			GCE A Level H2 Biology	
			9744 Biology November 2019	
1.	N19Q1	D	Not only should any correct option be biologically correct, but it must also answer the question. Statement 4 does not explain why cells are considered to be the smallest unit of all life since it only relates to multicellular organisms.	
2.	N19Q2	В	Options A and D were the most frequently selected incorrect answers. Information indicates that the stain is specific for phospholipids rather than proteins. An explanation for the presence of the red-coloured structures must account for the removal of the red colour from most of the cell.	
3.	N19Q3	A	Options B and D are incorrect because nuclear envelope and 80S ribosomes are found in eukaryotic cells not in <i>E. coli</i> (prokaryotic cell). Option C is incorrect because RNA polymerase is used to transcribe DNA to mRNA not translate mRNA to protein.	
4.	N19Q4	В	Statement 1 is true. At optimum temp of 86°C for thermophilic bacteria, the percentage unfolding of the enzyme is more than half at 58%. Statement 2 is true. The psychrophilic bacteria begins unfolding at 38°C and is 100% unfolded at 48°C which is within the 15°C range. Statement 3 is false. At 62°C, for mesophilic bacteria, the enzyme is 100% unfolded but the activity of the enzyme remains high at about 97%.	
5.	N19Q5	C	Graph X reaches a higher concentration of product within the same time limit. Hence, it has a higher rate of enzyme reaction which could be due to higher enzyme concentration or higher substrate concentration. (Hence, options narrowed to B and C). Graph Y has a steeper initial gradient but reaches the same concentration of product as the original reaction. Hence, it has the same concentration of substrate but higher rate of reaction due to higher temperature (greater number of effective collisions between E and S). This excludes option B and leaves answer as option C. To confirm, graph Z has a lower initial rate of reaction and reaches a lower maximum product concentration in the same time frame. Hence, graph Z has a lower substrate concentration.	
6.	N19Q6	C	From the figure, it can be seen that the structure of arabinose and glucose are similar except for slight differences. The graph shows that as concentration of glucose (substrate) increases, the effects of arabinose inhibition can be overcome and the graph will reach the same V _{max} as the uninhibited enzyme graph. Hence, this is an example of competitive inhibition. Note: option B is not correct because arabinose <u>does not have the same</u> structure as glucose but a similar structure.	
7. 8	N19Q7	B	Only totipotent stem cells can give rise to genetically modified individuals	
0.	NI SQU	D	polynucleotide strands. J: enzyme adding free dNTPs to the 3' end of the leading strand \rightarrow DNA polymerase K: enzyme joining the ends of the Okazaki fragments together \rightarrow DNA ligase	
9.	N19Q9	A	H7N10 does not exist, hence options B & C cannot be the answer. For option D, H2N2 is no longer found at the present so it cannot be the answer. Also, influenza does not remain in the bodies of those who have recovered from it. That leaves only A as the correct answer.	
10.	N19Q10	A	Statement 1: True. Both cells must come in contact via a mating bridge before conjugation can occur. Statement 2: True. In Hfr cells, part of the bacterial chromosome may be transferred over during conjugation.	

			Statement 3: True. Upon completion of conjugation, the recipient cell now has		
			an F plasmid and is known as a F ⁺ cell. Statement 4: True. The genes involved in pilus formation are found on the F		
			plasmid which will be transferred over during conjugation.		
11.	N19Q11	С	inducer = allolactose (carbohydrate)		
			promoter = DNA		
			repressor = protein		
12.	N19Q12	D	Statement 1 is correct but cannot be concluded from the findings above.		
			tail which can then be lengthened when needed for embryonic development		
			hence not encoded in the maternal DNA.		
			Statement 3 is correct because when maternal mRNA is needed to be translated		
			during embryonic development, the poly(A) tail is extended which implies it is		
			needed for translation to begin.		
			Statements that were true but could not be concluded from the information		
			provided should have been eliminated.		
13.	N19Q13	D	These are the steps listed in sequential order for a Southern blot and nucleic		
4.4	N40044	Δ.	acid hybridization experiment to take place.		
14.	N19Q14	A	in cancer cells. Since loss-of-function of tumour suppressor genes result in		
			cancer, it can be concluded that p16 gene methylation switches off the gene.		
			Option 2: The gene was not mutated, only methylated. Tumour formation		
			resulted with methylation of the progene, so this statement is true.		
			Option 3: The methyl groups were said to be derived from the diet (environmental		
			factor). Since methylation of p16 gene was often found in cancer cells, we can		
45	N40045		infer that the environment contributes to the development of tumours.		
15.	N19Q15	C	Statement 1 – ability to migrate and form new colonies \rightarrow metastasis Statement 2 – divides indefinitely (immortalisation) but haven't formed tumour		
			yet		
			Statement 3 – loss of contact inhibition – forming primary tumour		
40	140040		(transformation)		
16.	N19Q16	D	As it is an extra Y chromosome (for XYY genotype), non-disjunction must occur during sperm formation		
			In Meiosis I, the XY chromosomes separate normally into daughter cells.		
			In Meiosis II, the Y chromosomes do not separate and both Y chromosomes		
			enter one sperm cell.		
			When this YY sperm fuse with an X eqg. it will result in an XYY zygote.		
17.	N19Q17	Α	Since it involves 2 genes for two enzymes P and Q respectively = dihybrid		
			inheritance		
			Both gapes are found on chromosome 7 – linkage (linked gapes)		
			bour genes are round on chromosome r = mikage (miked genes)		
			Enzyme P and enzyme Q belong to the same metabolic pathway and enzyme Q		
			catalyses the later step in the pathway. So if enzyme P is non-functional or		
			absent, whether enzyme Q is present or not, it cannot carry out its function.		
			r is the experiance of the α/q inclus = episodolo		

