

Question 1: Design an Investigation**10 points**

A	Describe one reproductive strategy used by a K-selected species such as the chickadee. Point 01 Examples of acceptable responses may include the following: • (K-selected species) provide considerable parental care for offspring. • (K-selected species) have few offspring. • (The parents) expend significant energy for each offspring. • (Individuals) reproduce more than once in their lifetime. • (K-selected species) have a long gestation period/reach reproductive maturity later.
B	Based on the information provided, explain how a decrease in spider populations could affect a lower trophic level. Point 02 Examples of acceptable responses may include the following: • Insects/insect populations would increase because the insects are not being preyed on/eaten as much. • Plants/plant populations would decrease because the number of insects that eat plants will increase.
C	Based on the data in Figure 1, identify the number of spiders per sample at 25% nonnative plants. Point 03 Examples of acceptable responses may include the following: • 2.0 • 2
D	Based on the data in Figure 1, describe the trend in the number of insects per sample in relation to the percentage of nonnative plants. Point 04 Examples of acceptable responses may include the following: • As nonnative plant percentage/percent increases, the number of insects decreases. • As nonnative plant percentage/percent decreases, the number of insects increases. • They have an inverse/indirect/negative relationship.
E	Scientists hypothesized that the population of chickadees would be stable or growing with fewer than 25% nonnative plants. Describe one way that the data in Figure 2 support this hypothesis. Point 05 Examples of acceptable responses may include the following: • Below this level/With fewer than 25%, the growth rate is at/above replacement level. • Below this level/With fewer than 25%, enough reproduction is occurring to replace the population. • Below this level/With fewer than 25%, the population growth rate is positive.

F	(i) Identify a likely scientific question for the students' investigation of ant diversity. Point 06 Examples of acceptable responses may include the following: • Does the number of species/species richness/biodiversity differ between an urban park and a grassland? • Does mowing affect the number of species/species richness/biodiversity?
	(ii) Identify the dependent variable in the students' investigation. Point 07 Examples of acceptable responses may include the following: • Number of ant species • Ant species richness • Presence/absence of different ant species
G	(i) Explain why the ant community of the unmowed grassland would be more likely to recover from a disturbance, such as a flood or fire, than the ant community in the mowed urban park would. Point 08 Examples of acceptable responses may include the following: • With a larger number of species, the grassland is more likely to have some species/individuals with adaptations that allow them to survive. • The grassland is more diverse, so the loss of one species is less likely to cause a collapse (of the whole ecosystem).
	(ii) Explain how the results of the investigation could have been altered if students had measured ant biodiversity at a paved playground rather than in the grassland. Point 09 Examples of acceptable responses may include the following: • (The playground) would have fewer species (than the grassland/urban park) because the paved area is not suitable habitat for many ant species. • (The playground) would have fewer species (than the grassland/urban park) because humans could trample the ants/ant habitat.
H	Describe one effect a paved road in a forest can have on animal species such as deer or bears. Point 10 Examples of acceptable responses may include the following: • Animals can get hit by cars when trying to cross the road/hunt/migrate. • Fragmentation can lead to isolation of individuals/loss of genetic diversity. • Noise pollution can damage hearing/cause stress/mask the sounds used to communicate/hunt. • The road/noise pollution can cause changes in migratory routes/prevent movement of animals (to access resources). • Species that thrive in edge habitats might increase.