Learning Target (S8P5.a): I can read a passage and answer questions to support the claim that electric fields exist between objects exerting forces on each other even the objects are not in contact.

FSI 8th Physical Science Reading for Meaning: Electricity & Electric Fields

Electric forces influence objects even when they are not touching. An electric field surrounds any object with an electric charge. This field represents the region where another charged object would experience a force. When two charged objects enter each other's electric fields, they interact—either attracting or repelling depending on their charges.

For example, rubbing a balloon on hair transfers electrons, giving the balloon a negative charge. When the balloon is brought near a wall, it causes electrons in the wall to shift slightly. This separation of charges in the wall—called induction—creates an attractive force, allowing the balloon to stick without touching. This shows that electric fields extend into the space around charged objects.

The strength of an electric field depends on the amount of charge and the distance from the charged object. A larger charge produces a stronger field. However, the strength decreases rapidly with distance. This is why you might feel a shock when you touch a metal doorknob after walking across carpet—the electric field was strong enough to allow electrons to jump to or from your hand.

Many technologies rely on electric fields. Capacitors store electric energy by separating charges across thin insulating materials. Lightning is another example: electric fields build between clouds and the ground until they become strong enough to create a massive electric discharge. Understanding electric fields helps explain everyday phenomena and supports the development of important technologies.

1. Based on the passage, what evidence best supports the idea that electric fields exist even when objects are not in contact? (DOK 3)

A. The balloon sticking to a wall after being rubbed on hair.
B. The doorknob shock after walking across carpet.
C. The fact that electric fields weaken over distance.
D. The shift of electrons inside a wall when a balloon is near.

2. A student rubs a plastic rod with wool and brings it near small pieces of paper. The paper jumps toward the rod before touching it. What is the best explanation? (DOK 3)

A. The rod creates a magnetic field that pulls the paper.
B. The electric field of the charged rod exerts a force on the neutral paper.
C. Airflow caused by rubbing pushes the paper.
D. The paper becomes heavier when charged.

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3. Which scenario most clearly demonstrates electric induction as described in the passage? (DOK 3)

A. A metal spoon heating up in boiling water.
B. Electrons shifting inside a wall when a charged balloon is nearby.
C. A magnet attracting iron filings.
D. A wire glowing when electric current flows.

4. According to the passage, why does the electric field strength decrease with distance? (DOK 3)

A. Because electric fields only work in conductors.
B. Because charges disappear as they move through space.
C. Because the influence of a charge spreads out over a larger area.
D. Because electric fields only interact with negative charges.

5. A researcher increases the amount of charge on a metal sphere. How will this change the electric field around it? (DOK 3)

A. The electric field will weaken.
B. The electric field will remain unchanged.
C. The electric field will strengthen.
D. The electric field will stop interacting with other objects.

6. A student argues that a balloon sticking to a wall proves that the wall must be electrically charged. Based on the passage, how would you respond? (DOK 4)

A. The wall must have had a positive charge before the balloon touched it.
B. The balloon's electric field shifted charges in the wall, creating attraction.
C. Gravity pulls the balloon toward the wall.
D. The wall becomes magnetized when the balloon gets close.

7. How does the passage connect electric fields to real-world technological applications? (DOK 3)

A. By showing that electric fields are too weak for technology.
B. By giving examples of lightning and capacitors that rely on electric fields.
C. By explaining how electric motors spin.
D. By describing magnetic forces in electrical circuits.

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8. A person feels a shock when touching a doorknob after walking on carpet. Which reasoning best explains this event? (DOK 3)

A. The person's hand generates a magnetic force.
B. The doorknob heats up due to friction.
C. The electric field allowed electrons to move between the person and the doorknob.
D. The carpet releases moisture that transfers energy.

9. Which claim is best supported by the examples provided in the passage? (DOK 3)

A. Electric fields only exist in thunderstorms.
B. Electric fields cannot affect neutral objects.
C. Electric fields can exert forces over a distance.
D. Electric fields require physical contact to operate.

10. Evaluate the importance of electric fields in both natural and engineered systems using evidence from the passage. (DOK 4)

A. They are only important for creating lightning.
B. They only apply to charged metal objects.
C. They help explain both natural events and modern technologies.
D. They prevent electric charges from interacting.

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