CONCEPT: MULTIPLE CROSS OVERS AND INTERFERENCE

● Mapping the loci of 3+ genes can be more difficult, because of multiple cross overs

□ Multiple crossovers occur when more than one crossover causes 2+ changes in the gamete genotype

EXAMPLE:

v+	ct	cv
v	ct+	cv+

v	ct	cv+
v+	ct+	cv

□ Calculate information on double cross overs by:

1. Double counting the double crossovers when calculating the RF for the genes of farthest distance

- This will help you accurately map the genes (Trihybrid cross)

● **Interference** is when crossovers in one region of the chromosome affects the chance of crossover in an adjacent region

□ Independent crossovers (meaning, no interference) can be calculated using the double recombination frequency

EXAMPLE: Double cross over calculation with no interference

1. If the frequency of crossing over is 20% for genes A and B, and 30% for genes B and C, what is the frequency of a double crossover between A and C?
   - (0.2 x 0.3) x 100 = 6%

□ If the calculated value does not equal the observed results, then that means interference is impacting the data

- Uses the **coefficient of coincidence**

$$I = 1 - \frac{\text{Observed frequency or \# of double recombinants}}{\text{Expected frequency or \# of double recombinants}}$$

EXAMPLE: Calculating the interference

Observed frequency: 4

Expected frequency: 6

1-(4/6) = 0.33 x 100 = 33%

□ Therefore, there were 33% fewer double crossovers occurred than expected

- Crossing over at one location, partially decreased the chance of crossover at an adjacent location

PRACTICE:

1. A female with the following genotype can produce a number of different gametes. Choose the gamete produced if no crossovers have occurred. Genotype = $\frac{a\ b\ +}{+\ +\ c}$
    a. a + c
    b. + b c
    c. a b +
    d. + b +

2. A female with the following genotype can produce a number of different gametes. Choose the gamete produced if a single crossover has occurred. Genotype = $\frac{a\ b\ +}{+\ +\ c}$
    a. + + c
    b. + b c
    c. a b +
    d. a b c