Branching Problem Set

1 Genes A and B are unlinked autosomal genes. In both cases, wild type is dominant to mutant (A>a and B>b). Determine the F2 phenotypic ratios using **GENOTYPIC** branching for the dihybrid cross **a x b**.

2 Genes A B and D are unlinked autosomal genes. In both cases, wild type is dominant to mutant (A>a and B>b D>d). Use branching to determine the F2 **phenotypic** ratios for the trihybrid cross **ab x d**.

3 Genes A B and F are unlinked autosomal genes. For A and B, wild type is dominant to mutant (A>a and B>b). For F, wild type and mutant are semidominant. Use branching to determine the **phenotypic** ratios for the trihybrid cross **a x bf.**

4 In Drosophila the gene for white eyes (w) is X-linked and the gene for black body (b) is autosomal. In both genes, the wild type is dominant to the mutant. Use **BRANCHING** to determine the F2 **PHENOTYPIC** ratios in the cross.

male black body x female white eyes

5 In Drosophila the gene for white eyes (w) is X-linked and the gene for black body (b) is autosomal. The gene for vestigial wing (v) us also autosomal and is not linked to black body. In all genes, the wild type is dominant to the mutant. Use **BRANCHING** to determine the F2 **PHENOTYPIC** ratios in the cross. .

male white eyes black body x female vestigial wing

Branching Problem Set – Anwers Key

Problem 1

	↗ 1BB	= 1	***AB***	9 ***AB***
1AA	→ 2Bb	= 2	***AB***	
	↘ 1bb	= 1	***Ab***	3 ***Ab***
	↗ 1BB	= 2	***AB***	
2Aa	→ 2Bb	= 4	***AB***	3 ***aB***
	↘ 1bb	= 2	***Ab***	
	↗ 1BB	= 1	***aB***	
1aa	→ 2Bb	= 2	***aB***	1 ***ab***
	↘ 1bb	= 1	***ab***	

Problem 2

		↗ 3***D***	27	***ABD***
	3***B***			
3***A***	↗	↘ 1***d***	9	***ABd***
		↗ 3***D***	9	***AbD***
	↘ 1***b***			
		↘ 1***d***	3	***Abd***
		↗ 3***D***	9	***aBD***
	3***B***			
1***a***	↗	↘ 1***d***	3	***aBd***
		↗ 3***D***	3	***abD***
	↘ 1***b***			
		↘ 1***d***	1	***abd***

Problem 3

		↗ 1***F***	9	***ABF***	
	3***B***	→2***Ff***	18	***ABFf***	
3***A***	↗	↘ 1***f***	9	***ABf***	
		↗ 1***F***	3	***AbF***	
	↘ 1***b***	→2***Ff***	6	***AbFf***	**** Ff = heterozygous phenotype***
		↘ 1***f***	3	***Abf***	
		↗ 1***F***	3	***aBF***	
	3***B***	→2***Ff***	6	***aBFf***	
1***a***	↗	↘ 1***f***	3	***aBf***	
		↗ 1***F***	1	***abF***	
	↘ 1***b***	→2***Ff***	2	***abFf***	
		↘ 1***f***	1	***abf***	

Problem 4

F1 = WYbb (male) x wwBB (female)

F2 = wYBb (male) x WwBb (female)

		↗ 3***B***	3	***WB***	***female***
	W				
w	↗	↘ 1***b***	1	***Wb***	"
		↗ 3***B***	3	***wB***	"
	↘ w				
		↘ 1***b***	1	***wb***	"
		↗ 3***B***	3	***WB***	***male***
	W				
Y	↗	↘ 1***b***	1	***Wb***	"
		↗ 3***B***	3	***wB***	"
	↘ w				
		↘ 1***b***	1	***wb***	"

Problem 5

F1 = wYbbVV (male) x WWBBvv (female)

F2 = WYBbVv (male) x WwBbVv (female)

				↗	3***V***	9	***WBV***	***female***
			↗ 3***B***					
				↘	1***v***	3	***WBv***	"
		W		↗	3***V***	3	***WbV***	"
	↗		↘ 1***b***					
				↘	1***v***	1	***Wbv***	"
W				↗	3***V***	9	***WBV***	"
	↘		↗ 3***B***					
				↘	1***v***	3	***WBv***	"
		w		↗	3***V***	3	***WbV***	"
			↘ 1***b***					
				↘	1***v***	1	***Wbv***	"
				↗	3***V***	9	***WBV***	***male***
			↗ 3***B***					
				↘	1***v***	3	***WBv***	"
		W		↗	3***V***	3	***WbV***	"
	↗		↘ 1***b***					
				↘	1***v***	1	***Wbv***	"
Y				↗	3***V***	9	***wBV***	"
	↘		↗ 3***B***					
				↘	1***v***	3	***wBv***	"
		w		↗	3***V***	3	***wbV***	"
			↘ 1***b***					
				↘	1***v***	1	***wbv***	"

note that the ratios for the females are duplicated. You could simplify the results by combining the two sets.