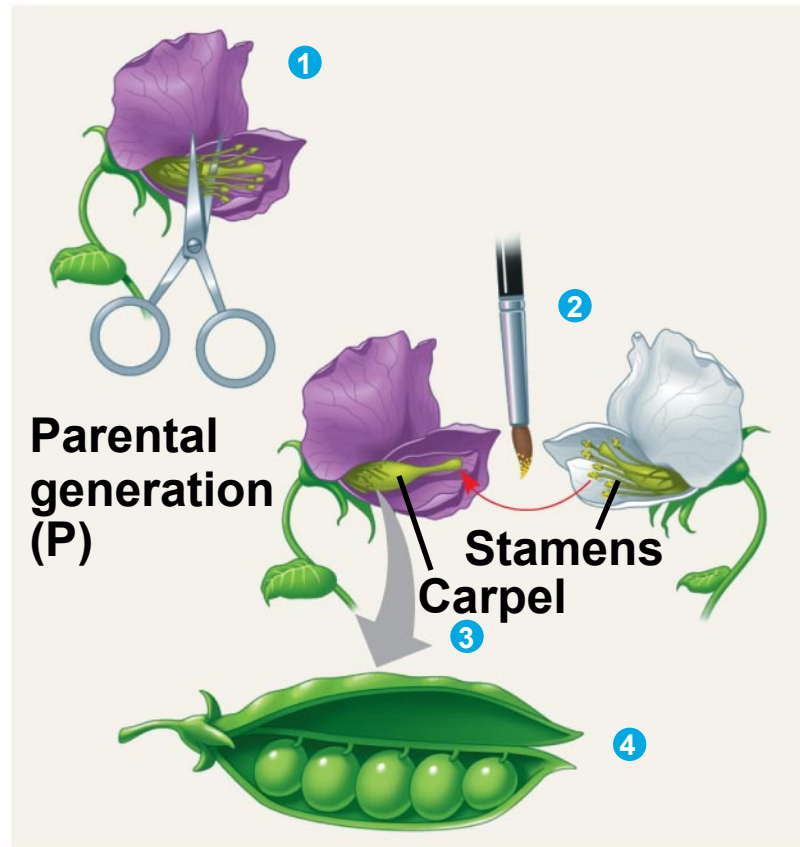




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## TECHNIQUE



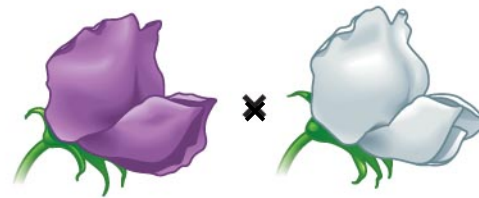
## RESULTS



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## EXPERIMENT

**P Generation**  
(true-breeding  
parents)



**Purple  
flowers**

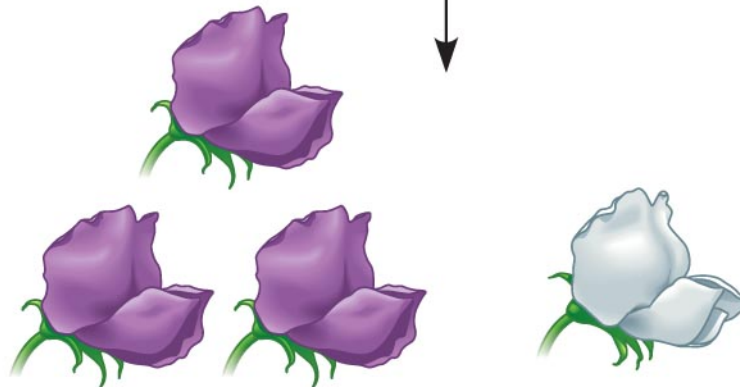
**White  
flowers**

**F<sub>1</sub> Generation**  
(hybrids)



**All plants had  
purple flowers**

**F<sub>2</sub> Generation**




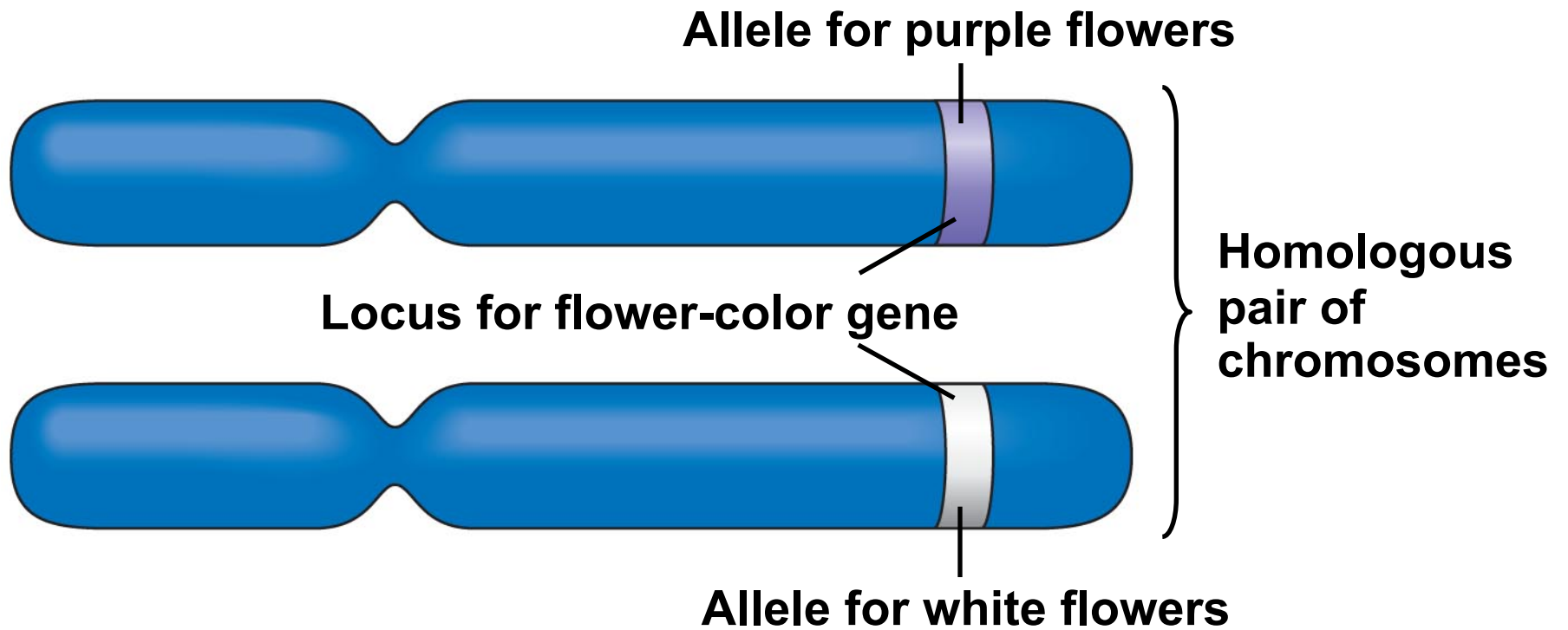
**705 purple-flowered  
plants**

**224 white-flowered  
plants**



**Table 14.1 The Results of Mendel's F<sub>1</sub> Crosses for Seven Characters in Pea Plants**

Character	Dominant Trait	x	Recessive Trait	F <sub>2</sub> Generation Dominant:Recessive	Ratio
Flower color	Purple	×	White	705:224	3.15:1
					
Flower position	Axial	×	Terminal	651:207	3.14:1
					
Seed color	Yellow	×	Green	6,022:2,001	3.01:1
					
Seed shape	Round	×	Wrinkled	5,474:1,850	2.96:1
					
Pod shape	Inflated	×	Constricted	882:299	2.95:1
					
Pod color	Green	×	Yellow	428:152	2.82:1
					
Stem length	Tall	×	Dwarf	787:277	2.84:1
					



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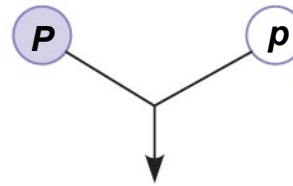
## P Generation



