

PEARSON EDEXCEL A-LEVEL BIOLOGY B • 9B10

BIOLOGY



EXAM QUESTION PACK

TOPIC 1: BIOLOGICAL MOLECULES
LIPIDS

SCORE

/25

PERCENTAGE

%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions and mark schemes in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question or mark scheme material in this pack. Pearson has not endorsed, approved or been involved in the production of it. Pearson, Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson publishes its past papers and mark schemes free of charge. Always check the current specification at [qualifications.pearson.com](https://www.pearson.com/qualifications) before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ~~☒~~ and then mark your new answer with a cross ☒.

Lipids and carbohydrates are used as respiratory substrates.

The respiration of lipids generates more ATP than the respiration of carbohydrates.

The table shows bonds that may be found in carbohydrates and lipids.

Which box in each row shows whether the bond may be found in these molecules?

(3)

Bond	Molecule that bond may be found in			
	carbohydrate only	lipid only	both carbohydrate and lipid	neither carbohydrate nor lipid
covalent	☐	☐	☐	☐
ester	☐	☐	☐	☐
hydrogen	☐	☐	☐	☐

(Total for question = 3 marks)

Q2.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ~~☒~~ and then mark your new answer with a cross ☒.

Palm plants and cocoa plants are used to produce lipids for the food industry.

Palm oil is produced from palm plants. Cocoa butter is produced from cocoa plants.

The fatty acid compositions of palm oil and cocoa butter are shown in the table.

Fatty acid	Chemical formula of fatty acid	Percentage of fatty acid found in palm oil and cocoa butter (%)	
		Palm oil	Cocoa butter
palmitic acid	$C_{16}H_{32}O_2$	45	27
oleic acid	$C_{18}H_{34}O_2$	40	31
linoleic acid	$C_{18}H_{32}O_2$	10	3
myristic acid	$C_{14}H_{28}O_2$	1	1
stearic acid	$C_{18}H_{36}O_2$	4	38

(i) How many of the named fatty acids shown in the table are saturated?

(1)

