



Pacific
Community
Communauté
du Pacifique



EDUCATIONAL QUALITY AND
ASSESSMENT PROGRAMME

Scoring Schedule 2018

**South Pacific
Form
Seven
Certificate**

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Item #	Skill Level	Evidence	Student Response Level			
			1	2	3	4
STRAND 1						
1.1a	1	A maggot moving away from light is an example of a negative phototaxis . A taxis is a movement towards or away from a stimulus with direction; in this case the stimulus is light.	Correctly identifies the response as negative phototaxis			
1.1b	2	Increase rate of turning-a kinesis/ Don't move directly to the stimulus-a taxis. A Kinesis is a non-directional response to the intensity of a stimulus (non-directional) Kineses usually involve movement of whole organism (motility), rather than growth Kineses are non-directional so they are neither positive nor negative	States either (i) movement being directional or (ii) that rate is of movement not increased	Includes both directional and rate does not increase in the description		
1.2	2	<ul style="list-style-type: none"> • appear bigger in size to predators-risky and difficult to swallow • long spines will scare predators away and also offer protection • Predators recognise them as poisonous. If they eat it they will die) 	One feature only (any one from the bullet points)	Lists two or more features		
1.3a	1	The environmental cues that reset or calibrate a biological clock are known as Zeitgebers (German for 'time givers')	Correctly defines the term			

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1.3b	4	<p>An endogenous rhythm (i) is an internal or an in built rhythm (ii) the internal rhythm involves an internal biological clock,. (iii) The rhythm persists in the absence of external cues.</p> <p>The hermit crab is nocturnal as shown in the actogram the crab is mostly active at night from 12-24 hours. The inbuilt clock of the crab responds to the hours of the days, without being affected ny any other environmental cue.</p> <p>Explanation: It is an advantage to have an in built clock because the functions /activities can continue in the absence of environmental cues. For example regardless of whether it is low or high tide, the crab will become active for whatever processes or activities it wants to carry out.</p> <p>Discussion: using specific examples - Normally, when the crab is active, its environment is covered by the high tide. Hence, the water may provide protection from potential predators (e.g. birds), prevent desiccation (drying out) and increase the likelihood of finding food. During low tide the crabs remain inactive. This will make them less visible to potential predators. Therefore, this response is advantageous as it allows</p>	Offers one appropriate idea only, e.g. may define endogenous correctly using any one of the three points in the evidence, or correctly identifies the crab as being nocturnal	Describes endogenous with two or more appropriate ideas. This includes a correct identification of nocturnal behaviour.	Makes a clear link between the inbuilt biological clock and the advantage of such a biological clock (refer to the evidence)	Discusses endogenous rhythm as an advantage in helping the organism save energy and protected because they will only come out when the conditions are suitable and safe Refer to the evidence provided.

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		the crab to conserve energy during low tide when they would be more exposed to predation and less food is available, and to be most active when the risk of predation is less and the chance of obtaining food is higher.				

1.4a	2	F	C	D		One correct answer only	Two or three correct answers		
1.4b	3	<p>Dominance behaviors in animals include aggressive displays and ritualised fighting. Dominance in an animal community is not about size or strength or seniority but rather about displays of certain behaviors. Animals may often look like they are fighting, but true fighting is actually very rare. Often quick slaps or bites keep subordinates in their place, but members of the group very rarely injure each other. "Fighting" is often ritualised in order to prevent injury, while still determining superiority in strength or agility. When young dogs roll onto their back, this is also a submissive / appeasement gesture. The young dog is exposing its vulnerable areas to communicate that it is no threat to your dominance</p>				<p>Offers one correct idea e.g. an appropriate definition or example of dominance or submissive behavior, or social organization.</p>	<p>Provides two or more appropriate ideas about dominance or submissiveness but lacks linking of characteristics to social organisation</p>	<p>Explains how dominance and submissive behaviour is maintained through agonistic behaviour with examples such as aggressive stances and ritualised fighting. and links these to social organisation.</p>	

