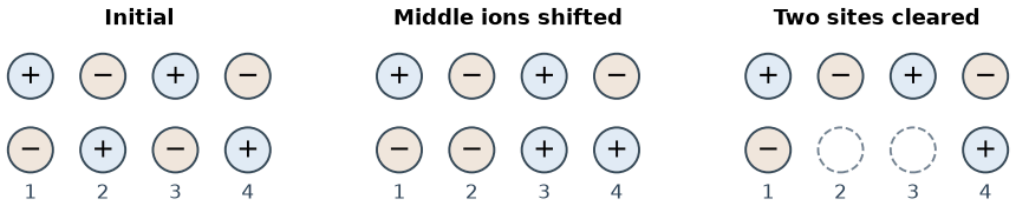
Repairing a Shifted Ionic Layer

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A display models two adjacent rows of ions. Each positive or negative ion has one unit of charge. Opposite charges attract and like charges repel at facing positions. The display swaps two adjacent ions in the lower row and then clears those two sites so a student can repair the arrangement.



Three arrangements of the same two rows. Dashed circles mark empty sites.

1 Which view has two repelling facing pairs and two attracting facing pairs?

(1) Initial

(2) Middle ions shifted

(3) Two sites cleared

(4) All three

2 Explain why the lower row has the same total charge before and after the middle ions shift even though some interactions change. [1]

Answer and work

For the repair, the class has one positive ion and one negative ion to insert into the two cleared sites.

3 State which sign to put at each cleared site to restore attraction at all four positions. Explain why placing the two ions in the reverse order would fail. [1]

Answer and work

A second display starts with the repaired rows. It moves both repeating rows one position to the right together.

4 Predict how many of the four facing pairs still attract after both rows move. Explain using their relative positions. [1]

Answer and work