

_____

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Question 11 · AS Paper 1 · June 2023 · Q03.3 · 3 marks

0 3 . 3 Explain why phospholipids can form a bilayer but triglycerides cannot.

[3 marks]

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Question 12 · A level Paper 1 · June 2018 · Q10.2 · 5 marks

1 0 . 2 Mucus produced by epithelial cells in the human gas exchange system contains triglycerides and phospholipids.

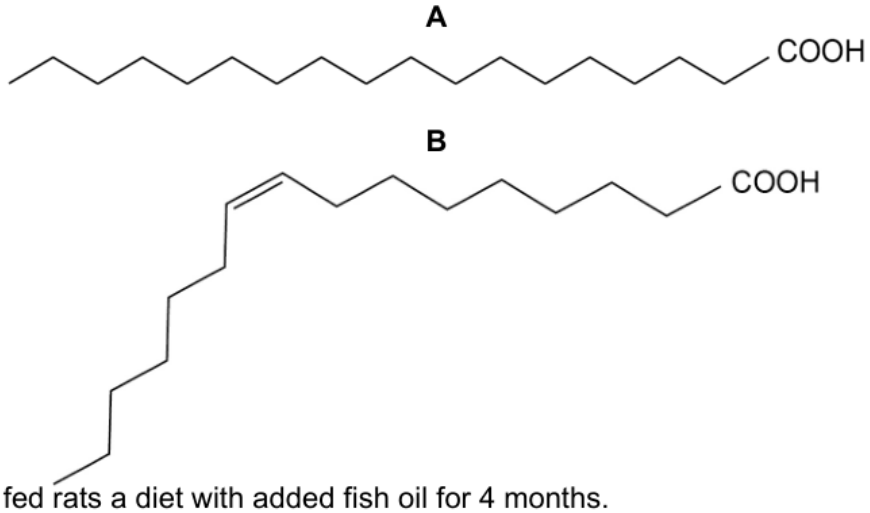
Compare and contrast the structure **and** properties of triglycerides and phospholipids.

[5 marks]

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0 3 . 4 **Figure 4** shows two fatty acids, **A** and **B**.

Figure 4



Scientists fed rats a diet with added fish oil for 4 months.

They obtained samples of red blood cells from the rats before starting this diet (0 months) and after 4 months on this diet.

For each red blood cell sample, they separated the cell-surface membranes and measured:

- the percentage of phospholipids containing each of the fatty acids **A** and **B**
- the fluidity of the membrane.

Table 1 shows the scientists' results.

Table 1

Time sample of red blood cells obtained / months	Mean percentage of phospholipids containing fatty acid A	Mean percentage of phospholipids containing fatty acid B	Mean fluidity of the membrane / arbitrary units
0	19.8	1.7	31
4	11.7	9.0	97

Suggest why the fluidity of the membrane was higher after 4 months.

Use all the information provided in the question.

[3 marks]

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Question 14 · information from earlier in the question

The percentage of saturated fatty acids compared with unsaturated fatty acids found in lipid stores in seeds differs in different populations.

Scientists investigated two populations of the plant, *Helianthus annuus*.

The scientists grew young plants from seeds collected from each population. They placed the seeds on wet tissue paper so that the root growth was visible.

They grew seeds from each population at two temperatures:

- warm temperature of 24 °C
- cool temperature of 10 °C

After 10 days, the scientists measured the length of each root.

Table 6 shows some of the properties of the two populations and the scientists' results.

Table 6

Population	Temperature in natural environment	In the seed – Mean percentage of fatty acids that are saturated	Mean length of root after 10 days at 24 °C / mm (± 2 x standard deviation)	Mean length of root after 10 days at 10 °C / mm (± 2 x standard deviation)
1	Warm	10.9	8.2 (±1.0)	3.1 (±0.3)
2	Cool	6.1	5.5 (±0.9)	4.3 (±0.2)

The mean ±2 × standard deviation includes 95% of the data.

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Question 14 · A level Paper 1 · November 2021 · Q08.4 · 4 marks

0 8 . 4 It is known that:

- during respiration saturated fatty acids yield more energy than unsaturated fatty acids
- saturated fatty acids have higher melting points than unsaturated fatty acids
- lipases in seeds act more rapidly on liquid substrates.

Use this information and **Table 6** to show how each population is better adapted for its natural environment when compared with the other population.

[4 marks]

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Question 15 · AS Paper 1 · June 2018 · Q05.3 · 2 marks

0 5 . 3 Describe how you would test a liquid sample for the presence of lipid **and** how you would recognise a positive result.

[2 marks]

Question 16 · AS Paper 2 · June 2025 · Q03.2 · 2 marks

0 3 . 2 Describe the biochemical test used to confirm the presence of lipid in a sample.