**Appearance:** Purple flowers      White flowers

**Genetic makeup:** *PP*                      *pp*

**Gametes:**



## F<sub>1</sub> Generation



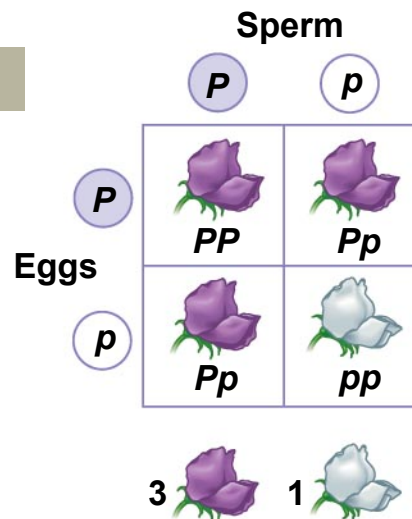
**Appearance:** Purple flowers

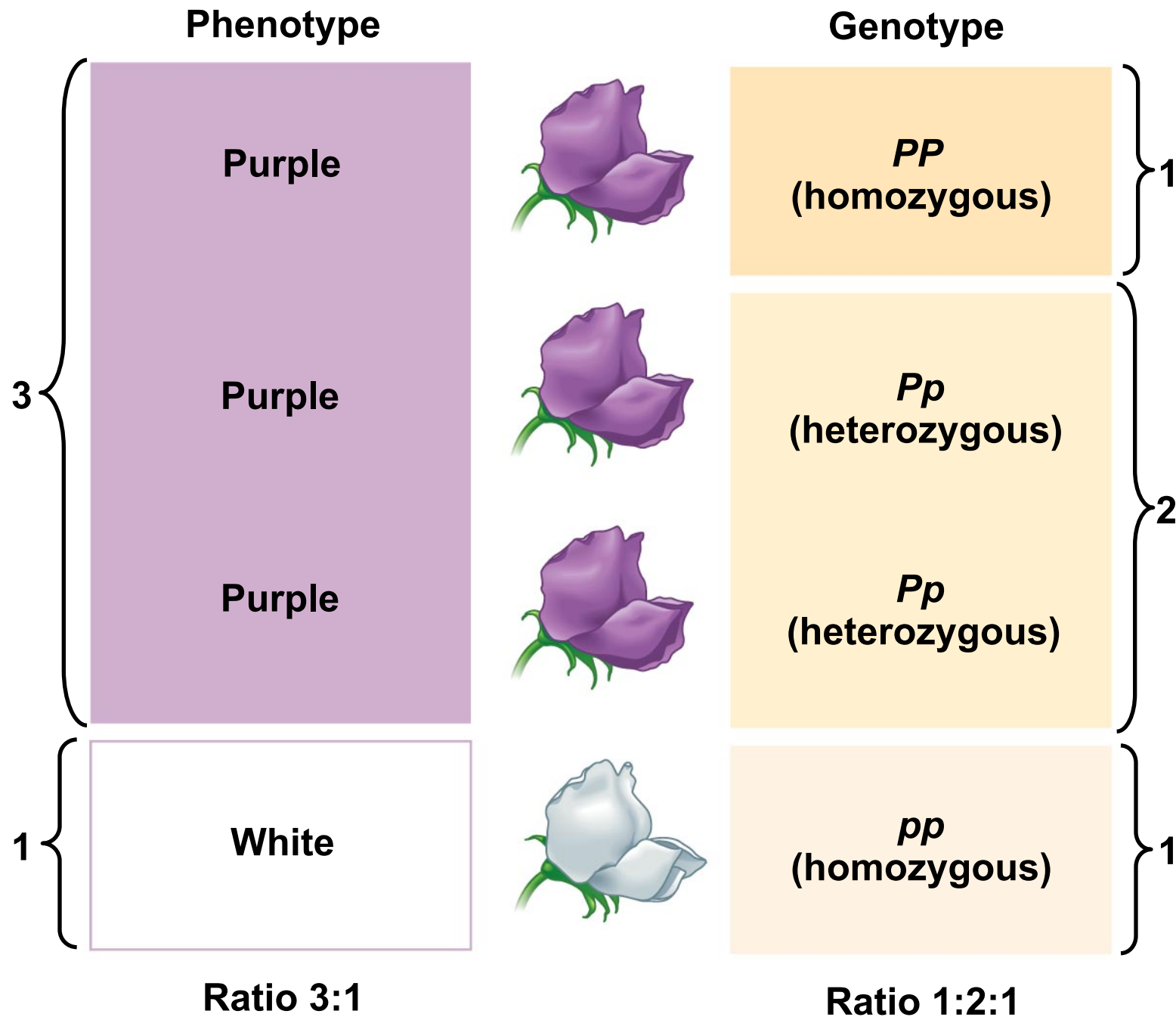
**Genetic makeup:** *Pp*

**Gametes:**

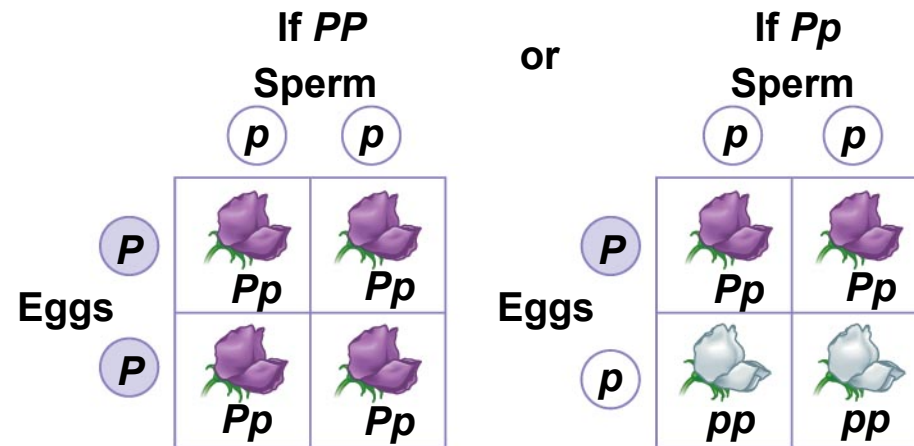
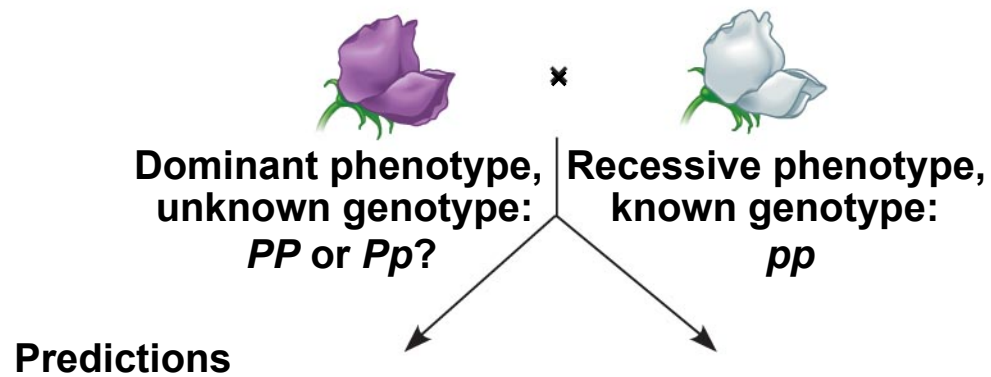


