Tennessee Comprehensive Assessment Program (TCAP) Grade 6 Practice Items

The picture shows a diver standing on a platform high above a pool. The diver will spring off the platform and travel down toward the pool.

Which statement **best** describes an energy transformation as the diver leaves the platform and travels toward the pool?

A. The diver has kinetic energy while standing on the platform that transforms into potential energy as she travels toward the pool.

B. The diver has kinetic energy while standing on the platform that transforms into mechanical energy as she travels toward the pool.

C. The diver has potential energy while standing on the platform that transforms into chemical energy as she travels toward the pool.

D. The diver has potential energy while standing on the platform that transforms into kinetic energy as she travels toward the pool.

Freshwater jellyfish are an invasive species in Tennessee. These small, see-through organisms can be found in many freshwater ecosystems across the state. The jellyfish eat large quantities of zooplankton. Jellyfish can be spread by attaching themselves to boats. People are working to stop the spread of these jellyfish in lakes and rivers in Tennessee.

Which **two** solutions would **best** help stop the spread of the freshwater jellyfish and how would the solution affect zooplankton populations?

- [ ] A. **Solution:** Require boats to be cleaned before they are used in different lakes.
  Effect on Zooplankton: Jellyfish will not spread to other lakes.

- [ ] B. **Solution:** Require boats to be cleaned before they are used in different lakes.
  Effect on Zooplankton: Populations will decrease because jellyfish feed on them.

- [ ] C. **Solution:** Require people to have a license to drive a boat in lakes.
  Effect on Zooplankton: Populations will be more stable because jellyfish do not feed on them.

- [ ] D. **Solution:** Require boats to be cleaned before they are used in different lakes.
  Effect on Zooplankton: Populations will increase because there will be fewer jellyfish to feed on them.

- [ ] E. **Solution:** Require people to have a license to drive a boat in lakes.
  Effect on Zooplankton: Populations will decrease because jellyfish feed on them.

Objects with different masses are released from the edge of a table and fall to the floor at the same time. The calculated kinetic energy results are shown in the table.

Object	Kinetic Energy (Joules)
1	5.5
2	12.1
3	8.3

Which statement **best** compares the masses of the objects?

- A. Object 1 has the largest mass.
- B. Object 3 has the smallest mass.
- C. Object 2 is more massive than Object 3.
- D. Object 3 is less massive than Object 1.

Emerald Ash Borer – Part 1

The emerald ash borer is a beetle originally found in Asia. It was first discovered in the United States in Michigan in July 2002. The beetle likely came into the United States in wooden packing material imported from Asia. Since 2002, the beetle has spread throughout major portions of the United States as shown on the map. The beetle lives in young ash trees in the United States.

Current Beetle Habitat in the United States

Key
Beetle habitat
Non-beetle habitat

In Asia the emerald ash borer is considered a minor threat to hardwood trees. These beetles inhabit only weakened or damaged trees. The beetle damages trees by boring a hole and laying eggs under the bark of the tree. The larvae of the beetle cause further damage by boring more paths through the inner bark layers and feeding on the inner plant tissue. This reduces the ability of the tree to transport water and nutrients to its upper layers. Months later, the mature beetles bore their way back out through the bark. This damage can destroy the tree within a few years of infestation. Because much of the damage occurs beneath the bark, it can be very difficult to detect the beetle. In Asia there are types of wasps that lay their eggs within the beetle. The hatched larvae eventually eat the beetle.

In both Asia and the United States there are other beetle species that also live in ash trees.

Why is the emerald ash borer able to spread more easily in the United States than it does in Asia?

