



GCE Biology

S21-A400U10-1

Assessment Resource 3

Energy for Life Resource C

- Many diseases are caused by deviations of blood glucose from normal levels. The concentration
 of blood glucose is actively regulated to remain very nearly constant.
 - (a) What general name is given to this type of negative feedback mechanism?

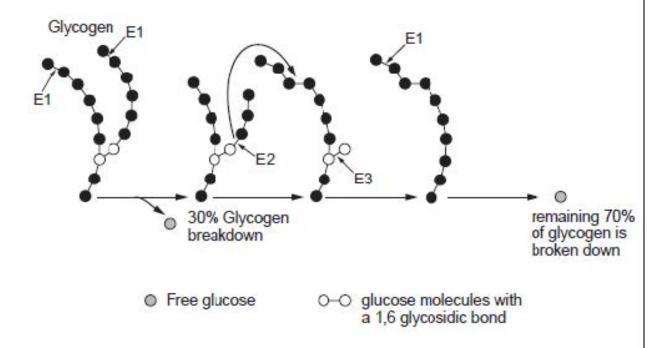
[1]

Glycogen is a molecule the body uses to store glucose, a source of energy. Glycogen storage disease (Cori's disease) is an inherited disorder caused by the build up of glycogen in the body's cells. The accumulated glycogen is structurally abnormal being a short branched polysaccharide.

The disorder is caused by a deficiency of a debranching enzyme.

From infancy, individuals with Cori's disease have low blood glucose levels.

The diagram below shows normal glycogen breakdown with all enzymes functioning.



Enzyme E1 sequentially hydrolyses 1-4 glycosidic bonds in glycogen from the end of the molecule

Enzyme E2 transfers short chains of glucose from one chain to another Enzyme E3 is the debranching enzyme

- (b) Symptoms of Cori's disease are often more obvious between meals.
 - (i) What would be the main symptom of low blood glucose?

[1]

	(ii) Using the diagram opposite explain how the lack of the debranching enzyme caus low blood glucose.	ses [4]
(c)	Explain what has happened to produce a non-functional glycogen debranching enzym	ne. [3]
(d)	Both parents are usually unaffected and it affects both males and females equally. He	O.W
(u)	is this gene most likely to be inherited?	[1]
 (e)	How does glycogen differ structurally from the storage polysaccharide starch?	[1]

2.	The graph	below s	shows the	trends in	the state	e of world	d stocks	of marin	e fish fror	n 1974 to	2010.
	Percenta	ge of sto	cks asse	ssed							
	100										
	90-								Overfish	ed	
	80-										
	70-										
	60						Б	ılly fishe	d		
	50- 40-							iliy ilsiile	9		
	30-		$\overline{}$								
	20-								\rightarrow		
	10-					Und	er fished				
	1974	48	1982	∞	<i>.</i> 0	o.A.	100%	2002	%	0,0	
	10,	1978	100	1986	1000	1994	100	200	2006	2010	
		∧t b	iologicall	y			w	ithin biol	ogically		
		uns	iologicall ustainable	e levels			su	stainable	e levels		
	Fully fishe	ed = fishe	ed at max	imum su	stainable	yield					
	Underfish	ed = cur	rently bel	ieved to l	e fished	at below	/ maximu	ım susta	inable yie	eld	
	(a) Usi	ng the da	ata, what	conclusio	ns can b	e drawn	about the	world fi	shing sto	cks since	e 1974.
	1.7	3									[4]
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(b)	Desc	ribe three strategies, apart from aquaculture, which can be used to prevent ishing and explain how each would help to conserve stocks. [3]							
(c)	One method of decreasing demands on wild fish stocks is the use of aquaculture. The Scottish salmon industry is one such example. One problem with raising salmon this way is the high build up of parasites, such as lice, which feed on the blood and tissue of salmon.								
	(i)	Why are the farmed fish more susceptible to infection by lice than wild fish and why is eliminating the lice a problem for fish farms? [2]	,						
	(ii)	There are important environmental concerns that farmed fish can escape from their pens. Explain three reasons why it is important to the environment that the escape of farmed fish is prevented. [3]							

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3.	More than a billion years ago, aerobic bacteria colonised primordial eukaryotic cells that lacked the ability to use oxygen metabolically. A symbiotic relationship developed and became permanent. The bacteria evolved into mitochondria, thus enabling the host cells to carry out aerobic metabolism, a much more efficient way to release energy than anaerobic glycolysis. Describe the role of mitochondria in eukaryotic cells using your knowledge of respiratory pathways.							
	Explain how the original aerobic bacteria and primordial eukaryotic cells benefitted from this relationship.							
	Detailed diagrams are not required. [9 QER]							
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	only
END OF PAPER	9