

2023–2024 Gr7 Science Benchmark Unit 3

Question 1.

When plants reproduce sexually, it is advantageous if they can spread their offspring as far away as possible, so they do not end up competing with them for sunlight or nutrients.

Which of the following provide evidence that could be used to support the argument that specialized plant structures affect the probability that a plant's seeds will be spread away from the parent plant? Select all that apply.

- A. Willow trees have seeds that are light and float on water.
- B. Dandelion seeds have added parts that allow them to travel easily on a breeze.
- C. Sand burrs have barbed seeds that attach to passing animals.
- D. Lavender has a scent that attracts pollinators, which ensures that fertilization and seed formation occur.
- E. Strawberries can reproduce without producing seeds; they send long runners underground to different areas.

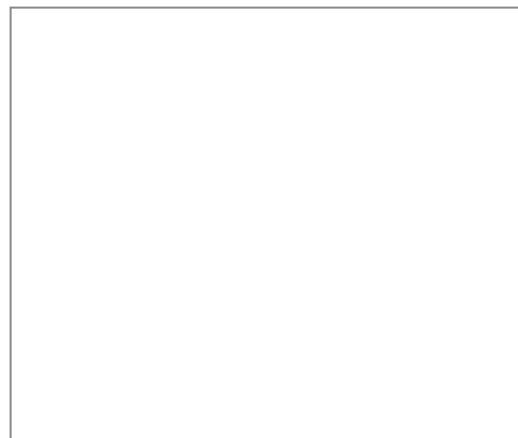
Question 2.

Bird's nests are a common sight. The size, shape, and construction of bird's nests varies among bird species. However, the effect of the behavior is similar.

Explain how the behavior of nest building affects the survival of bird offspring.



If a population of birds was unsuccessful at nest-building one year due to habitat destruction that resulted in a lack of nesting materials, how would the population be affected?



Question 3.

A male dog and a female dog, each weighing 10 pounds, produce a litter of puppies. When the puppies are old enough, they live with different families.

Which statement **best** predicts how much the puppies will weigh when they become full grown dogs?

- A. Each full-grown dog will also weigh exactly 10 pounds because weight is determined by genes.
- B. Each full-grown dog will weigh about 10 pounds because weight is influenced by genes and also by diet.
- C. Each full-grown dog will weigh from 5 pounds to 100 pounds because weight is determined entirely by diet.
- D. Each full-grown dog will weigh about 5 pounds, because they inherit half of their genetic material from each parent.

Question 4.

Genetic information is passed to offspring from parent(s). Because sexual reproduction involves two parents, the offspring have genetic variation. Draw a Punnett square to show what hair color variations would be possible if one genetic parent had brown hair (Bb) and the other genetic parent had blonde hair (bb). Write the four outcomes in a list.



Question 5.

Nick conducted an investigation using young tomato plants grown in a greenhouse. All of the plants were the same species and, at the start of the investigation, the same size. Some of the tomato plants in the greenhouse were shaded. Other plants, forming a control group, were in sunlight. The number of plants per square meter of soil were the same for both groups. Over a period of 90 days, some plants from each group were harvested, and then dried to provide a more accurate measure of growth. The dry mass of tomato plants per square meter of soil was measured for both groups.

The table shows the data from Nick's investigation.

Number of Days	Dry Mass of Tomato Plants (g/m ²)	
	Control	Shaded
15	160	160
28	200	165
32	250	200
40	330	275
48	400	315
52	550	460
61	640	500
74	660	600
89	1000	750

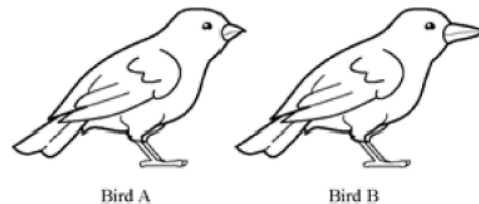
Based on this evidence, which statement best explains the differences in the growth of the two groups of tomato plants?

- A. The differences are almost entirely due to genetic factors.

- B. Being shaded turns on genes inside tomato plants that cause the plants to make more stems and leaves.
- C. Exposure to sunlight affects helps tomato plants reproduce more quickly, which increases the number of plants per square meter.
- D. Shade is an environmental factor that affects plant growth.

Question 6.

Bird A has the genotype *ll* for bill length, and Bird B is *LL*. The bills of their offspring would be:



- A. long in 100% of the offspring.
- B. short in 100% of the offspring.
- C. long in 50% of the offspring.
- D. short in 75% of the offspring.

Question 7.

The mating season for white-tailed deer is just two to three months long. Male deer grow antlers before each breeding season. They use their antlers to fight each other to establish dominance in bachelor herds and earn the right to mate with certain females.

Scientists claim that this aggressive behavior increases the chances of successful reproduction for the entire deer population.

Which statement best supports this claim?

- A. Healthier male deer are able to grow larger antlers.
- B. Healthier males are better able to protect their young.
- C. This behavior extends the length of the mating season.
- D. This behavior gives healthier males a better chance to mate.

