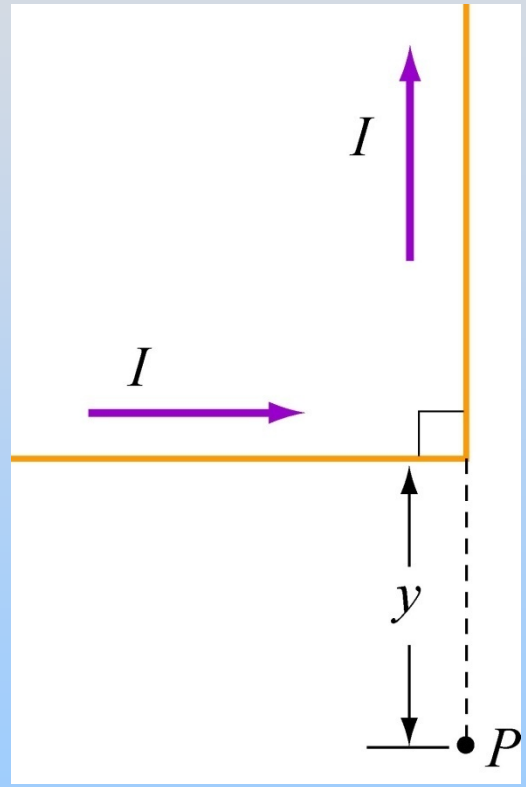
Concept Question: Biot-Savart

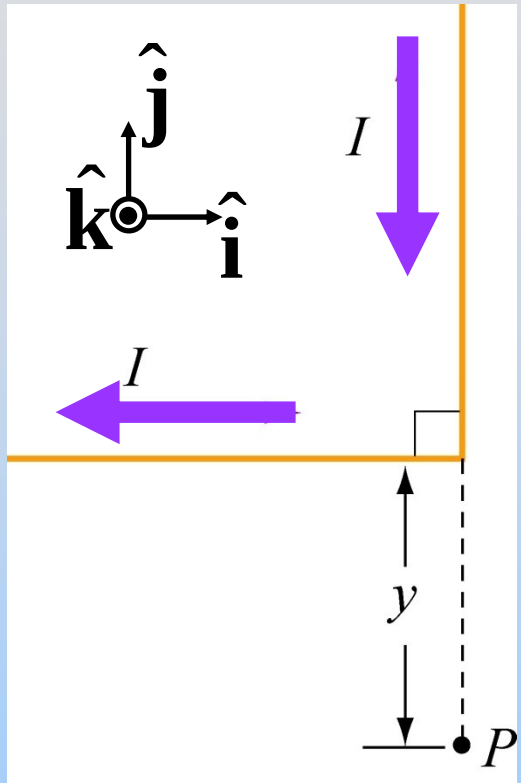
The magnetic field at P points towards the

1. +x direction
2. +y direction
3. +z direction
4. -x direction
5. -y direction
6. -z direction
7. Field is zero (so no direction)



Concept Question Answer: Biot-Savart

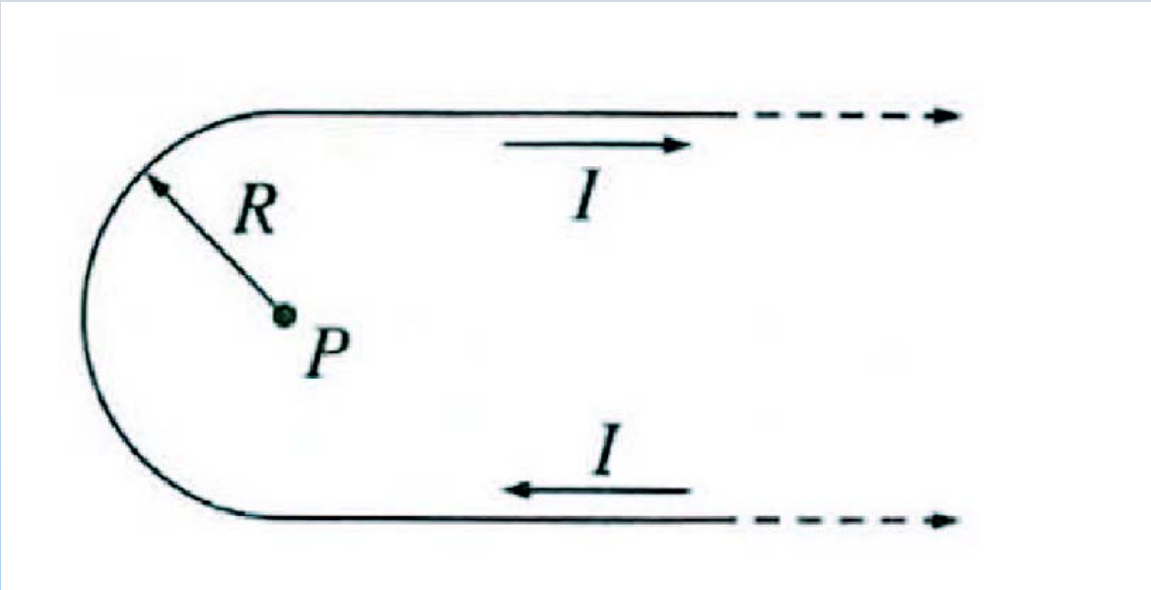
Answer: 3. B(P) is in the +z direction (out of page)



The vertical line segment contributes nothing to the field at P (it is parallel to the displacement). The horizontal segment makes a field out of the page.

