

38. The field at the center of the pipe (point  $C$ ) is due to the wire alone, with a magnitude of

$$B_C = \frac{\mu_0 i_{\text{wire}}}{2\pi(3R)} = \frac{\mu_0 i_{\text{wire}}}{6\pi R} .$$

For the wire we have  $B_{P, \text{wire}} > B_{C, \text{wire}}$ . Thus, for  $B_P = B_C = B_{C, \text{wire}}$ ,  $i_{\text{wire}}$  must be into the page:

$$B_P = B_{P, \text{wire}} - B_{P, \text{pipe}} = \frac{\mu_0 i_{\text{wire}}}{2\pi R} - \frac{\mu_0 i}{2\pi(2R)} .$$

Setting  $B_C = -B_P$  we obtain  $i_{\text{wire}} = 3i/8$  .