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FIGURE 12.24. (A) Meiosis in a diploid organism. First, the genome is copied to produce a $4n$ cell. Then crossing over occurs and cell division produces two $2n$ cells. These go through another round of division to produce haploid (n) gametes. (B) Recombination due to cross-over. One region of the genome is shown for a $4n$ cell. (Top) No cross-over; (bottom) a single cross-over. (C) Recombination due to segregation. A cross between gametes from two parents is shown. The assortment can be readily detected using a tester cross (not recombinants).