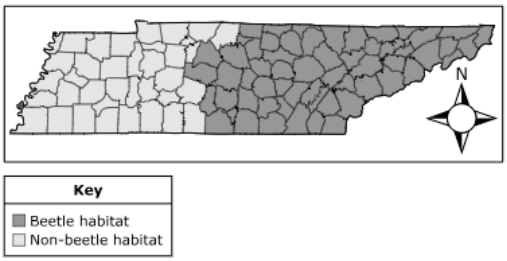
- A. In the United States there are fewer predators for the emerald ash borer than there are in Asia.
- B. In Asia the emerald ash borer competes with more beetles than it does in the United States.
- C. In the United States the emerald ash borer competes with more beetles than it does in Asia.
- D. In Asia there are fewer predators for the emerald ash borer than there are in the United States.

As the number of ash trees that are destroyed by the emerald ash borer increases, a likely effect will be

- A. decreased competition with other beetles that lay eggs in ash trees.
- B. increased predation from natural predators of the emerald ash borer.
- C. decreased predation from natural predators of the emerald ash borer.
- D. increased competition with other beetles that lay eggs in ash trees.

Emerald Ash Borer – Part 2

In Tennessee, the emerald ash borer was first seen in July 2010. It has been found in many counties within Tennessee as shown on the map.



In the United States the wasps that prey on the emerald ash borer are not naturally present. Also, the ash trees in the United States do not have any natural resistance to the beetle. Much of the treatment for the beetle involves quarantining wood from an affected area by not allowing firewood and other wood products to be transported to an area where the beetle is not present. Another form of treatment involves using pesticides to reduce the beetle population. A more recent treatment involves introducing some of the Asian wasps that lay their eggs in this beetle into the United States.

Humans introduced the emerald ash borer into the United States.

Which of these is a benefit of introducing the Asian wasps?

- A. The wasps would be able to control the emerald ash borer without the need for pesticides that might affect other insects.
- B. The wasps would feed on the adult beetles and would not affect the larvae of the emerald ash borer.
- C. The wasps would be easy to monitor to ensure that they appear only where they are released.
- D. The wasps would be unaffected by any use of pesticides.

Another solution considered by state officials is spraying pesticides on ash trees before the beetles have infested them. Which statement describes a disadvantage of this solution?

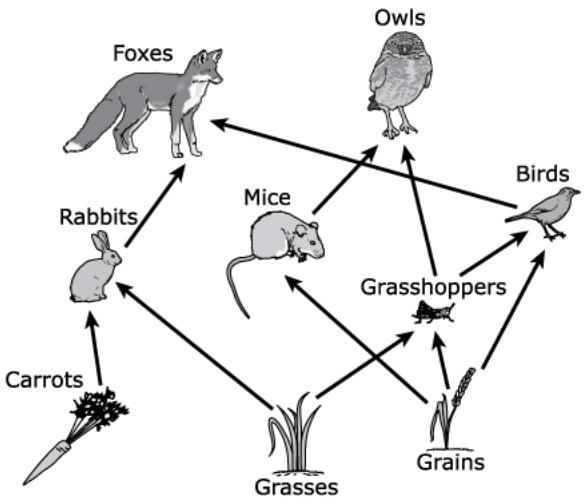
- A. The ash tree species is hard to identify.
- B. Every ash tree would have to be located and sprayed.
- C. The beetle prefers only old ash trees.
- D. Ash trees have to be sprayed only once every three years.

Some coastal communities have installed wind turbines along shoreline cliffs to collect wind energy.

Which of these is a disadvantage of the installation and use of wind turbines?

- A. reduction in available solar energy
- B. elimination of water waste
- C. physical obstacles for migrating birds
- D. reduction in the use of fossil fuels

The food web shows some feeding relationships in an ecosystem.



Which **three** statements summarize how the ecosystem would be affected by pests that attack grains?

- [ ] A. The population of mice would decrease.
- [ ] B. The fox population would not be affected.
- [ ] C. There would be less food for grasshoppers.
- [ ] D. The population of rabbits would increase.
- [ ] E. The bird population would decrease.

The table lists three operations of a car when the driver performs certain actions.

