

**Assessment Schedule – 2022****Biology: Demonstrate understanding of the responses of plants and animals to their external environment (91603)****Evidence Statement****Question One**

Evidence	Achievement	Merit	Excellence
<p>A hierarchy is a rank order according to dominance. It is an order with individuals at the top of the hierarchy having first choice of resources, e.g. food resources / mates. In some species, only high-ranking individuals mate. Predation is the interspecific relationship where one species hunts, kills and eats the other. A territory is a defended area in which animals safely raise their young.</p> <p>Courtship is behaviour that results in more successful breeding and potential reproduction. It can be singing or flight displays such as in the stitchbird, which will serve to show that they have energy for mating and caring for the young / providing for their mate. This enables female choice, and the best birds get to mate more often. For the male carrying out flight and song, they have the best chance to mate. Courtship also establishes correct species so saves energy breeding with another species which would result in no viable chicks.</p> <p>However courtship takes time and energy that could be used in mating or finding food, predators may hear them, and they might get injured in flight display.</p> <p>With limited numbers of birds having many mating strategies allows more mating, as they have options for partnerships; by defending the nest, more offspring survive, and by performing, the most successful birds mate, enabling a 'stronger' chick group. To defend the nest only in mating season means that the energy is only used directly when young are vulnerable, and therefore this energy is not wasted at other times of the year. Having group nesting strategies means there are more adults to defend the area, and this will likely result in increased survival due to more vigilance / defence. With more young surviving, the population size can be maintained or even increase.</p>	<ul style="list-style-type: none"> <li>• Describes hierarchy.</li> <li>• Describes predation.</li> <li>• Describes territory.</li> <li>• Describes group nesting.</li> <li>• Describes an advantage of courtship / flight display / song.</li> <li>• Describes a disadvantage of courtship / flight display / song.</li> <li>• Describes female choice.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains WHY courtship strategies create an advantage E.g. Stronger birds (more energy for courtship) are more likely to be selected by the females and more chance that offspring will survive (genes be passed on).</li> <li>• Explains WHY courtship strategies can have disadvantages. E.g. The displays / singing may make the birds more likely to be preyed on, removing them from the gene pool or preventing them from mating if injured E.g. Requires the use of energy which can't then be used for feeding and reproduction</li> <li>• Explains advantage of group nesting. E.g. There are more adults to defend the one area and provide food for the offspring resulting in increased survival.</li> <li>• Explains a benefit of territory for mating season. E.g. Greater protection of the resources and young increasing survival. E.g. Energy is not wasted / risk of injury is decreased outside of mating season.</li> </ul>	<ul style="list-style-type: none"> <li>• Discusses how the benefits of the <b>bolded</b> behaviours - group nesting and defending the territory in the mating season outweigh the costs, and enable the population to be maintained through more (and fitter) young surviving.</li> <li>• A fully linked answer where the discussion (as above) also includes the other behaviours of hierarchy and courtship and how all the behaviours collectively enable the population to be maintained through more (and fitter) young surviving.</li> </ul>

Not Achieved			Achievement		Merit		Excellence	
NØ = no response or no relevant evidence.	N1 =1a	N2 =2a	A3 = 3a	A4 = 4a	M5 = 2m	M6 =3m	1st bullet point.	2nd bullet point.

**Question Two**

Evidence	Achievement	Merit	Excellence
<p><b>Migration</b> is the annual or seasonal mass movement made by animals from their breeding area to another area that has a good food supply and optimum temperatures. True migration involves a return trip.</p> <p>Because it is an annual event, this is a circannual rhythm, which may be endogenous or controlled by external cues</p> <p>The bunting navigates at night, so cannot use the Sun. It likely uses other cues such as star navigation or the Earth’s magnetic field / south celestial pole.</p> <p>Environmental cues</p> <p>A drop in temperature and a shortening in the length of the day. E.g. changes in the length of the day are sensed directly through the skin and feathers by the pineal gland. Because the changes in day length are consistent from year to year, this is the most likely trigger for the buntings migration.</p> <p><b>Methods of migration</b></p> <p>Most birds navigate using a range of methods</p> <p>Using the <b>Earth’s magnetic fields</b> to determine where they are in relation to the other fields.</p> <p><b>Stellar</b> –using the position of the stars to guide them during the night on their migration. However, when using this method, it is important that the bunting must also have a biological clock to take into consideration the rotation of the earth, which causes the apparent movement of the stars across the sky.</p> <p><b>Visual cues</b> – some landmarks are used in migration like coast lines and mountain ranges.</p> <p>For migration to be worthwhile, the benefits gained from migration must outweigh the costs associated with migration. Some <b>advantages</b> include:</p> <ul style="list-style-type: none"> <li>• The animals remain in favourable temperatures; this means that they will not use as much energy to keep warm.</li> <li>• They can grow larger and store energy reserves for the return trip.</li> <li>• They can leave more offspring, as their offspring have a higher chance of survival.</li> <li>• They have a constant supply of food, reducing predation / parasitism / disease.</li> </ul>	<p><b>Describes migration.</b></p> <ul style="list-style-type: none"> <li>• e.g.: Migration is the annual or seasonal mass movement made by animals from their breeding area to another area that has a good food supply and optimum temperatures.</li> <li>• Identifies the rhythm as circannual.</li> </ul> <p>Environmental cues</p> <p>E.g. A steady drop in temperature OR a change (shortening) in the length of the day.</p> <p>Describes Navigation methods that could be used at night.</p> <ul style="list-style-type: none"> <li>• Using the earth’s magnetic fields to determine where they are in relation to the other fields</li> <li>• Stellar – Some use the position of the stars to guide them during the night on their migration.</li> </ul> <p>Identifies a benefit that applies to the bunting.</p> <p>E.g. Increases bunting reproduction / survival in winter.</p>	<ul style="list-style-type: none"> <li>• Explains that migration is a method of avoiding unfavourable conditions and the repeating trip enables good conditions all year.</li> <li>• Explains why the navigation method used by buntings must work at night.</li> <li>• Explains that navigation often relies on internal (pineal gland) and external cues (stars).</li> <li>• Explains that buntings likely use a number of methods to reduce the risk of going off course.</li> <li>• Explain how birds can use the celestial pole as a stationary object of which other stars move around / stella navigation or explains how use magnetic field.</li> <li>• Explains that migration leads to increased overall / reproductive success for the bunting.</li> <li>• Explains an appropriate difficulty in the journey.</li> </ul>	<p><b>Comprehensively discusses the costs and benefits of migration to the bunting</b></p> <p>Some advantages include:</p> <ul style="list-style-type: none"> <li>• • The animals remain in favourable temperatures; this means that they will not use as much energy to maintain suitable body temperature.</li> <li>• • They have a constant supply of food so they can grow larger and store energy reserves for the return trip.</li> <li>• • Better breeding conditions, so they can leave more offspring, as their offspring have a higher chance of survival.</li> <li>• • Reduction of predation / parasitism / disease as the predators have no prey and parasites no host etc</li> <li>• • Greater genetic mixing due to different populations sharing breeding grounds</li> </ul> <p>Some of the costs include:</p> <ul style="list-style-type: none"> <li>• They could get lost or blown off course and not have enough energy to complete the journey.</li> <li>• They might get eaten by predators during the journey</li> <li>• They might starve and die during the migration due to lack of food en route.</li> <li>• Their huge investment in energy, so they may arrive</li> </ul>