STRAND 2						
			1	2	3	4
2.1a	1	A genome is an organism's complete set of DNA, including all of its genes.	Correctly defines the term			
2.1b	2	(i) A genome is an organism's complete set of deoxyribonucleic acid (DNA). (ii) DNA molecules are made of two twisting, paired strands. (iii) Each strand is made of four chemical units, called nucleotide bases. The bases are adenine (A), thymine (T), guanine (G) and cytosine (C). (iv) Bases on opposite strands pair specifically; an A always pairs with a T, and a C always with a G. (v) the genome determines the characteristics of the organism	One correct idea from the list	Two or more appropriate ideas on the composition of a genome is provided		
2.1c	3	(i) Each genome contains all of the information needed to build and maintain that organism. In humans, (ii) a copy of the entire genome is contained in all cells that have a nucleus (iii) the genome is made of a chemical called DNA. (iv) The genome contains genes, which are packaged in chromosomes, and carried in the nucleus of all body cells of an organism. (v) Each and every specific characteristic of an organism e.g. eye color, hair texture etc is determined wholly or partly by information carried in DNA and genes	One appropriate idea is provided	Two or more appropriate ideas are provided but lacks the correct mechanism for linking between genome and without linking – (iv) and (v) in the evidence targets the linking	Clear description with two or more appropriate ideas, as well as clarity on how genome determines full characteristics of an organism, i.e. linking between genome structure and determination of characteristics is clear.	
2.2a	2	Each keratin molecule consists of (i) several polypeptide chains, (ii) each individual chain wound into a spiral or helix.. (iii) several/more than one polypeptide chain in molecule	One of the three ideas is given	Two or all three ideas are given		

2.2b	3	Chemical bonds form between S-containing amino acids having R groups form disulphide bonds; these strong covalent bonds give keratin molecules their characteristic strength	one appropriate idea is provided, e.g. double bonds, or covalent bonds	Mention of bonds and sulphur groups but lacks linking between structure and strength	Clear explanation of the bonding between the sulphur groups forming strong covalent bonds, includes R group and disulphide	
2.3a	1	Transcription is the process by which the information in a strand of DNA is copied into a new molecule of messenger RNA (mRNA).	Correctly defines transcription			
2.3b	1	The genetic code is a set of three-letter combinations of nucleotides called codons, each of which corresponds with a specific amino acid or stop signal.	Correctly defines the term codon			
2.3c	1	The function of tRNA is to decode an mRNA sequence into a protein and transfer that protein to the ribosomes where DNA is replicated. The tRNA decides what amino acid is needed according to the codon from the mRNA molecule. Then the tRNA molecule attaches the amino acid to the amino acid chain and returns to the cytoplasm to do it all over again	Correctly states the role/function of tRNA; one idea is clearly correct			
2.3d	1	Anti-codon -tRNA comes in 20 different kinds of molecules, each acting as a carrier for a specific amino acid, of which there are also 20 different kinds. Each folded tRNA molecule contains an anticodon, which corresponds to a codon and determines what amino acid is needed	Correctly identifies anticodon			
2.4a	1	Codominance is a form of dominance wherein the alleles of a gene pair in a heterozygote are fully expressed. This results in offspring with a phenotype that is neither dominant nor recessive.	Correctly defines codominance			

2.4b	3	A checkered feather chicken is an example of co-dominance as (i) both alleles B and W are expressed in the phenotype. (ii) If it is complete dominance a phenotype of offspring would either be black or white, whichever is more dominant. If incomplete dominance then phenotype of offspring would be intermediate colour/blend/grey overall	Provides one appropriate idea, wither (i), (ii) or (iii) in the evidence	states at least two correct ideas, without much comparison to show difference	Provides two or more ideas as well as clearly differentiate between the three types of inheritance using symbols and describing phenotypes	
2.5a	1	Polyploidy is having multiple [more than 2] sets of homologous chromosomes that make up the genome of a cell/organism	Correctly defines the term polyploidy			
2.5b	1	Tetraploid is a condition of having 4 sets (or 2 pairs) of homologous chromosomes [4n]	Correctly defines the term tetraploid			
2.5c	4	(i) Definition: Aneuploidy is the presence of an abnormal number of chromosomes in a cell, e.g. a human cell having 45 or 47 chromosomes instead of the usual 46.. Aneuploidy originates during cell division (meiosis) when the chromosomes do not separate properly between the two cells. (ii) Examples of aneuploidy include Downs syndrome Turners and Klinefelters syndrome (iii) Description of meiotic defect Down syndrome is a genetic disorder caused when abnormal cell division results in extra genetic material from chromosome 21[Trisomy 21]. (iv) Discussion of effects on phenotype - People with Down syndrome have mental and physical retardation and a characteristic facial profile. May be associated other congenital abnormalities. no standard treatment for Down	One appropriate idea is provided, e.g. definition of aneuploidy, or name of chromosomal abnormality, or the meiotic defect etc.	Two or more appropriate ideas are provided, e.g. definition and name and abnormal number of chromosome etc, but no description of effects	Two or more appropriate ideas are provided, e.g. definition and name and abnormal number of chromosome etc, and linking between aneuploidy and phenotype is clear	Provided answers has basic details as well as linking and also the discussion of effects of the named condition e.g. downs syndrome, Klinefelters syndrome and turners syndrome