Operations of a Car

1.	Accelerating when the gas pedal is pressed firmly
2.	Slowing down when the gas pedal is released
3.	Stopping when the brake pedal is pressed

Each operation listed in the table involves changes in

A. kinetic energy.

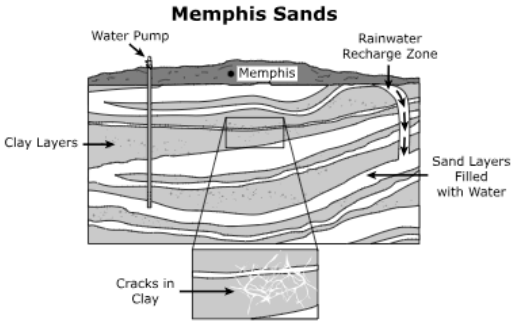
B. nuclear energy.

C. potential energy.

D. chemical energy.

Memphis Sands – Part 1

In western Tennessee, the major source of drinking water comes from the Memphis Sands. The Memphis Sands are layers of sand underground that hold water. These sand layers are surrounded by clay layers above and below. The trapped water is called the Memphis Sands Aquifer. The diagram shows the aquifer.



The majority of the water within the Memphis Sands has been there more than 2,000 years. Recently, however, researchers have discovered that an increasing amount of the water has been there 13 years or less. This newer water contains more pollutants than normal and enters the aquifer through cracks in the clay layers. As more water is pumped out of the aquifer, the newer water increasingly takes the place of the older water. The older water in the aquifer comes from recharge zones where rainwater enters the ground. Here, rain travels underground through sand that filters it clean. Over time, the aquifer water level has changed. For example, in the 1920s the water level in one well was 70 feet below the surface. Years later, the level of this same well dropped to 140 feet below the surface. In 2010, the well rose again to 100 feet below the surface.

The aquifer formed when layers of sand sank down into a depression and were later covered with clay.

Which statement **best** explains the presence of newer water in the aquifer?

- A. Decreased rainfall east of Memphis allows water to enter the aquifer quickly.
- B. Cracks in the clay allow water to enter the aquifer quickly.
- C. The aquifer sands are changing in composition, allowing water to enter the aquifer quickly.
- D. Rising of the aquifer surface level allows water to enter the aquifer quickly.

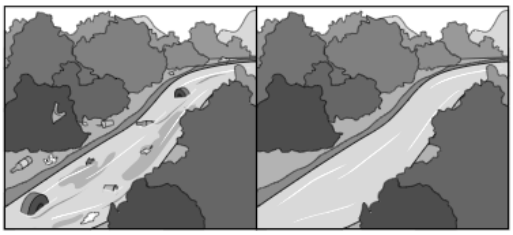
How do sand layers in the aquifer benefit humans and the water supply?

- A. The sand layers contain the newest water.
- B. The sand layers prevent water from evaporating.
- C. The water is usually found above the sand layers.
- D. The water is cleaned as it passes through the sand layers.

Memphis Sands – Part 2

Before the discovery of the Memphis Sands, one of the main sources of drinking water was the Wolf River. This river flows through the city of Memphis. The river has long been used for transportation, recreation, and as a source of water for drinking. The area around the river has a natural floodplain and a habitat for diverse wildlife. In the early days of Memphis, the Wolf River was polluted as industry poured waste into the river. By the 1960s, the river had been significantly damaged by pollution and erosion. The floodplains around the river were so damaged that the river was re-channeled by the Army Corps of Engineers. In recent years, the Wolf River conservation effort has been launched. This cleanup project's goal is to protect the river from future pollution and sedimentation.