18.	N19Q18	С	Since both have mothers who have lilac phenotype (bbdd), they will each have b and d alleles in their genotype.				
			Seal male = BbD Blue female = Bb	od odd			
			Parental phenoty Parental genotyp	vpe: Seal ca be: BbDd	t x x	Blue ca Bbdd	t
			Gametes:	D Bd D bd		Bd	bd
			Fertilisation				
				BD	Bd	bD	bd
			Bd	BBDd seal cat	BBdd blue cat	BbDd seal cat	Bbdd blue cat
			bd	BbDd seal cat	Bbdd blue cat	bbDd chocolate cat	bbdd lilac cat
			Offspring genoty Offspring phenot	pe: 3 B_D_ : 3 ype: 3 seal cats	B_dd :1 bbD_ s:3 blue cats:1	: 1 bbdd chocolate cat: 1	lilac cat
19.	N19Q19	В	The observed nu The expected nu of offspring.	imbers will help to imbers can be ca	o calculate the to alculated from th	tal no. of offsprin e expected ratio	g present. and total no.
			Since O and E and To determine if the we need to use the total sector to the sector of	re known, it is po ne results are sig he x² value to fin	ssible to calculat nificantly differen d the probability	e χ^2 value. t or not from expe in a χ^2 distributio	ected values, n table.
20.	N19Q20	В	3 false, as chlorop	hyll appears green	as it reflects gree	n light	
21.	N19Q21	С	A, Wrong as reduc	ed NADP not syntl	hesized in light-ind	lependent stage.	
			B, wrong, PS I is ac	ctive even in low li	ght intensity		
			D, wrong, in low li	ght intensity, there	e should be low ra	te of e- flow, henc	e
			accumulation of p	roton in thylakoid	space should be lo	w. Hence rate of	ATP and
			INADPH syn is low. independent stage	i nat will result in e, which will cause	accumulation of F	eduction stage in l PGA.	ignt-

22.	N19Q22	D	ATP synthesis is driven by proton motive force during chemiosmosis, which is the flow of electrons from the thylakoid space into the stroma of the chloroplast		
			(photosynthesis) and from the intermembranal space into matrix of mitochondria (aerobic respiration.		
			A and B are wrong as it involves the diffusion of protons and not electrons through ATP synthase. C is wrong as proton moves from stroma to thylakoid space.		
23.	N19Q23	В	Q and R are both involved in ligand-receptor interaction which leaves option A or B available. Signal transduction begins when intracellular part of the receptor is activated and goes on to activate the G protein, etc. Since R is pointing to the extracellular part of the receptor, it is not part of signal transduction. So it leaves us with option B.		
24.	N19Q24	С	Leaves are all genetically identical. Option A – crossing over will give variation to offspring, which is the tree. Not the leaves. Option B – unlikely to have such drastic mutations at different parts of the tree. Option D – variation exists spontaneously, they do not exist for the natural selection to operate on.		
25.	N19Q25	D	Descendants of 1996 birds showed skeleton sizes continued to increase. During this period, weather was normal without cold spells. Selection was favouring larger skeleton sizes.		
26.	N19Q26	D	Option 1 – wrong. Guanaco and vicuna are different species, speciation arise from macro evolution. Option 2 – studies on similarity of molecular sequences do not yield information about selection pressure. They only give ideas on how closely related organisms are.		
27.	N19Q27	С	Note: both injections were given on the same day – day 0 right after exposure to the virus.		
			that antibodies were from the injection, and not produced by the individual. Therefore, it is passive immunity. The [antibodies] decreased and goes to 0 after 20 days, which also means that there were no memory cells produced to continue the production of antibodies.		
			For injection 2, there were no antibodies produced in the blood for the first 7 days. The antibodies only came about from day 7 onwards, and have sustained amount of antibodies from 21 days onwards. This hints that the adaptive immune system of the host was activated, which explained the lag before the production of antibodies, and from which memory cells were produced, thus there were still a considerable [antibodies] in the blood after 28 days, which is active immunity.		
28.	N19Q28	В	With increase in proportion of children vaccinated, there will be greater herd immunity, it breaks the possibility of transmission between individuals, which confers a lower risk of infection for both people with reduced immunity and newborns. However, eradication of the pathogen may not be achieved by this.		
29.	N19Q29	A	 From the graph, no. of wild potato species per km² is lower for a large range of heights above sea levels. The decrease in no. of wild potato species suggests that some wild potato species may become extinct. Information on latitude is not provided in the graph. There is a slight increase in the no. of wild potato species at 4600-5100m above sea level suggesting that some species may have shifted from lower heights. 		

			4. At 5000m above sea level, there is an increase in the no. of wild potato
			species, implying a greater diversity.
30.	N19Q30	D	 A: increased resistance of mosquitoes to insecticide can result in more mosquitoes to spread the virus. B: more mosquitoes → same as A C: increased population density increase probability of mosquitoes biting to spread the virus. D: irrelevant to the number of people bitten by the mosquitoes since peak biting period of <i>Aedes</i> mosquitoes is during dusk and dawn.