	<p>syndrome. It depends on affected individual's physical and intellectual need. Down syndrome usually have certain characteristic signs, including: flat facial features small head and ears short neck bulging tongue eyes that slant upward oddly shaped ears poor muscle tone</p> <p>Turner syndrome -a rare genetic condition in which a female does not have the usual pair of two X chromosomes. Condition resulting from a sex chromosomal defect in girls. There is a partial or complete absence of an X chromosome that affects the overall development and learning ability of the affected person. Not an inherited condition with no cure for the condition. Hormone therapy is the primary mode of treatment. Other treatment options are based on the type and severity of symptoms. Females with Turner syndrome exhibit certain physical characteristics at birth and in childhood, including: swollen hands and feet (in infants)short stature, a high palate, low-set ears,obesity,droopy eyelids, flat feet</p> <p>Klinefelter syndrome (KS) is a condition that occurs in men who have an extra X chromosome. The syndrome can affect different stages of physical, language, and social development. Symptoms may include any of the following: abnormal body proportions (long legs, short trunk, shoulder equal to hip size) Abnormally large breasts , infertility, Sexual problems, Less than normal amount of pubic, armpit, and facial hair</p>				
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STRAND 3						
3.1a	1	Gene cloning is the process in which a gene of interest is located and copied (cloned) out of DNA extracted from an organism.	Correctly defines gene cloning			
3.1b	2	<p>Bacteria have a single large circular piece of chromosomal DNA as well as smaller circular pieces of DNA known as Plasmids. These plasmids were an attractive target as they are capable of replicating independently of the chromosomal DNA</p> <ol style="list-style-type: none"> 1.The target gene is isolated and cut out using a 'sticky end cutter' restriction enzyme. 2.The bacterial plasmid is cut open using the same restriction enzyme. 3.DNA ligase 'sticks' (ligates) the target gene into the plasmid. The resulting plasmid is known as a recombinant plasmid. Next the recombinant plasmid is inserted into the bacterium by a process known as transformation. 4.The bacteria are then placed in a growth reactor, providing the optimal growth conditions, allowing the bacteria to replicate many times. Finally the bacteria are lysed (cut open) and the plasmids are extracted. 	Lists one step	Lists two correct steps or more		
3.2a	1	Agrobacterium is a genus of Gram-negative bacteria that uses horizontal gene transfer to cause tumors in plants. <i>Agrobacterium tumefaciens</i> is well known for its ability to transfer DNA between itself and plants, and for this reason it has become an important tool for genetic engineering.	Correctly defines what <i>Agrobacterium tumefaciens</i> is able to do i.e. able to transfer DNA between itself and host plants			

3.2b	2	<p>Steps needed in the isolation stage to make the <i>Agrobacterium tumefaciens</i> transgenic</p> <p>ISOLATION-The target gene must then be isolated. DNA from the organism that contains the target gene can usually be isolated simply by breaking up cells mechanically or with chemical treatments such as detergents. The DNA can be separated from the other cell components using a technique called centrifugation. To separate the target gene from the rest of the DNA it would first be cut using a restriction enzyme.</p> <p>The fragments would then be separated according to size using a technique called Gel Electrophoresis.</p> <p>The fragment that contains the target gene can be identified using a DNA probe.</p> <p>And can then cut out of the gel and amplified (copied) using PCR.</p> <p>Alternatively the gene could be inserted into a bacterial plasmid using DNA Ligase.</p> <p>The bacteria would then copy the gene each time it underwent cell division (a technique called Gene Cloning)</p>	One correct idea is evident in the response,	Correctly outlines at least two steps in a clear correct order of the isolation stage		
3.3a	1	PCR	Correctly identifies Polymerase Chain Reaction[PCR]			
3.3bi	1	DNA Profile	Correctly identifies the diagram as a DNA Profile			
3.3bii	2	<p>Parenting disputes</p> <p>Paternity Testing:</p> <p>Children inherit half their chromosomes from each parent and thus should possess a combination of parental fragments</p>	States inheritance of chromosomes but lacks detail on how dispute is resolved	Two or more correct ideas in the description Mentions inheritance of		

		In other words, all fragments produced in the child should also be produced by either the mother or father		parental chromosomes		
STRAND 4						
4.1a	1	Independent assortment is the formation of random combinations of chromosomes in meiosis and of genes on different pairs of homologous chromosomes by the passage according to the laws of probability of one of each diploid pair of homologous chromosomes into each gamete independently of each other pair.	Defines independent assortment correctly			
4.1b	3	Mutation is the ultimate source of new alleles in plant pathogen populations. It also is the source of new alleles that create new genotypes. Small populations have fewer alleles due to genetic drift and also because fewer mutations are generated in a small population. Mutation can be defined as a change in the DNA sequence within a gene or chromosome of a living organism. Many mutations are neutral, i.e. they can neither harm nor benefit, but can also be deleterious or beneficial. Deleterious mutations can affect the phenotype and in turn, reduce the fitness of an organism and increase the susceptibility to several illnesses and disorders. On the other hand, beneficial mutations can lead to the reproductive success and adaptability of an organism to its environment. These beneficial mutations can be spread and fixed in the population due to natural selection processes if they help individuals in the population to reach sexual maturity and to successfully reproduce. Mutations are, undoubtedly, a source of genetic variation and serve as a raw material for evolution to act.	One correct idea of mutation presented but lacks explanation on its effects on the gene pool	Two ideas mentioned but lacks detail to relate how mutation introduces new alleles to the gene pool	Detailed explanation of how mutation introduces new alleles into the population thus increasing variation and diversity within the gene pool	