Concept Question: Bent Wire

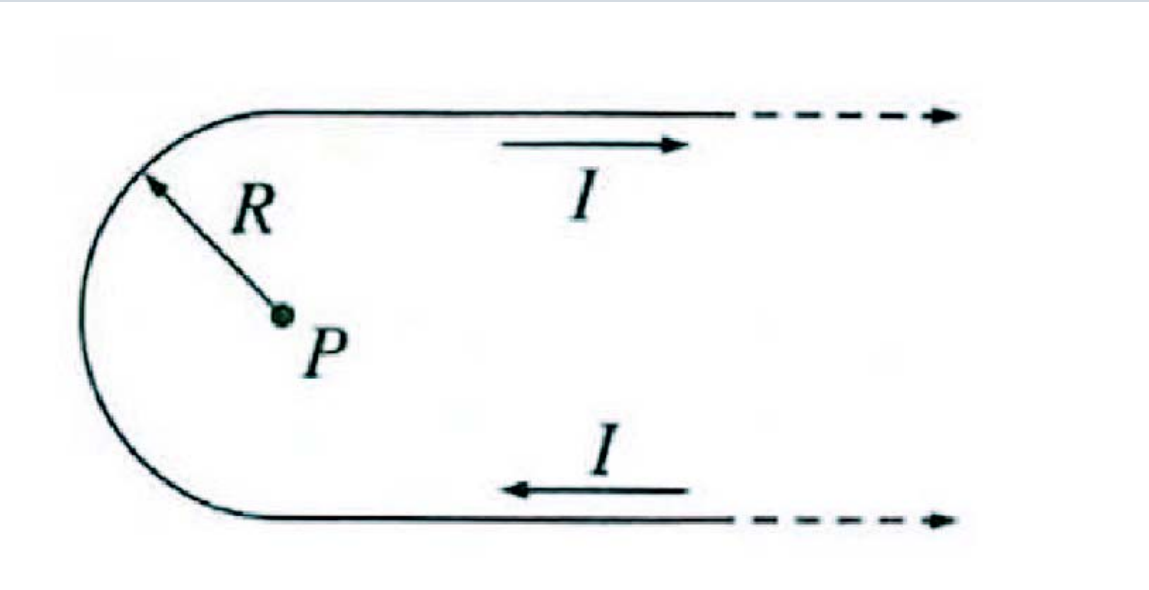
The magnetic field at P is equal to the field of:



1. a semicircle
2. a semicircle plus the field of a long straight wire
3. a semicircle minus the field of a long straight wire
4. none of the above

Concept Question Answer: Bent Wire

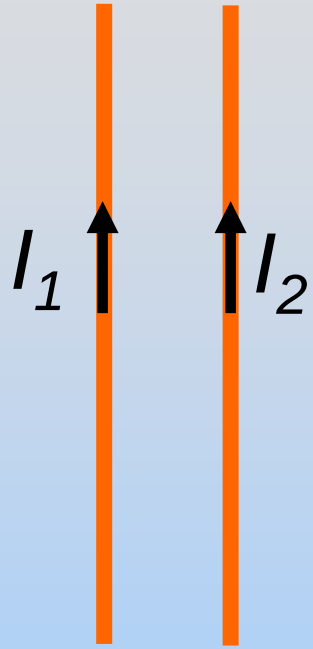
Answer: 2. Semicircle + infinite wire



All of the wire makes B into the page. The two straight parts, if put together, would make an infinite wire. The semicircle is added to this to get the complete field

Concept Question: Parallel Wires

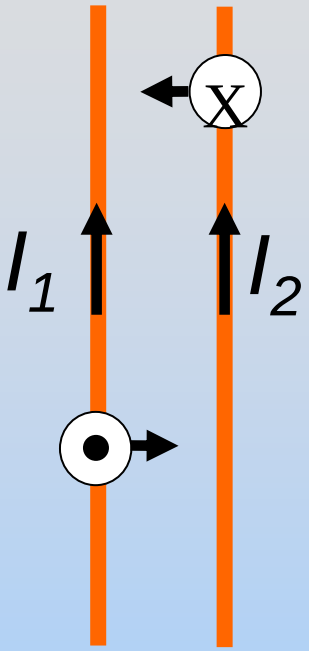
Consider two parallel current carrying wires. With the currents running in the same direction, the wires are



1. attracted (likes attract?)
2. repelled (likes repel?)
3. pushed another direction
4. not pushed – no net force
5. I don't know