☐ A 1

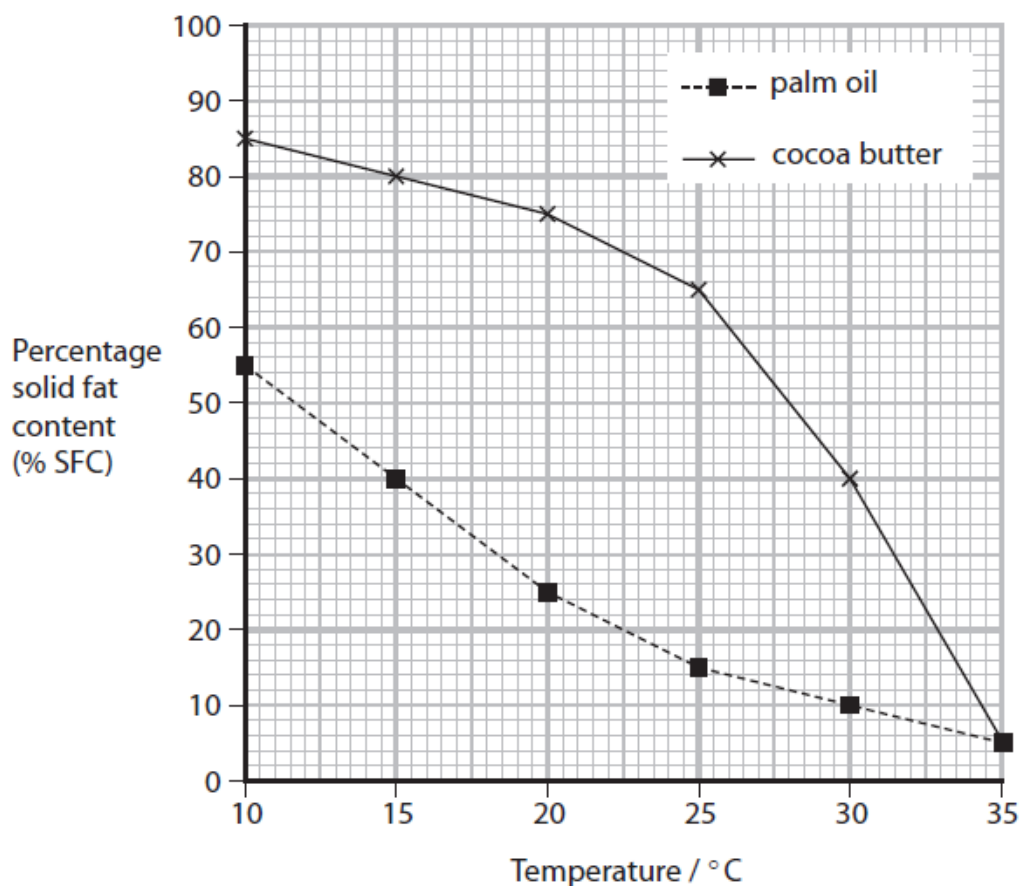
☐ B 2

☐ C 3

☐ D 4

(ii) The percentage solid fat content (% SFC) is a measure of how much of a lipid is solid at different temperatures.

The graph shows the effect of temperature on the % SFC for palm oil and for cocoa butter.



Comment on the effect of temperature on the % SFC of palm oil and of cocoa butter.

(4)

.....

.....

.....

.....

.....

.....

.....

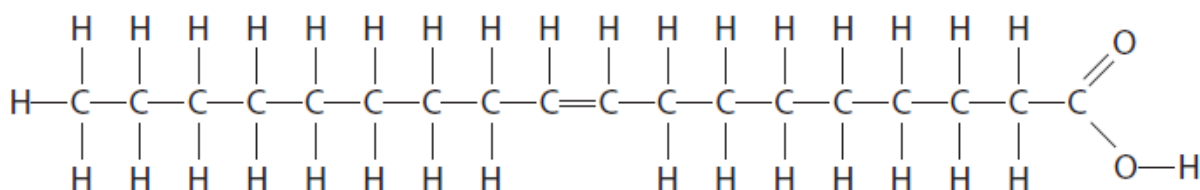
.....

(Total for question = 5 marks)

Q3.

Soya bean plants have been genetically modified (GM) to increase the concentration of certain organic molecules.

The diagram shows one of these molecules.



Explain what type of molecule is shown in the diagram.

(2)

.....

.....

.....

.....

(Total for question = 2 marks)

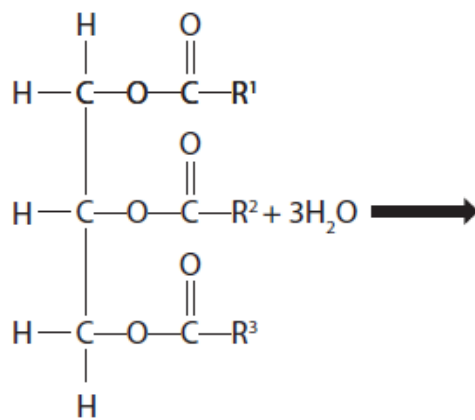
Q4.

Palm plants and cocoa plants are used to produce lipids for the food industry.

Palm oil is produced from palm plants. Cocoa butter is produced from cocoa plants.

Palm oil and cocoa butter are made of triglycerides composed of different fatty acids.

The diagram shows a triglyceride.



Complete the diagram to show the products of hydrolysis of this triglyceride.

(Total for question = 2 marks)

Q5.

Many of the chemicals found in living organisms are polymers.

Which of the following molecules are all polymers?

(1)

- ☐ **A** polypeptides, nucleotides, starch
- ☐ **B** polypeptides, starch, lipids
- ☐ **C** proteins, carbohydrates, lipids
- ☐ **D** proteins, nucleic acids, starch

Q6.

Answer the question with a cross in the box you think is correct ☐. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☐.

