Tennessee Comprehensive Assessment Program

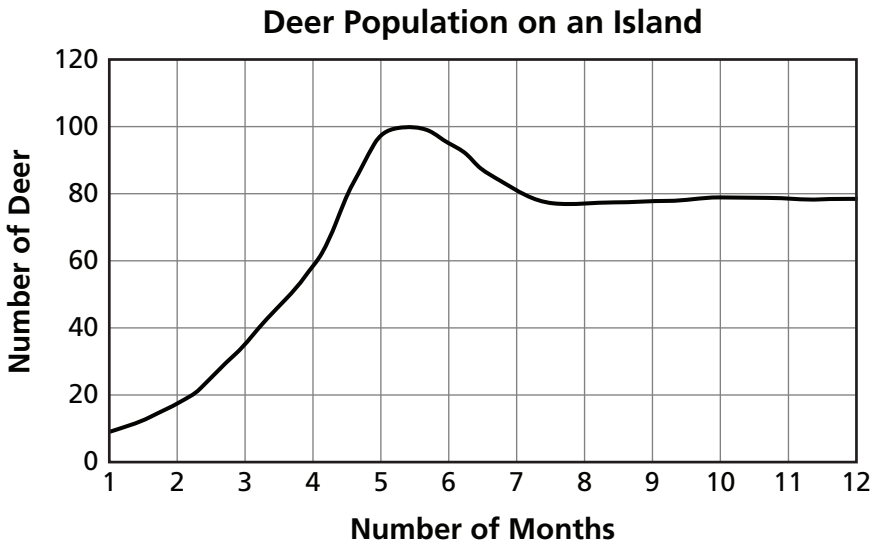
TCAP

Biology
Grade HS Item Release

TN Department of Education

TB01S0294_2

00. A student is analyzing data to find the carrying capacity of a deer population.



When did the deer population first reach its carrying capacity?

A. 3.0 months

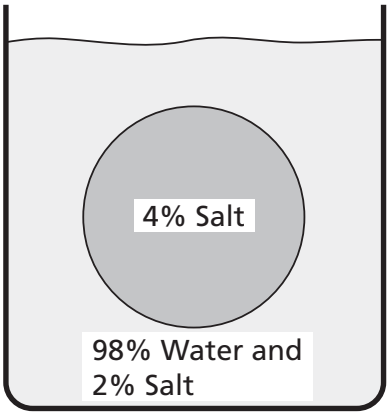
B. 4.5 months

C. 5.0 months

D. 6.5 months

TB02S0843_4

00. A diagram of a cell in a solution is shown. The cell is **not** permeable to the salt.



Which response describes net movement across the cell membrane under these conditions?

A. Salt will move out of the cell.

B. Salt will move into the cell.

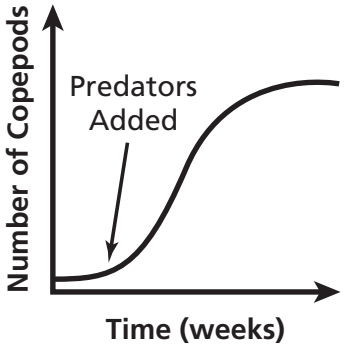
C. Water will move out of the cell.

D. Water will move into the cell.

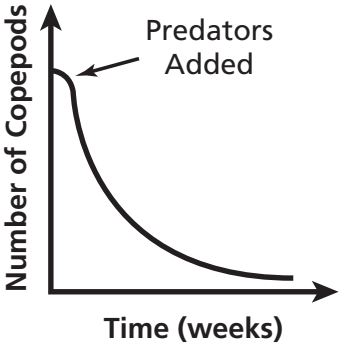
TB02S1414_3

00. Copepods are tiny aquatic organisms used as a food source for fish in the wild or in aquariums. If copepods are placed in a new aquarium that lacks copepod predators, which graph represents the population change after the addition of copepod predators?

