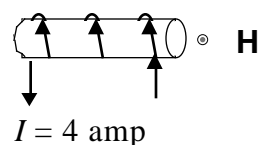
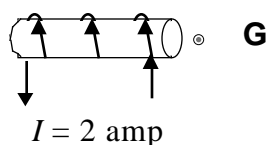
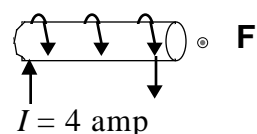
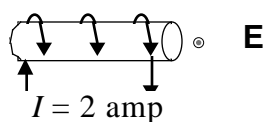
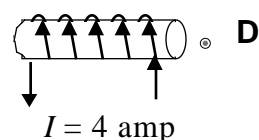
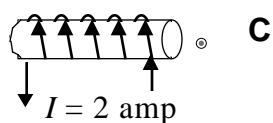
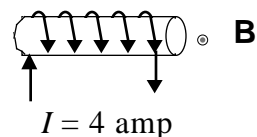
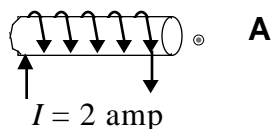


Unequal Current Electromagnets—Magnetic Field at Ends¹⁸⁸

Eight electromagnets are shown below. The current in each electromagnet is indicated in the diagram as well as the number of turns. They have the same length and diameter. Carefully observe the orientation of the turns and direction of current flow in the coil.

Rank the magnetic field just outside the right end of the electromagnet 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._____

Or, the magnitude of the magnetic field is zero.____

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

¹⁸⁸ B. Emerson, C. Hieggelke