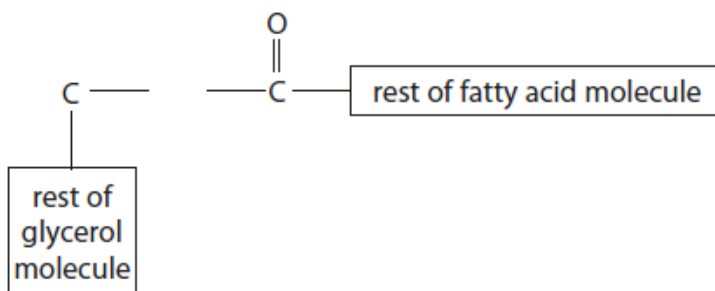
The structure of a lipid relates to its role in living organisms.

Triglycerides are lipids.

(i) The diagram shows part of a glycerol molecule and part of a fatty acid.

Complete the diagram to show the ester bond joining the fatty acid to the glycerol molecule.

(1)



(ii) The table shows the relative atomic mass of some elements.

Element	Relative atomic mass
carbon	12
hydrogen	1
nitrogen	14
oxygen	16

A triglyceride is made from a glycerol molecule and three fatty acids.

The molecular mass of the glycerol is 92 and the total molecular mass of the three fatty acids is 362.

Which is the molecular mass of this triglyceride?

(1)

☒ **A** 400

☐ **B** 436

☒ C 448

☒ D 454

(Total for question = 2 marks)

Q7.

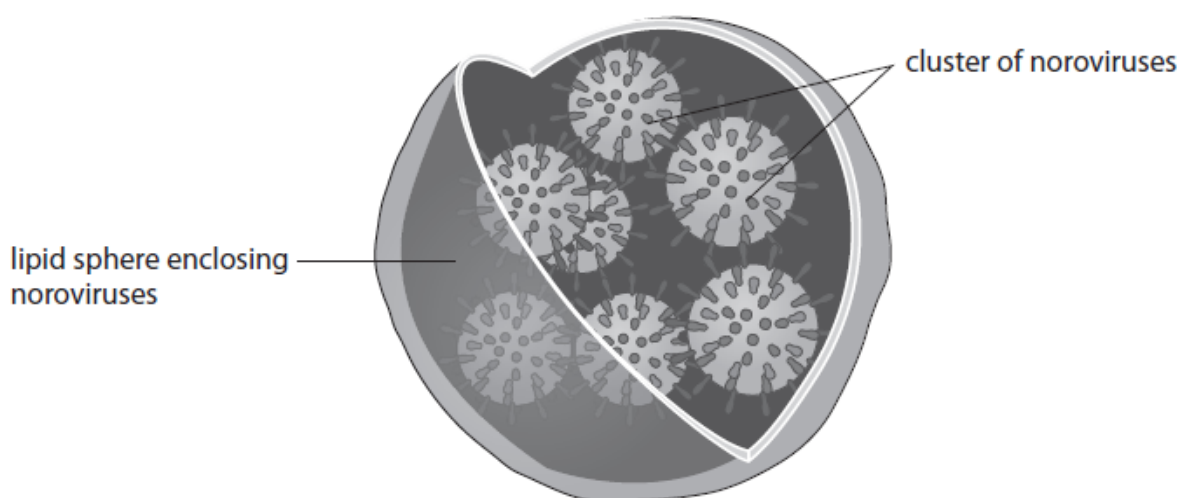
Norovirus is a single-stranded RNA, non-enveloped virus.

Norovirus is the most common cause of gastroenteritis.

Noroviruses can infect an animal as individual viruses or as a cluster of viruses inside a lipid sphere.

A cluster of viruses inside a lipid sphere is called a stealth sphere.

The diagram shows a stealth sphere.



(i) Animals infected with stealth spheres develop gastroenteritis very quickly and with severe symptoms.

Animals infected with individual noroviruses develop gastroenteritis more slowly and with less severe symptoms.

Analyse the information to explain these findings.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

(ii) Scientists are hoping that new treatments for norovirus infections can be developed to target the stealth sphere.

Analyse the information to explain how targeting the stealth sphere could be used to treat these infections.

(2)

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)

Q8.

The electron carriers in chloroplasts are inhibited by detergent.

Detergents dissolve lipids.

Explain how detergents inhibit the functioning of electron carriers in chloroplasts.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

Q9.

Lipids and carbohydrates are used as respiratory substrates.