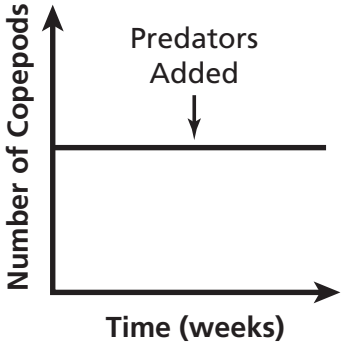
A.



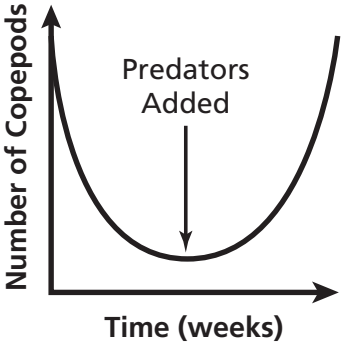
C.



B.



D.



TB02S1483_4

00. A table shows information collected by a student about four different specimens.

Characteristics of Four Specimens

Specimen	Responds to Stimuli	Can replicate DNA	Capable of Growing	Cell Wall Present	Composed of Cells
1	No	Yes	No	No	No
2	Yes	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	Yes	Yes
4	Yes	Yes	Yes	No	Yes

Which specimens are **most likely** living organisms?

A. Specimens 1 and 4 only

B. Specimens 2 and 3 only

C. Specimens 1, 2, and 3

D. Specimens 2, 3, and 4

TB02S1541_4

00. Using a light microscope, students observe prepared slides of different types of plant cells and complete the table shown.

Cell Type	Description	Location in the Plant
companion cells	spherical, yellow	vascular tissue
root hair cells	hairlike projections from the roots	roots
sieve cells	long and tapered with overlapping ends	vascular tissue
palisade cells	thin cell wall	leaves

Which cell type would **most likely** contain the highest quantity of chloroplasts?

A. companion cells, because they are spherical and yellow

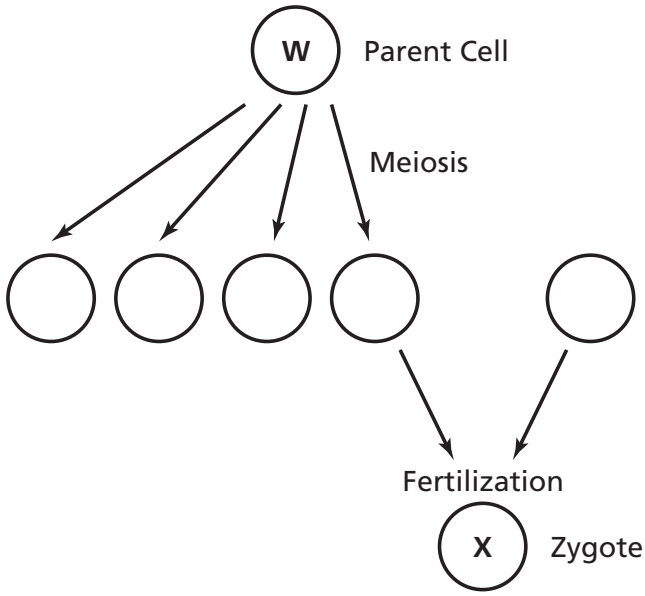
B. root hair cells, because they are located in the roots

C. sieve cells, because they are long and tapered

D. palisade cells, because they are in the leaves

TB02S1605_3

00. A partial diagram of meiosis and fertilization is shown.



Which statement accurately compares cells W and X?

