Learning Target: I can read a passage to learn about kinetic and potential energy and then use the information gathered to answer multiple choice comprehension questions.

8th Grade Science Kinetic and Potential Energy Reading for Meaning

"The Roller Coaster of Energy"

At the top of "Thunder Peak," the tallest roller coaster in Georgia, riders feel the slow climb as the chain pulls the cars upward. Each click of the chain adds more **gravitational potential energy** to the cars because of their increasing height above the ground. When the coaster pauses for a brief moment at the top, that stored energy is ready to be released.

As soon as the cars begin their descent, the potential energy rapidly transforms into **kinetic energy**—the energy of motion. The coaster speeds downward, converting nearly all the potential energy into kinetic energy as it races toward the bottom. The faster the cars move, the greater the kinetic energy they possess. At the bottom, riders feel the rush of motion—but not all the energy is perfectly transferred.

Some energy is **lost to friction and air resistance**. The wheels rubbing against the track and the air pushing against the cars transform part of the system's energy into **thermal energy** and **sound**. Engineers use this knowledge to design smoother tracks, better bearings, and aerodynamic cars that minimize energy loss and maintain speed.

As the coaster climbs the next hill, its kinetic energy decreases while potential energy increases again. This constant transformation between potential and kinetic energy demonstrates one of the most important laws in science: **the Law of Conservation of Energy**—energy cannot be created or destroyed, only changed from one form to another.

In daily life, similar energy transformations occur everywhere. A basketball held above the ground has gravitational potential energy; when dropped, it converts that stored energy into kinetic energy. A stretched rubber band stores **elastic potential energy**, which becomes kinetic when released. Even chemical potential energy stored in food fuels your body's motion when converted into kinetic energy as you run, jump, or climb.

Understanding how energy transforms helps scientists and engineers design more efficient machines—from electric cars to wind turbines—ensuring that the maximum amount of energy goes into useful work rather than being lost to the environment.

DOK 3–4 Level Multiple Choice Questions

1. When the roller coaster car reaches the top of "Thunder Peak," which statement best explains why it has maximum potential energy?

A. Its velocity is greatest at the top.
B. It has more mass at higher altitudes.
C. Its height above the ground is greatest, increasing gravitational potential energy.
D. It has used up all of its kinetic energy.

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2. As the coaster moves down the first hill, which best describes the *energy transformation* that occurs?

A. Kinetic → Thermal → Potential
B. Potential → Kinetic → Thermal
C. Chemical → Kinetic → Sound
D. Thermal → Chemical → Mechanical

3. Which evidence from the passage best supports the Law of Conservation of Energy?

A. "Riders feel the slow climb as the chain pulls the cars upward."
B. "The faster the cars move, the greater the kinetic energy they possess."
C. "Some energy is lost to friction and air resistance."
D. "Energy cannot be created or destroyed, only changed from one form to another."

4. Engineers redesign the roller coaster to reduce air resistance. Which *result* would best demonstrate successful energy conservation?

A. The coaster makes louder sounds during descent.
B. The coaster's speed increases because less energy is lost as heat.
C. The coaster loses more energy as potential energy.
D. The coaster stops sooner due to friction.

5. Compare the basketball and roller coaster examples. What key similarity do they share about energy transformation?

A. Both show energy being destroyed at the end of motion.
B. Both transform stored potential energy into kinetic energy when released.
C. Both rely on chemical potential energy for movement.
D. Both maintain constant potential energy throughout motion.

6. A student argues that when the coaster reaches the bottom, all its energy has been converted to kinetic energy. Why is this incorrect?

A. The coaster has no kinetic energy left.
B. Some energy has been transformed into thermal and sound energy due to friction.
C. The coaster's mass increases at lower elevations.
D. The coaster loses potential energy forever.

7. Which scenario best models *elastic potential energy* similar to the rubber band example?

A. A battery powering a flashlight.
B. A stretched bow before releasing an arrow.
C. A falling book hitting the ground.
D. A spinning turbine generating electricity.

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8. A scientist designs a simulation showing how potential energy changes to kinetic energy as height changes. Which variable must remain constant to test only the effect of height?

A. The mass of the object
B. The surface friction
C. The air temperature
D. The shape of the object

9. Based on the passage, what would happen to total energy in the roller coaster system if friction were completely eliminated?

A. The coaster would lose energy faster.
B. The total energy would remain constant and perfectly transfer between potential and kinetic.
C. The coaster would create new energy at the top of each hill.
D. The total energy would increase each time the coaster descended.

10. Which claim best synthesizes the passage's central idea about energy transformations?

A. Machines can create new energy to move efficiently.
B. Energy is always lost when objects move.
C. Energy continuously changes form, but the total amount of energy in a system remains constant.
D. Potential energy exists only in objects that move quickly.