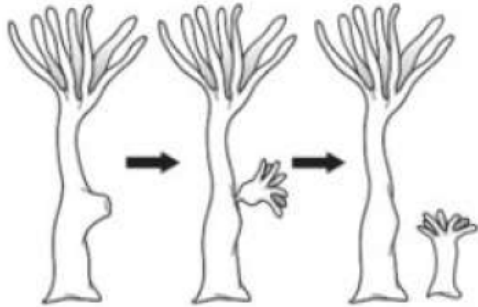
Question 8.

Organisms that result from sexual reproduction are _____ their parents.

- A. different from
- B. the exact same as
- C. similar to
- D. not at all similar to

Question 9.

A hydra is a freshwater, multicellular organism related to jellyfish. The diagram shows one hydra during three stages of reproduction.



Martin claims that the diagram is a model of asexual reproduction. Describe the evidence in the diagram that supports or does not support Martin's claim.

Question 10.

In 1986, a meltdown of a nuclear reactor in the city of Chernobyl, in Ukraine, released highly radioactive chemicals into the atmosphere. As a result, people suffered various forms of cancer because of exposure to these radioactive chemicals. Cancerous cells divide much more often than noncancerous cells and form tumors in the body. A scientist claims that these cancers were caused by harmful mutations. He wants to make a model to support his claim. Which statement best describes what the scientist's model needs to represent in order to support his claim?

- A. The radioactive chemicals burned people's skin, which increased cell division rates in the people who developed cancer.
- B. The radioactive chemicals polluted people's food, which changed some people's ability to digest proteins and caused cancer.
- C. The radioactive chemicals caused structural changes in people's genes, which changed how proteins functioned in cell division.
- D. The radioactive chemicals polluted people's drinking

water, which caused cells to divide more quickly in the people's bodies and form tumors.

Question 11.

You can feel the prick of a pin because specialized nerve cells in the skin rely information to your _____.

- A. brain
- B. finger
- C. eyes
- D. spinal cord

Question 12.

Choose the correct order of events for the picture.



- A. Receptors in your hand detect the heat and send signals to the spinal cord. You feel pain. Nerve signals travel from your spinal cord to your arm muscles and you pull your hand away. Nerve signals travel from the spinal cord to the brain.
- B. Receptors in your hand detect the heat and send signals to the spinal cord. Nerve signals travel from your spinal cord to your arm muscles. Nerve signals travel from the spinal cord to the brain. You feel pain and you pull your hand away.
- C. Receptors in your hand detect the heat and send signals to the spinal cord. Nerve signals travel from

your spinal cord to your arm muscles and you pull your hand away.

Nerve signals travel from the spinal cord to the brain.

You feel pain.

- D. Receptors in your hand detect the heat and send signals to the spinal cord. Nerve signals travel from the spinal cord to the brain. Nerve signals travel from your spinal cord to your arm muscles. You feel pain and you pull your hand away.

Question 13.

Which of the following is NOT a disadvantage of asexual reproduction?

- A. do not need a mate
- B. little genetic variation
- C. mutations can occur
- D. all susceptible to same disease

Question 14.

Which behavior, carried out by horses, elephants and many other animals, helps offspring survive?

- A. herding
- B. nest building
- C. courtship
- D. imprinting

Question 15.

Which would provide the most reliable data about the genetic factors that affect plant growth?

- A. two plants of different species grown in the same conditions
- B. three plants of different species, each given a different amount of light
- C. one plant grown in ideal environmental conditions
- D. two plants of the same species grown in the same environmental conditions

Question 16.

Which is an example of an animal behavior that directly affects plant reproduction?

- A. birds building a nest using twigs
- B. squirrels burying nuts
- C. ducks hiding in predators in marsh grass
- D. horses moving in a herd over prairie grass

Question 17.

What is detected by chemoreceptors?

- A. tastes
- B. sounds
- C. odors
- D. both A and C

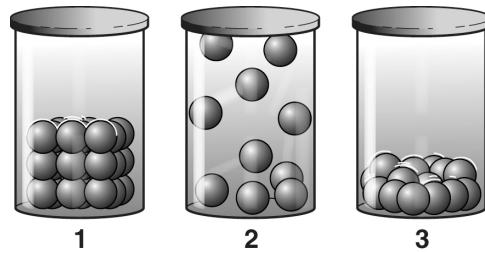
Question 18.

Of the following, which is NOT a sense organ?

- A. eyes
- B. ears
- C. tongue
- D. intestine

Question 19.

The diagram shows molecules of water in three different phases.

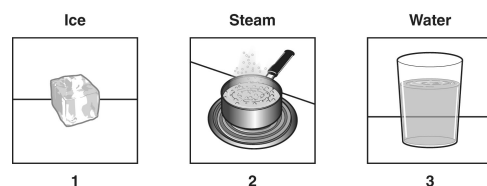


What BEST represents the phases of water from 1 to 3?

- A. solid, gas, liquid
- B. gas, solid, liquid
- C. liquid, gas, solid
- D. gas, liquid, solid

Question 20.

The motion of atoms is affected by temperature. The pictures show water at three different temperatures.



Which order of the pictures indicates decreasing motion of atoms?

- A. 1, 2, 3
- B. 2, 3, 1
- C. 3, 2, 1
- D. 1, 3, 2