The respiration of lipids generates more ATP than the respiration of carbohydrates.

The electron transport chain uses hydrogen ions to generate ATP.

Explain why the respiration of lipids generates more ATP than the respiration of carbohydrates.

(2)

.....

.....

.....

.....

.....

.....

(Total for question = 2 marks)

Mark Scheme

Q1.

Question Number	Answer				Mark
	Bond	Molecule that bond may be found in			
		carbohydrate only	lipid only	both carbohydrate and lipid	neither carbohydrate nor lipid
	covalent	☐	☐	X	☐
	ester	☐	X	☐	☐
	hydrogen	X	☐	☐	☐
					(3)

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	C 3 <i>A is incorrect because palmitic, myristic and stearic acid are saturated fats</i> <i>B is incorrect because palmitic, myristic and stearic acid are saturated fats</i> <i>D is incorrect because palmitic, myristic and stearic acid are saturated fats</i>		1

Question Number	Answer	Additional Guidance	Mark
(ii)	An answer that makes reference to four from the following: • %SFC for both decreases as temperature increases for both cocoa butter and palm oil / both have 5% SFC at 35 °C (1) • the % SFC of cocoa butter is higher at all temperatures (except 35 °C) (1) • because cocoa butter has higher percentage of / more saturated fat (1) • so fatty acid chains can associate with each other more easily (1) • the % SFC of cocoa butter decreases more steeply above 25 °C / larger decrease after 25°C (1)	Accept converse Accept converse Accept pack more tightly together / has straight chains/rods which pack tightly together higher density of intermolecular contacts/bonds	4

Q3.

Question Number	Answer	Mark
	An explanation that makes reference to the following: - fatty acid because it has a {carboxylic acid / COOH / carboxyl group} (1) (mono)unsaturated because it has {a double bond / C=C / carbons with only one H} (1)	(2)

Q4.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to the following: - correct structure of glycerol (1) - correct structure of three fatty acids (1)	Max one mark if other molecules e.g. water added to right hand side Accept 3 x one fatty acid	2

Q5.

Question Number	Acceptable Answer	Additional Guidance	Mark
	D (proteins, nucleic acids, starch)		(1)

Q6.

Question Number	Answer	Additional Guidance	Mark
(i)	• an O drawn between the two covalent bonds		(1)
(ii)	The only correct answer is A B is incorrect because three water molecules (54) have to be subtracted, not one C is incorrect because three water molecules 54 have to be subtracted, not six hydrogens D is incorrect because three water molecules 54 have to be subtracted		(1)

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to three of the following: • because more viruses delivered (1) • because {lipid / sphere} can pass through cell membrane / no need to bind to (cell) receptors / can bind to any cell (1) • because {lipid / sphere} protects viruses from {enzymes / stomach acid / phagocytes / immune system} (1) • credit a link between one reason and the information given (1)	e.g. more cells infected so symptoms develop faster more cells infected so symptoms are worse virus particles not destroyed so more cells infected	(3)

Question Number	Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to two of the following: • because the lipids could be {targetted / broken down} (1) • by an enzyme (that breaks down lipid) (1) • resulting in {fewer virus particles arriving at cells (in one go) / exposure to immune system} (1)	ACCEPT using a drug that can penetrate the lipid ACCEPT therefore destroying the viruses ACCEPT {fewer / no} viruses (arriving at the cells)	(2)

Q8.

Question Number	Acceptable Answer	Additional guidance	Mark
	An explanation that makes reference to the following: • electron carrier components are on chloroplast membranes (1) • detergents disrupt the phospholipid bilayer in the membranes (1) • therefore electrons can no longer move along the chain (1)		(3)

Q9.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to two of the following: • because a lipid molecule contains a higher proportion of hydrogen (than a carbohydrate molecule) (1) • therefore more reduced {NAD / FAD / coenzyme} (1) • therefore more hydrogen (ions) {to accumulate in the inter-membrane space / to produce a proton gradient / to pass through ATP synthase channels / for chemiosmosis / for oxidative phosphorylation} (1)	ACCEPT converse throughout ACCEPT NADH / FADH₂	(2)