A. Cells W and X have different genes; cell W is haploid and cell X is diploid.

B. Cells W and X have identical genes; cell W is diploid and cell X is haploid.

C. Cells W and X have different combinations of alleles; both cells are diploid.

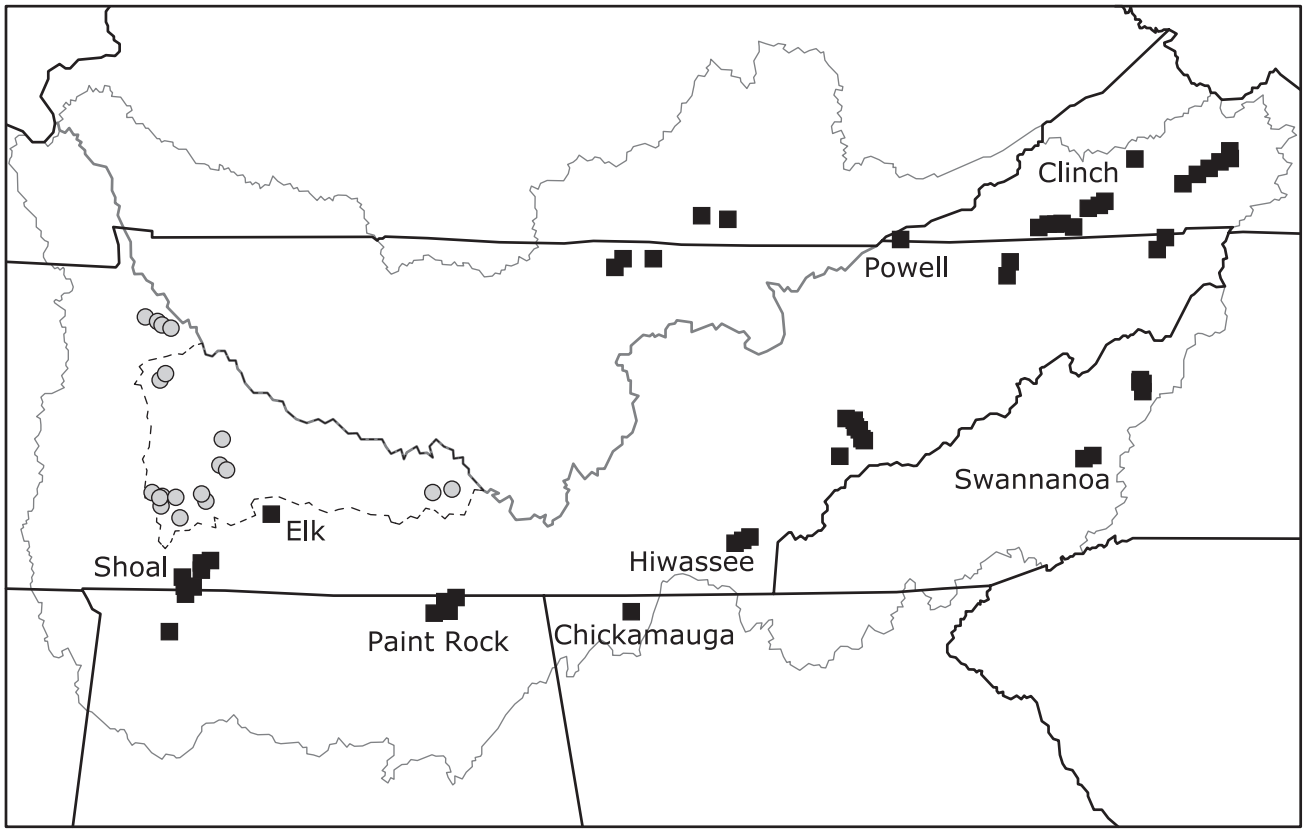
D. Cells W and X have identical combinations of alleles; both cells are diploid.

TB03J033A

Questions XX–XX refer to the passage(s) and image(s) shown.

Logperch Evolution – Part 1

Darters are a family of small, perchlike fish made up of approximately 250 different species. In the Tennessee River basin and the Duck River basin there are several populations of darters of the genus *Percina*. Until recently all of these populations were believed to consist of *P. burtoni*. Recently, a number of populations in the Duck River basin were identified as a new species, *P. apina*. The distributions of the populations are indicated on the map.



