What are the products of the following resolutions of your Holliday junction model?

Cut on $y$ sites

Cut on $x$ sites

How do these sequences after Holliday junction resolution compare to the original, undamaged & unrepaired strands, shown here?
You are studying the gene products of two gene loci, *ALWC* and *NLWC*, separated by a few kb of intervening sequence. You've developed a heterodiploid strain of yeast that harbor two alleles at each locus: *yankees* or *astros* at the *ALWC* locus, and *dodgers* or *braves* at the *NLWC* locus. The blue sequence contains the allele combination *astros*/braves. The orange sequence contains the allele combination *yankees*/dodgers.

However, your cells were exposed to the toxin Angelonium, and suffered a double-stranded break between these loci, and needs to be repaired by DSBR.

1. What will be the “sequence” (i.e., color) of the repaired strands? (Be mindful of which sequences will be used as template!)

2. The repaired DNA will create two Holliday junctions: one close to the *ALWC* locus and one close to the *NLWC* locus. How each of these HJs is resolved will determine whether or not there is genetic crossover of the parental alleles. For each of the following combinations of resolutions at these two Holliday junctions, (1) identify the resulting allele combinations and (2) determine whether that is genetic crossover or non-crossover.

| ALWC / NLWC | (1) Genotypes | (2) Crossover? |
|--------------|---------------|---------------|
| HJ / HJ      |               |               |
| A. x / y     |               | Yes // No     |
| B. x / x     |               | Yes // No     |
| C. y / x     |               | Yes // No     |
| D. y / y     |               | Yes // No     |
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![Diagram of Holliday Junctions](image)

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