PARTS OF A WELL-WRITTEN MULTIPLE CHOICE ASSESSMENT ITEM

HIGH SCHOOL - DOK: 3

Standard Addressed: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

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STIMULUS: The stimulus is the part of a multiple-choice question that gives the student information and/or context needed to answer the question. The stimulus should be thorough, but not contain deliberately misleading or excessive information. Stimuli are usually created by the assessment writer, but can occasionally be taken from the public domain.

Use the information below to answer the question that follows.

Black-footed ferrets are small members of the weasel family that give birth to 1 to 5 offspring per year. They eat prairie dogs and live inside prairie dog towns. Ferrets can become infected with and die from diseases such as canine distemper and sylvatic plague.

The black-footed ferret species was thought to be extinct before a population was found on a ranch in Wyoming. The ferrets were captured and bred in captivity until there were enough individuals to reintroduce populations in South Dakota and Wyoming.
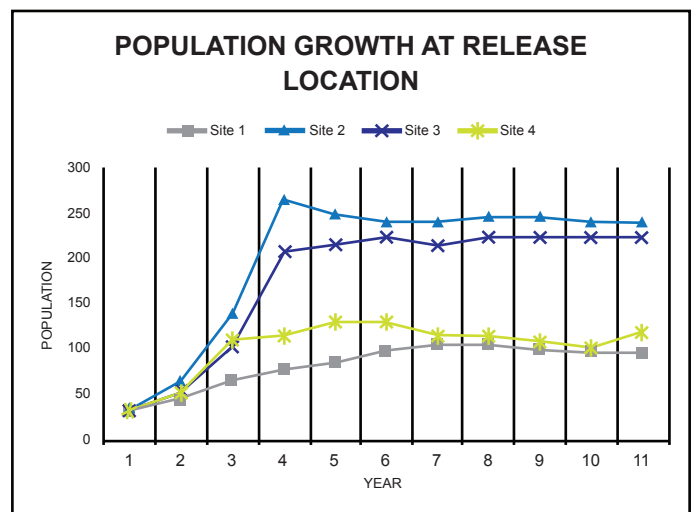
2

VISUAL PROMPT (if applicable): Some multiple-choice items benefit from the inclusion of a map, graph, or other image. Visual aids should only be used if they are necessary for the student to answer the question. All types of visual aids should contain all of the components that make them useful (scales on maps, keys for graphs, etc.) Specific instructions on copyright and use of non- images generally comes from a client.

The chart and graph below show information about four ferret reintroductions.

The four release locations are smaller populations within a much larger ferret population. The average number of distemper infections for the larger total population is 17 per 100 ferrets.

Average Prairie Dog Density and Disease Infection Rate Following Reintroduction		
Location	Prairie Dog Density (individuals/hectare)	Distemper Infection Rate (infections/100 individuals)
Site 1	3.2	8.58
Site 2	7.2	4.03
Site 3	7.0	6.59
Site 4	2.9	4.25

POPULATION GROWTH AT RELEASE LOCATION

Before releasing the black-tailed ferrets bred in captivity, it was unclear what factors would limit population growth most significantly and directly. According to the data, which statement describes the factor that most limited ferret population growth?

A. canine distemper rates
B. ferret birth rates
C. prairie dog densities
D. sylvatic plague cases

Rationales:

A. According to the data, canine distemper rates were a secondary limiting factor of ferret population growth, and prairie dog densities were the primary limiting factor.

B. While ferret birth rates may have limited the population growth and could be related to prairie dog density, the data do not demonstrate that birth rates were the most significant limiting factor to ferret population growth.

C. KEY: Based on the data presented in the stimulus, prairie dog densities were the primary limiting factor of ferret population growth.

D. While deaths due to sylvatic plague could be a secondary limiting factor of ferret population growth, this cannot be determined using the data provided.