		Germ line mutations occur in gametes (eggs or sperm cells) and can be pass on to offspring, whereas somatic mutations occur in non-reproductive cells and are not pass on to the following generation. Those mutations that occur in germ line are the most important to large-scale evolution because they can be transmitted to offspring.				
4.2a	1	Fitness-the ability to leave behind offsprings with fit genes. A biological condition in which a competing variant is increasing in frequency relative to other competing variants in a population. A relative measure of reproductive success of an organism in passing its genes to the next generation. The relative ability of an individual (or population) to survive, reproduce and propagate genes in an environment.	Correctly defines fitness			
4.2b	3	Fitness-genes which are considered more fit than others are selected for and therefore will occur more frequently since they will have a more adaptive value. Allele frequency changes with an effect that variation will decrease within the gene pool	One idea explained	States two correct ideas but linking of explains two ideas	Correctly links fitness to contribution of genes to increase in frequency of alleles, hence selection for adaptive value	
4.3a	1	Genetic drift (or allelic drift) is the change in the frequency of a gene variant (allele) in a population due to random sampling of organisms. [The alleles in the offspring are a sample of those in the parents, and chance has a role in determining whether a given individual survives and reproduces.]	Defines the term correctly			
4.3b	2	The bottleneck effect is a special case of genetic drift. almost (i) guarantees that its allele frequencies will not be identical to the parent population. "Bottleneck effect" occurs when (ii) populations undergo periodic crashes. (iii) Allele	Describes bottleneck/genetic drift but lacks cohesion /details in answer	Correctly describes bottleneck effect in relation to genetic drift		

		frequencies after the crash will probably differ from those before the crash. (iv)_Small numbers in the population and the variation within the gene pool.	One correct feature is provided	Two or more correct ideas are provided		
4.4a	1	Hybrid sterility refers to the offspring of a successful primary cross; however the secondary cross would fail. It could be due to the resulting condition wherein the offspring of the primary cross contains multiple sets of chromosomes, which in turn could be due to failure of chromosome separation (disjunction) during meiosis.	Term correctly stated: Hybrid sterility			
4.4b	1	Allopatric speciation also referred to as geographic speciation, is a mode of speciation that occurs when biological populations of the same species become isolated from each other	Correctly defines the term			
4.4c	3	Temporal isolation prevents fertilization of the species because the species have different breeding times so they are not able to meet or the reproductive parts are not receptive at the same time as pollination in plants. Temporal isolation is a prezygotic constraint. Two species that breed at different times of the day, season, or year cannot mix their gametes. Since the breeding times are different there is no chance of reproductive contact. This keeps different species separate etc.	One correct idea is provided.	Two correct ideas are provided but clear linking between temporal isolation and speciation is not.	Concept of how temporal isolation prevents the species from continually mating as a result of different mating times preventing them from contact well linked.	
4.5	4	Definition: Divergent Evolution is the accumulation of differences between groups which can lead to the formation of a new species. Features of DE: (i) It occurs when a population is separated into different environments due to a population being divided by circumstances, (ii) the separated populations then evolve or adapt	One correct idea is presented, e.g. definition of divergent evolution	Provides two or more appropriate ideas (refer to evidence) but the linking between divergent evolution and speciation is not clear.	Provides 2 or more relevant ideas as well as clearly link divergent evolution to the formation of species from a common ancestor	Discusses divergent evolution with correct definition and named examples. Clearly outlines factors/conditions that favour divergent evolution to occur

	<p>to possess different survival traits, blocking the gene flow and resulting in two separate species. Description of factors that allowed DE: (i) The gene flow between the two populations is blocked, (ii) Each of the sub-species has evolved to better suit its environment, with significant variation in the size, shape and purpose of their beaks..</p> <p>Explanation of speciation (iii) As each of the species live on different islands, gene flow between species was restricted, eventually creating the distinct species we see today. Divergent evolution occurs when a structure with a common origin is adapted in different ways in different lineages, as with vertebrate forelimbs which now form paddles in whales, wings in bats, hands in primates, and running legs in horses</p>				
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