Concept Question Answer: Parallel Wires

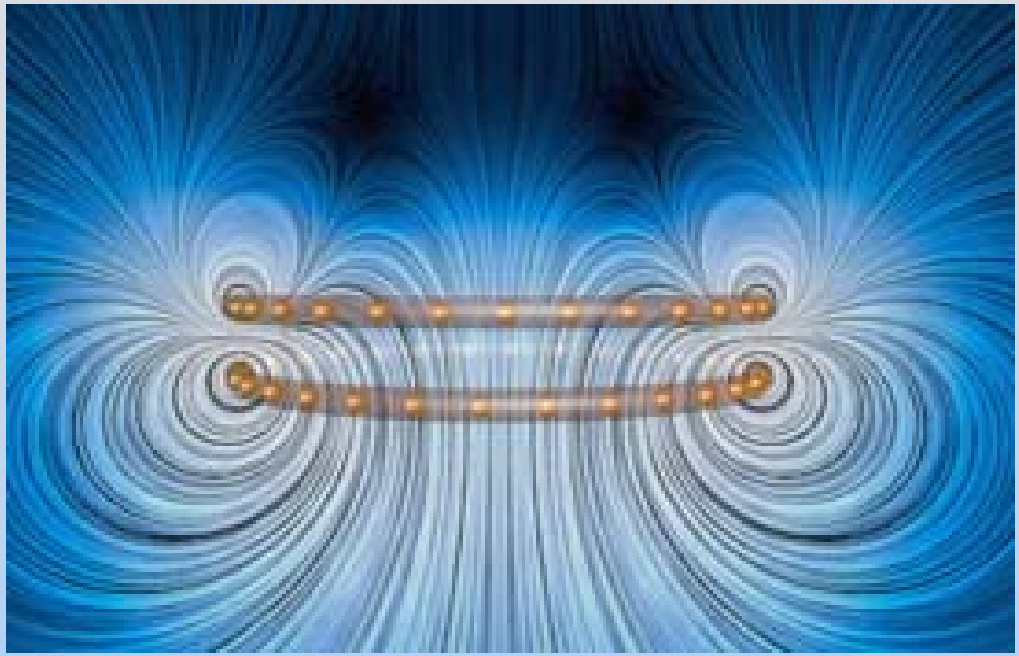
Answer: 1. The wires are attracted



I_1 creates a field into the page at I_2.
That makes a force on I_2 to the left.

I_2 creates a field out of the page at I_1.
That makes a force on I_1 to the right.

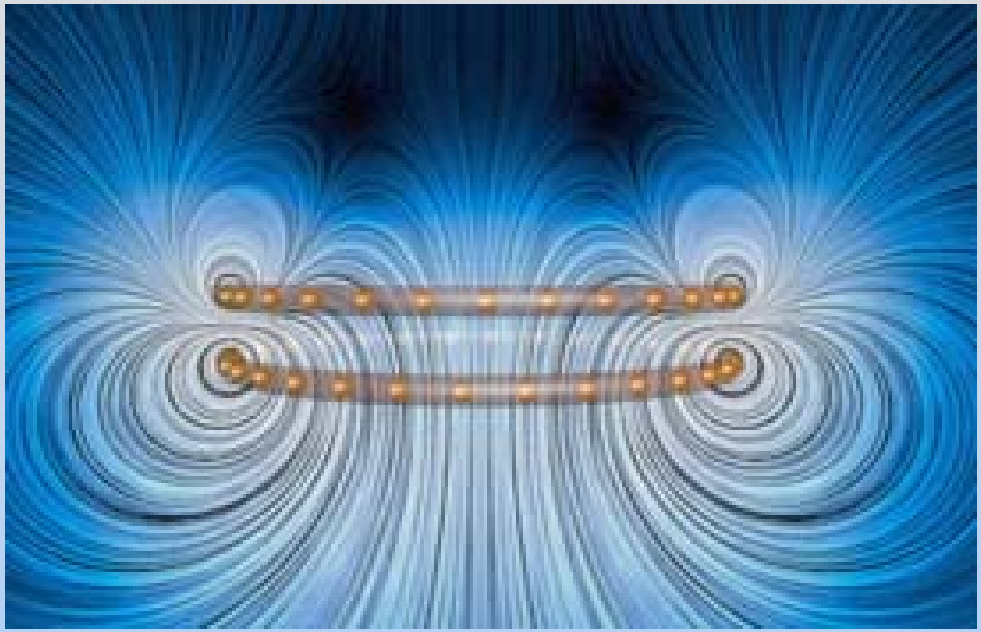
Concept Question: Current Carrying Coils



The above coils have

1. parallel currents that attract
2. parallel currents that repel
3. opposite currents that attract
4. opposite currents that repel

Concept Question Answer: I Carrying Coils



Link to animation

Answer: 4. Opposite currents that repel

Look at the field lines at the edge between the coils. They are jammed in, want to push out. Also, must be in opposite directions

8.02SC Physics II: Electricity and Magnetism

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