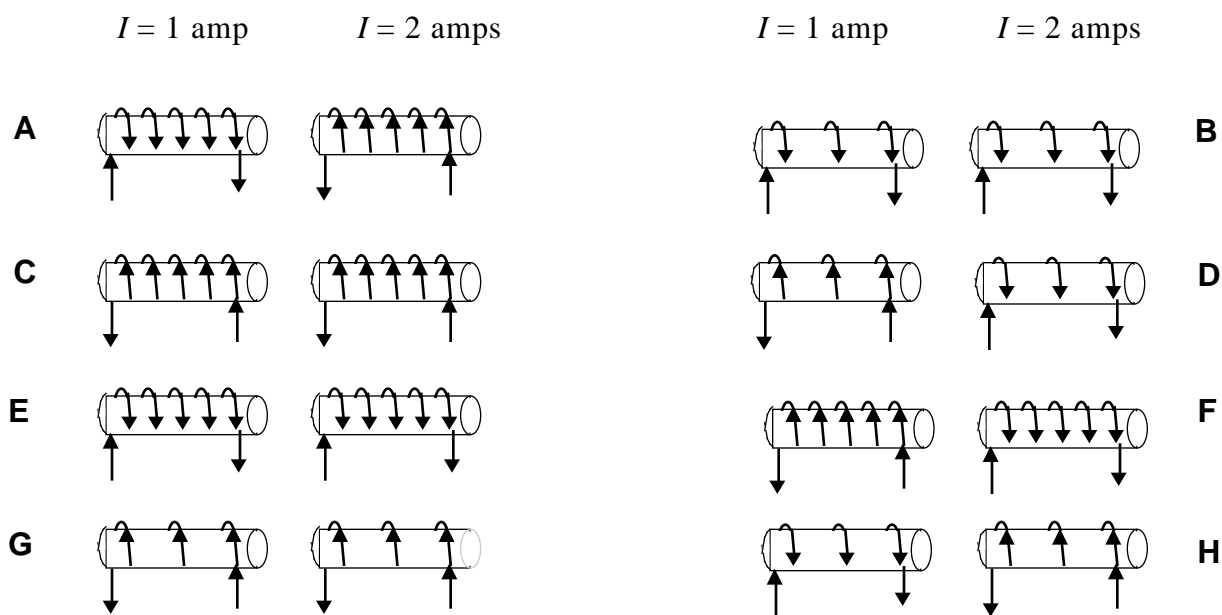


Electromagnets with Unequal Currents—Magnetic Field Between¹⁸⁹

Eight pairs of electromagnets are shown below. The current in the left electromagnet is one amp and the current in the right one is two amps in each case. They are also separated by the same distance, and they have the same length and diameter. Carefully observe the orientation of the coil and direction of current flow.

Rank the magnetic fields at the midpoints between the electromagnets from the largest to the smallest. (The direction to the right is positive, and $-5 < -3$.)



Largest 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____ Smallest

Or, the magnitude of the magnetic field is the same but not zero for all eight pairs. _____

Or, the magnitude of the magnetic field is zero for all eight pairs. _____

Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed

Sure

Very Sure

1 2 3 4 5 6 7 8 9 10

¹⁸⁹ B. Emerson, C. Hieggelke