Wolf River Cleanup



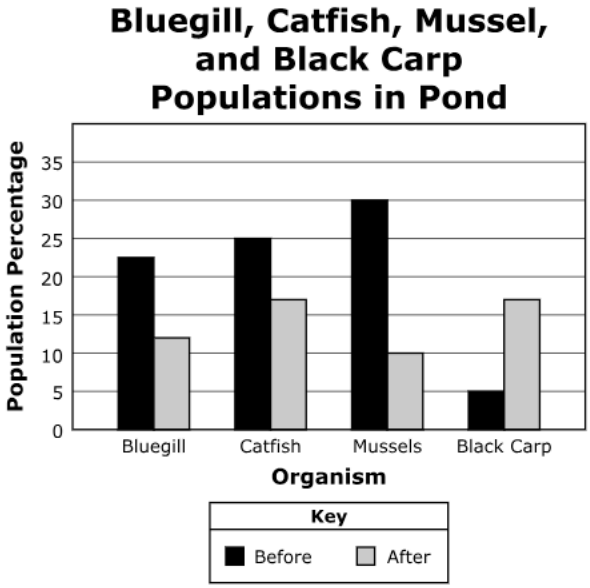
One way to measure the success of the river recovery effort is to study the increase in the

- A. number of species present in the river.
- B. speed of the current of the river.
- C. use of recreational boats on the river.
- D. number of structures built along the river.

Which factor is **most likely** to harm the Wolf River?

- A. restricting soil erosion
- B. reducing runoff from other sources
- C. removing trees and plants near the river
- D. limiting the release of chemicals into the river by factories

A small pond has catfish, bluegill, and mussels. More catfish are added and black carp are introduced to the pond to increase the stock for fishing. Mussels are a food source for both the catfish and black carp. A few months later, the populations of the catfish, bluegill, and mussels have decreased while the population of the black carp has increased.



Which statement identifies a solution to the changing populations in the pond?

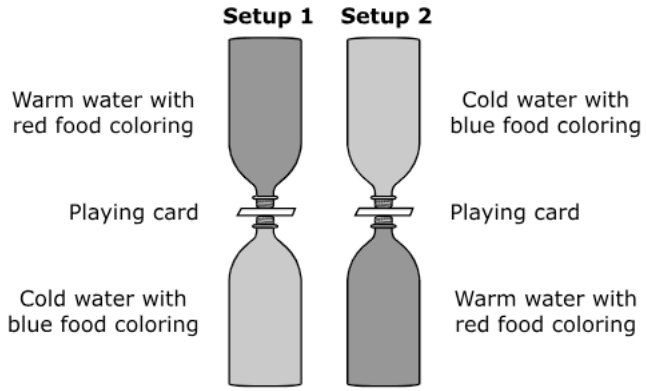
A. Remove the catfish so that the black carp population will decrease.

B. Add more mussels so that the black carp and catfish will have more food.

C. Remove the black carp so that the catfish and mussel populations will increase.

D. Add more bluegill so that the black carp population will not change but the pond will have more fish.

Students designed a lab to study how temperature affects ocean currents. Sketches of their setups are shown.



The students lined up the openings of the top and bottom bottles. They pulled out the playing cards. They then slowly let the water from the top bottle flow into the lower bottle and recorded their observations in the table.

Setup 1	Setup 2
The warm water stays mostly on top of the cold water.	The cold water sinks and mixes with the warm water.

Which **two** conclusions about Earth's ocean currents can the students reach from this lab?

- [ ] A. Temperature difference between air and deep water moves deep ocean currents.
- [ ] B. Surface currents will be warmer than deep water currents.
- [ ] C. When surface water in the ocean cools, it sinks and creates currents.
- [ ] D. Ocean currents must flow in a downward direction.
- [ ] E. The smaller the water temperature difference, the faster the ocean currents move.

Which farming practice allows a farmer to **best** maintain the long-term health of the ecosystem in which the crops grow?

- A. irrigating the fields with large volumes of water to clear the top layer of soil
- B. introducing a predator species to reduce the population of herbivores
- C. applying chemical fertilizer to the fields to increase crop productivity
- D. rotating the fields to help prevent the depletion of minerals in the soil

Students research the effect of a drought over the last 100 years on an ecosystem.

Which **three** types of data should students collect to identify how drought can affect an ecosystem?

- [ ] A. the barometric pressure of the atmosphere
- [ ] B. the types of animals in the area
- [ ] C. the height changes of native plants
- [ ] D. the local average wind speed
- [ ] E. the number of different organisms in the soil