Key

- *Percina apina*
- *Percina burtoni*
- Tennessee River basin
- Duck River basin

TB03S2433_033A_4

00. Which statement provides evidence that there are interactions between different populations of *Percina* in the Tennessee River Basin?

A. The color patterns of fish in different populations are distinct from one another.

B. The two populations are caught at the same rate by predators.

C. Tributaries of the Tennessee River are connected to each other.

D. There is gene flow between populations.

TB03S2435_033A_1

00. Based on their distribution, which populations of *P. burtoni* are predicted to be **most** closely related to *P. apina*?

A. Elk and Shoal

B. Paint Rock and Chickamauga

C. Hiwassee and Swannanoa

D. Clinch and Powell

TB03J033B

Questions XX–XX refer to the passage(s) and image(s) shown.

Logperch Evolution – Part 2

In 2017 a research group published results of an investigation into the similarities and differences between *P. burtoni* and *P. apina*. Some of the results from the investigation are shown in the table.

Comparison of *P. apina* and *P. burtoni* Characteristics

Characteristic	P. apina	P. burtoni
Habitat preference	Small gravel, shallow streams, strong flow	Small-to-medium gravel, moderate-to-strong flow
Pigment pattern	Wide spots	Tall spots
Mean number of lateral line scales	93.09 ± 0.28	89.92 ± 0.22
Mean number of dorsal fin spines	16.20 ± 0.09	16.20 ± 0.06
Mean number of alleles per locus tested	6.25	10.10
Mean relative heterozygosity at tested loci	0.518	0.609

TB03S2438_033B_1

00. Based on the data, which of these is **least** likely to support the claim that *P. apina* and *P. burtoni* are different species?

A. the mean number of dorsal fin spines

B. the mean number of alleles per locus

C. the pigment pattern

D. the habitat preference

TB03S2439_033B_4

00. Which combination of events **most likely** led to the divergence of *P. apina* and *P. burtoni* species?

A. The introduction of a new predator to the Elk River basin forced *P. apina* to change its pigmentation pattern.

B. Changes in the water chemistry in the Elk River basin caused *P. apina* to have a different fin structure.

C. Differences in available resources led to different immigration ranges between *P. apina* and *P. burtoni*.

D. Different selection pressures act on phenotypic differences between *P. apina* and *P. burtoni*.

Metadata - Biology

Items

Page Number	UIN	Associated Cluster UIN	Cluster Title	Grade	Item Type	Key	DOK	TN Standards	SEP	CCC
1	TB01S0294			Biology	MC	B	2	BIO1.LS2.1	DATA	SC
2	TB02S0843			Biology	MC	D	2	BIO1.LS1.7	MOD	SYS
3	TB02S1414			Biology	MC	C	2	BIO1.LS2.1	MATH	SC
4	TB02S1483			Biology	MC	D	2	BIO1.LS1.1	DATA	
5	TB02S1541			Biology	MC	D	2	BIO1.LS1.2	CEDS	SF
6	TB02S1605			Biology	MC	C	2	BIO1.LS3.1	MOD	
8	TB03S2433_033A	TB03J033A	Logperch Evolution	Biology	MC	D	2	BIO1.LS4.1	ARGS	
9	TB03S2435_033A	TB03J033A	Logperch Evolution	Biology	MC	A	2	BIO1.LS4.1	ARGS	
11	TB03S2438_033B	TB03J033B	Logperch Evolution	Biology	MC	A	2	BIO1.LS4.1	ARGS	
12	TB03S2439_033B	TB03J033B	Logperch Evolution	Biology	MC	D	2	BIO1.LS4.1	ARGS	SC

Cluster Stimuli

Page Number	UIN	Cluster Title	Grade	Item Type
7	TB03J033A	Logperch Evolution	Biology	Stimulus
10	TB03J033B	Logperch Evolution	Biology	Stimulus