<ul style="list-style-type: none"> <li>• Greater genetic mixing.</li> <li>• Better breeding conditions.</li> <li>• Some of the <b>disadvantages</b> include:             <ul style="list-style-type: none"> <li>- They could get lost or blown off course and not have enough energy to complete the journey.</li> <li>- They might get eaten by predators.</li> <li>- They might starve.</li> <li>- Their huge investment in energy.</li> </ul> </li> </ul>			<p>depleted and unable to court / mate / breed successfully.</p> <p><i>Benefits of migration must outweigh the costs associated with migration which means survival and reproductive success must be increased.</i></p>
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Not Achieved			Achievement		Merit		Excellence	
NØ = no response or no relevant evidence.	N1 =1a	N2 =2a	A3 = 3a	A4 = 4a	M5 = 2m	M6 =3m	E7=A cost and a benefit discussed, AND linked to overall survival advantage.	E8=2 costs and 2 benefits discussed AND linked to overall survival advantage.

**Question Three**

Evidence	Achievement	Merit	Excellence
<p>The dodder is a parasite which feeds on its host, gaining benefits whilst the host is harmed.</p> <p>The dodder wraps around the host plant using positive thigmotropism. This enables strong connection of haustoria to the host plant.</p> <p>Auxin migrates from the shoot tip down to the area of the growing stem where it accumulates on the side opposite the environmental stimulus (touch). Here it loosens cell walls which then take on more water and elongate; therefore growing faster (larger) than the cells on the touching side and this differential growth causes the bending and winding around the host plant.</p> <p>Synchronising flowering enables the dodder to have a wider range of host species on which it can live and be pollinated. This means that it doesn't matter if the dodder is parasitising a SDP or a LDP as they will still flower at the same time, which increases its chances of reproductive success.</p> <p>The SDP will be stimulated to flower in autumn or winter when the nights are lengthening, (longer than a critical period). The LDP flower in spring or summer when the nights are getting shorter, (shorter than a critical period).</p>	<ul style="list-style-type: none"> <li>• Describes parasitism as the dodder lives on an organism of another species (its host) and benefits by deriving nutrients at the other's expense</li> <li>• Describes positive thigmotropism as a directional growth movement that causes the plant to bend as a result of touching / coiling around the support in the direction of the support</li> <li>• Describes how thigmotropism occurs e.g differential cell growth due to Auxin</li> <li>• Describes SDP.</li> <li>• Describes LDP.</li> <li>• Describes an adaptive advantage to the dodder. E.g. Allows the dodder to get more energy.</li> </ul>	<ul style="list-style-type: none"> <li>• Explains how dodder benefits whilst host is harmed.</li> <li>• Explains how positive thigmotropic response enables haustoria to attach firmly to host plant.</li> <li>• Explains the action of auxin for the wrapping of the dodder around its host.</li> <li>• Explains that synchronised flowering means dodder is more likely to be on a host plant that is being visited by pollinators, regardless of the time of year</li> <li>• Explains difference between a SDP and LDP with reference to critical period.</li> </ul>	<ul style="list-style-type: none"> <li>• Discusses fully how parasitism enabled by positive thigmotropism (mechanism needed) enables dodder to gain more energy and devote more resources to reproduction leading to greater success and survival of the species</li> <li>• Discusses how being able to synchronise with both SDP and LDP enables the dodder to take advantage of the pollinators attracted to the host plant, increasing the chances of successful pollination, leading to greater success and survival of the species</li> </ul>

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

**Cut Scores**

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 7	8 – 13	14 – 18	19 – 24