Assessment Schedule – 2020

Biology: Demonstrate understanding of the responses of plants and animals to their external environment (91603)

Evidence Statement

Question One

Evidence	Achievement	Merit	Excellence
There are many behaviours that the fox has that ensure success for the pack. Monogamy means staying with one partner, normally for more than one breeding season. There is less time spent courting; so more time or energy for mating and raising offspring. Time is spent together raising the offspring rather than just one of the parents. Long term monogamy can reduce access to other partners and in turn reduce the genetic diversity. Parental care can offer teaching, protection and feeding of young, bringing the young safely to the age they can fend for themselves. By having fewer offspring, the parents can focus all of the protection, learning, and feeding on fewer individuals. They will also have more time and energy for this, as there would not be so many young taking time and effort. Although parental care does take time away from the adult caring for themselves, feeding themselves, the risk of the young attracting predators etc., it does mean there is more likely a chance that the adults leave more offspring over their lifetime. If no parental care, the young would not be able to gather enough food and protect themselves. Allogrooming increases the bonding in the group, making the group stronger and less likely to have aggression, which can cause injury. By having a larger group in the pre-mating season, the foxes are protected while mating and also have more genetic diversity to mate with. Being non-territorial means that adults do not waste energy or risk being injured in defending resources.	• Defines monogamy as having one partner at a time. • Describes an advantage of a monogamous relationship, e.g. no time is wasted on courtship. • Describes a disadvantage of a monogamous relationship, e.g. reduces access to other partners • Defines parental care as protection / support for young. • Describes an advantage of parental care, e.g. food provided to reach adulthood / teaching skills needed for life. • Describes a disadvantage of parental care, e.g. parents have less time to groom / feed themselves.	• Explains an advantage and a disadvantage of parental care. • Explains an advantage and a disadvantage of monogamous relationship. • Explains the benefit of allogrooming. OR Explains an advantage of minimal offspring. OR Explains an advantage of being non-territorial. OR Explains an advantage of group behaviour.	• Comprehensive answer of how & why the explained behaviours **can together** lead to the success of the fox packs. Includes, for example: - monogamous relationships - grooming - parental care - minimal offspring - non territorial and group behaviour. • Comprehensive answer of how explained behaviours can together lead to the success of the fox packs, despite the potential negatives of the behaviours with multiple behaviours of the group discussed that lead to success of the pack. **The positives of the behaviours must outweigh the negatives** in order for them to continue.

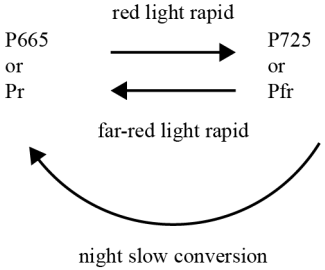
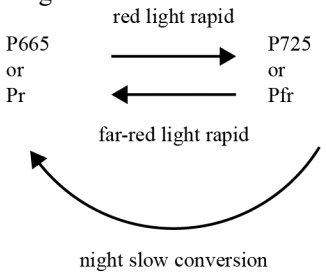
Not Achieved			Achievement		Merit		Excellence	
NØ = no response or no relevant evidence	1a	2a	3a	4a	2m	3m	1st E bullet point	2nd E bullet point