[2 marks]

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Mark schemes

Question 1 · AS Paper 1 · June 2018 · Q05.1 · 2 marks

05.1	P – glycerol Q – fatty acid (chains)	2	Accept phonetic spelling

Question 2 · AS Paper 1 · June 2018 · Q05.2 · 1 mark

05.2	Ester (bond);	1

Question 3 · A level Paper 1 · November 2021 · Q08.1 · 3 marks

08.1	1. **One** glycerol and **three** fatty acids; 2. Condensation (reactions) **and** removal of **three** molecules of water; 3. Ester bond(s) (formed);	3	Accept all marks in suitably labelled diagram OR in a balanced equation

Question 4 · AS Paper 1 · November 2020 · Q02.2 · 2 marks

02.2	1. Condensation (reaction) **OR** Loss of water; 2. Between of glycerol **and** fatty acid;	2	Accept labelled diagram

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Question 5 · A level Paper 1 · June 2024 · Q01.1 · 3 marks

01.1	1. Circle(s)/shape(s) drawn around H in one of the HO groups of the glycerol **and** the OH group of the fatty acid; 2. Ester (bond); 3. Condensation (reaction);	3 (3 x AO1)

1. Accept circle(s)/shape(s) drawn around the OH group of one molecule and the H of an OH group of the other molecule

Question 6 · AS Paper 1 · June 2016 · Q02.1 · 1 mark

02.1	1. In phospholipid, one fatty acid replaced by a phosphate;	1	Ignore references to saturated and unsaturated 1. Accept Pi/PO_4^{3-} / (P) 1. Reject P/Phosphorus Accept annotated diagrams

Question 7 · A level Paper 1 · June 2024 · Q01.2 · 1 mark

01.2	Stearic (acid);	1 (1 x AO1)

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Question 8 · A level Paper 1 · June 2024 · Q01.3 · 1 mark

01.3	As (number of C) double bonds increases, melting point decreases **OR** As unsaturation increases, melting point decreases **OR** As saturation increases, melting point increases;	1 (1 x AO2)

Accept converse Accept C=C for double bonds Accept as (number of) hydrogen/H (atoms) increases, melting point increases

Question 9 · AS Paper 2 · June 2025 · Q03.3 · 1 mark

03.3	(Fatty acid **B**) Double bond between carbon (atoms) **OR** Two carbons with only one hydrogen;	1 (1 x AO2)	Accept symbols C = C

Question 10 · AS Paper 1 · June 2023 · Q03.2 · 2 marks

03.2	(Triglyceride) 1. 3 fatty acids rather than 2; 2. 3 ester bonds rather than 2; 3. No phosphate group;	2 max (2 x AO1)	1, 2 and 3 Accept converse 1. Accept 'only 2 fatty acids'

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Question 11 · AS Paper 1 · June 2023 · Q03.3 · 3 marks

03.3	1. Phospholipid both hydrophobic and hydrophilic **OR** Phospholipid polar **OR** Phosphate group is charged; 2. Triglycerides only hydrophobic **OR** Fatty acid/triglyceride is non-polar; 3. Hydrophilic/phosphate group attracts water (to either side of bilayer);	3 (3 x AO1)

2. Accept 'Triglycerides not hydrophilic'

3. Accept 'faces water' for 'attracts water'
3. Ignore 'fatty acids repel water'

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10.2	1. Both contain ester bonds (between glycerol and fatty acid); 2. Both contain glycerol; 3. Fatty acids on both may be saturated or unsaturated; 4. Both are insoluble in water; 5. Both contain C, H and O **but** phospholipids also contain P; 6. Triglyceride has three fatty acids **and** phospholipid has two fatty acids plus phosphate group; 7. Triglycerides are hydrophobic/non-polar **and** phospholipids have hydrophilic and hydrophobic region; 8. Phospholipids form monolayer (on surface)/micelle/bilayer (in water) **but** triglycerides don't;

5 max	All statements **must** be clearly comparative or linked by the candidate, not inferred from separate statements. Accept mark points shown on adjacent annotated diagrams. 5. Must relate to element. 7. Accept non-polar for hydrophobic and 'polar'

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03.4	1. Fatty acid A is saturated **OR** Fatty acid B is unsaturated; 2. (At 4 months) less fatty acid A **and** more fatty acid B **OR** Fish oil has more fatty acid B than fatty acid A; 3. Increase in fluidity caused by increased unsaturated fatty acids **OR** Increase in fluidity caused by increased fatty acid B (from the fish oil); 4. Double bonds/unsaturated fatty acids cause bends/kinks in fatty acid tail **OR** (Membrane more fluid because) phospholipids further apart;	3 max (2 x AO2, 1 x AO3)

1.and 2. Accept identification of A (as saturated) or B (as unsaturated) using numbers from table 1

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Question 14 · A level Paper 1 · November 2021 · Q08.4 · 4 marks

08.4	1. Population 1 grew longer roots in warm temperatures **and** population 2 grew longer roots in cool temperatures; 2. Standard deviations do not overlap so difference (in mean) unlikely to be/not due to chance; 3. Population 1 (is better adapted to warm conditions because it) has more saturated fatty acids so more energy available (and more growth); 4. Population 2 (is better adapted to cool conditions because it) has more unsaturated/liquid fatty acids so more lipase activity (and more growth);	4	2. Accept: 'Standard deviations do not overlap showing difference (in mean likely to be) significant' 3. and 4. Accept for 'fatty acids', fat

Question 15 · AS Paper 1 · June 2018 · Q05.3 · 2 marks

05.3	1. (Mix / shake sample) with ethanol, then water; 2. White / milky (emulsion);	2	1. Sequence is important 2. Ignore cloudy 2. Reject precipitate

Question 16 · AS Paper 2 · June 2025 · Q03.2 · 2 marks

03.2	1. Add ethanol then water and shake/mix **OR** Add ethanol and shake/mix then add water; 2. White/milky <u>emulsion</u> **OR** <u>Emulsion</u> test turns white;	2 (2 x AO1)	2. Ignore cloudy 2. Reject precipitate

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