Question Two

Evidence	Achievement	Merit	Excellence
Tardigrades orientation responses help with the success and survival of the organism. Photokinesis is an orientation response of an organism. Like phototaxis, it is a response to light, however it is not a directional response, but rather a diffuse one. The organism, unable to sense direction, responds to the intensity of the stimulus, and the response is shown in the rate of random movement or turning. The tardigrade does not move directly to or away from light; instead, there is a change of behaviour in that there is an increase in the rate of turning, which randomly increases the chance that the tardigrade moves into a more favourable environment, which is away from the light and into the moist conditions. The tardigrade would dry out if in the light, as they normally live in moist areas. Plant tendrils display positive thigmotropism, as their growth orientates to the touch of the object they are growing on. This ensures they grow using less energy and can therefore quickly get up to more light for increased rate of photosynthesis, and the production of usable energy. In plants, the tropisms are controlled by a growth hormone auxin, which causes elongation of cells in the stem leading to directional growth. Auxin (or IAA) is made in the shoot tip and is soluble, and migrates / moves down the shoot, accumulating in the cells on the opposite side to the stimulus (in this case touch). This auxin affects the elasticity of the cells and they take in more water and are larger. This causes the bending round the wire.	• Describes a phototaxis response. • Describes a photokinesis response. • Describes a positive thigmotrophic response. • Describes auxin effect on cells. • Describes a benefit to the tardigrade of the response. • Describes a benefit to the cucumber / plant of the response.	• Explains how phototaxis and photokinesis differ. • Explains how auxin results in a response. • Explains a benefit of photokinesis to the tardigrade. • Explains a benefit of thigomotropism to the cucumber.	• Comprehensively discusses orientation response of the tardigrade, how it provides a benefit, and explains an adaptive advantage linking this to the success in growth and reproduction of the species. • Comprehensively discusses orientation response of the cucumber, how it provides a benefit, and explains an adaptive advantage linking this to increased photosynthesis and success in growth and reproduction of the species.

Not Achieved			Achievement		Merit		Excellence	
NØ = no response or no relevant evidence	1a	2a	3a	4a	2m	3m	1 E bullet point	2 E bullet points

Question Three

Evidence	Achievement	Merit	Excellence
Photoperiodism is a response to the differing ratio of light and dark in a day. Flowering is a response that is often controlled by the length of day / night, and specifically the night. Short-day plants will be induced to flower when the night is getting longer – longer than a critical period. Long-day plants will be induced to flower when the night is getting shorter – shorter than a critical period. Critical periods differ in different species.  Phytochrome is a plant pigment that exists in two forms: phytochrome red (PR) and phytochrome far red (PFR). During the day PR absorbs red light, which converts it quickly to PFR, and at night, the conversion of PFR to PR is slow, as it is absorbing far red light. The interruption of night with light resets the clock, and phytochrome will once again exist in the far red form. Flower A needed a night longer than a critical period, which it got, therefore it was induced to flower. B needed a night to be shorter than a critical period. As the night is greater than the critical length, flowering does not occur. C needed a short night and although the night may seem long, it has been interrupted, essentially providing the conditions of night, shorter than the critical length, therefore flowering occurred. Being a long-day plant, the benefit is that it flowers when conditions are right for pollination, e.g. summer for bees etc., but the disadvantage is that flowering does not happen all year to increase the number of the species. By interrupting the night, you can artificially induce the critical night length and force a plant into flowering. This is what happened in C.	• Defines a LDP. • Defines a SDP. • Describes phytochrome forms. • Describes how night is measured by the conversion amount. • Describes benefit of LDP. • A description of A or B or C, e.g. A, the flower on the left, flowered as it is a SDP and needed a long night.	• Explains how PR and PFR work, maybe through a diagram.  • Explains benefit of summer flowering to a LDP. • Explains A or B with reference to critical NIGHT length OR the fact that it is the night length that is important • Explains use of light interruption in plant C.	• Discusses fully the photoperiodic response of flowering to include the phytochrome system in plants A and B • Discusses how the phytochrome system in plant C induces flowering due to the interruption of dark (night). (Allow a comparison with the SDP)

Only the active form of phytochrome (P_{fr}) is capable of causing flowering, however its action differs in SDP's and LDP's Long-day plants flower when the days are long – hence require the night period to be *less than* a critical length In long-day plants, P_{fr} *activates* flowering and hence flowering requires high levels of P_{fr} (i.e. resulting from short nights) A short burst of light resets the P_{fr} levels to be high enough to induce flowering. Short-day plants flower when the days are short – hence require the night period to *exceed* a critical length In short-day plants, P_{fr} *inhibits* flowering and hence flowering requires low levels of P_{fr} (i.e. resulting from long nights) After a short burst of light, there is too much P_{fr} remaining and flowing is inhibited.			

Not Achieved			Achievement		Merit		Excellence	
NØ = no response or no relevant evidence	1a	2a	3a	4a	2m	3m	1 E bullet point	Both E bullet points

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 14	15 – 19	20 – 24