## F<sub>2</sub> Generation

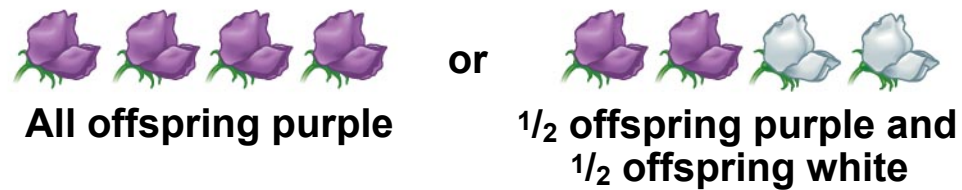




## TECHNIQUE

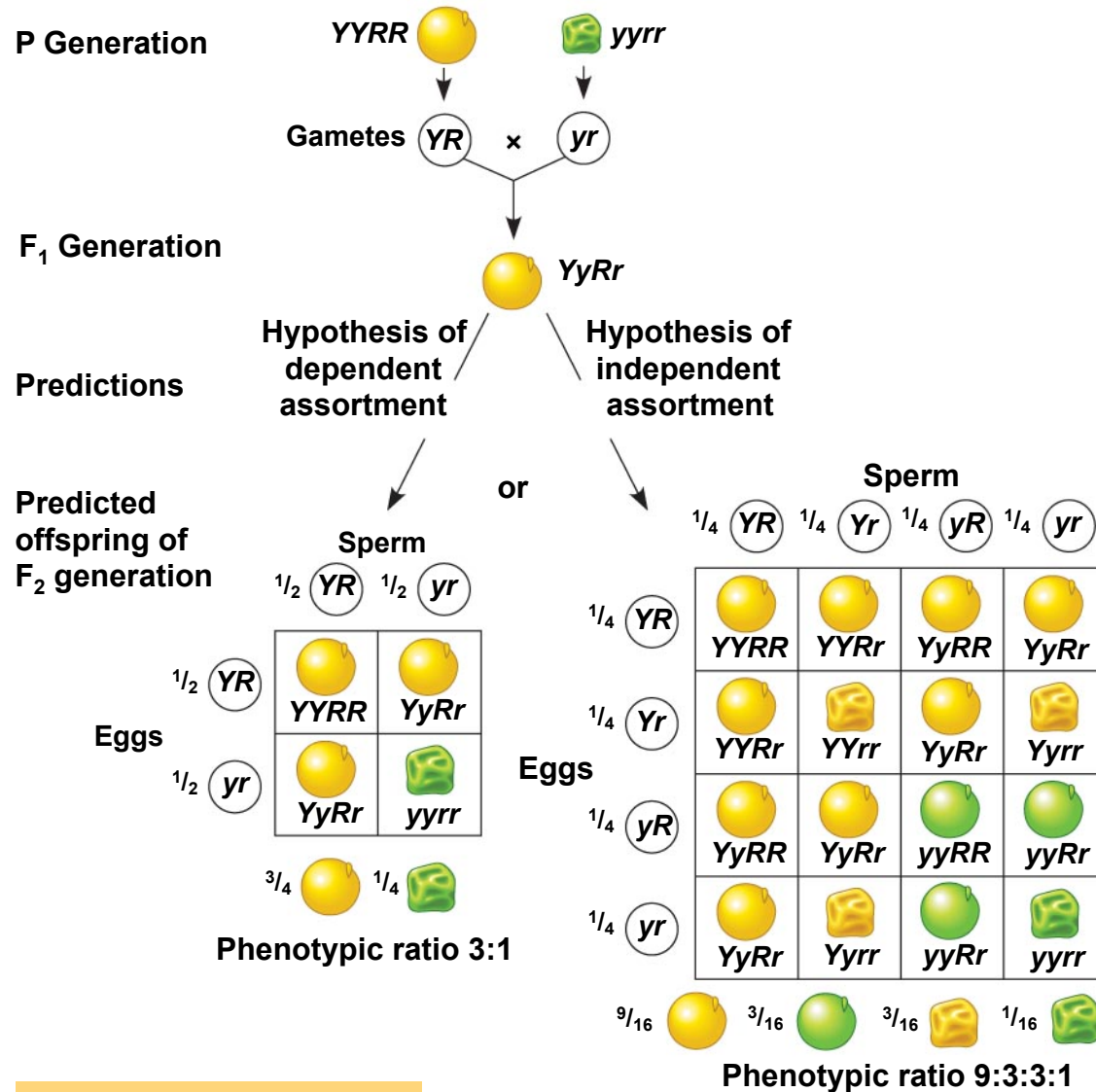


## RESULTS





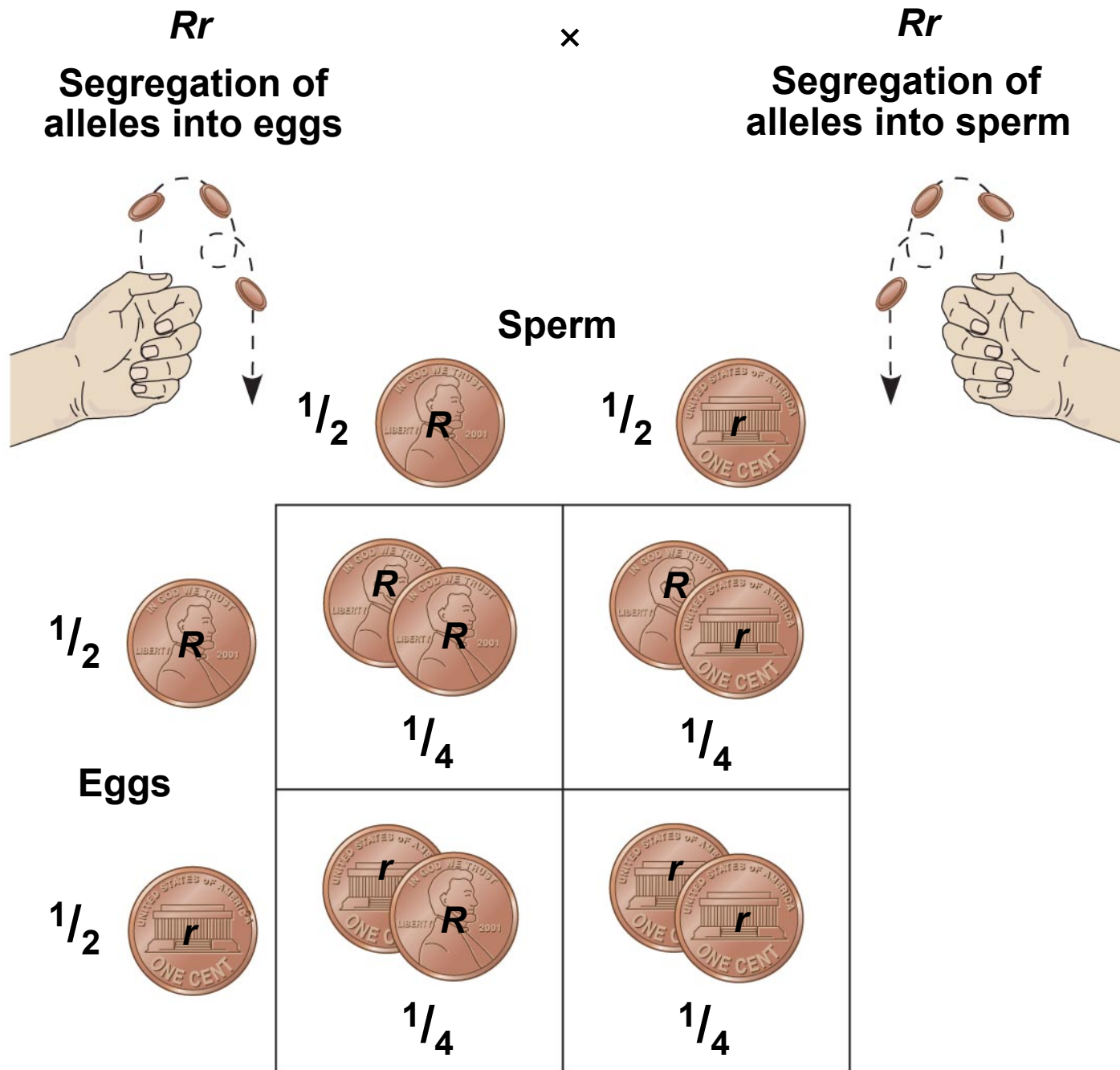
## EXPERIMENT



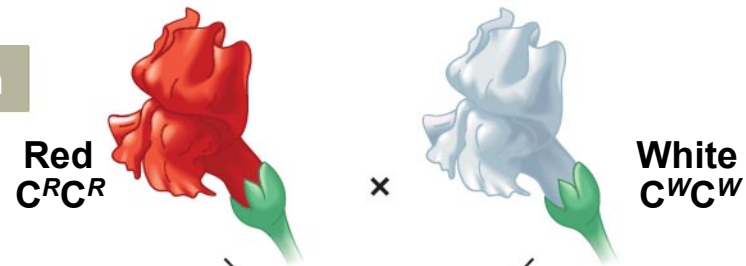
## RESULTS

315 yellow round    108 green round    101 yellow wrinkled    32 green wrinkled    Phenotypic ratio approximately 9:3:3:1

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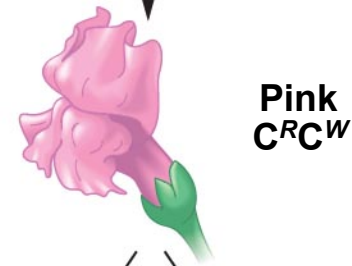
**P Generation**



Gametes



**F<sub>1</sub> Generation**



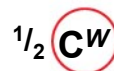
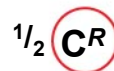
Gametes  $\frac{1}{2} C^R$   $\frac{1}{2} C^W$





Sperm





**F<sub>2</sub> Generation**


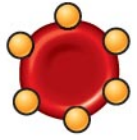


Eggs



$\frac{1}{2} C^R$	 $C^R C^R$	 $C^R C^W$
$\frac{1}{2} C^W$	 $C^R C^W$	 $C^W C^W$

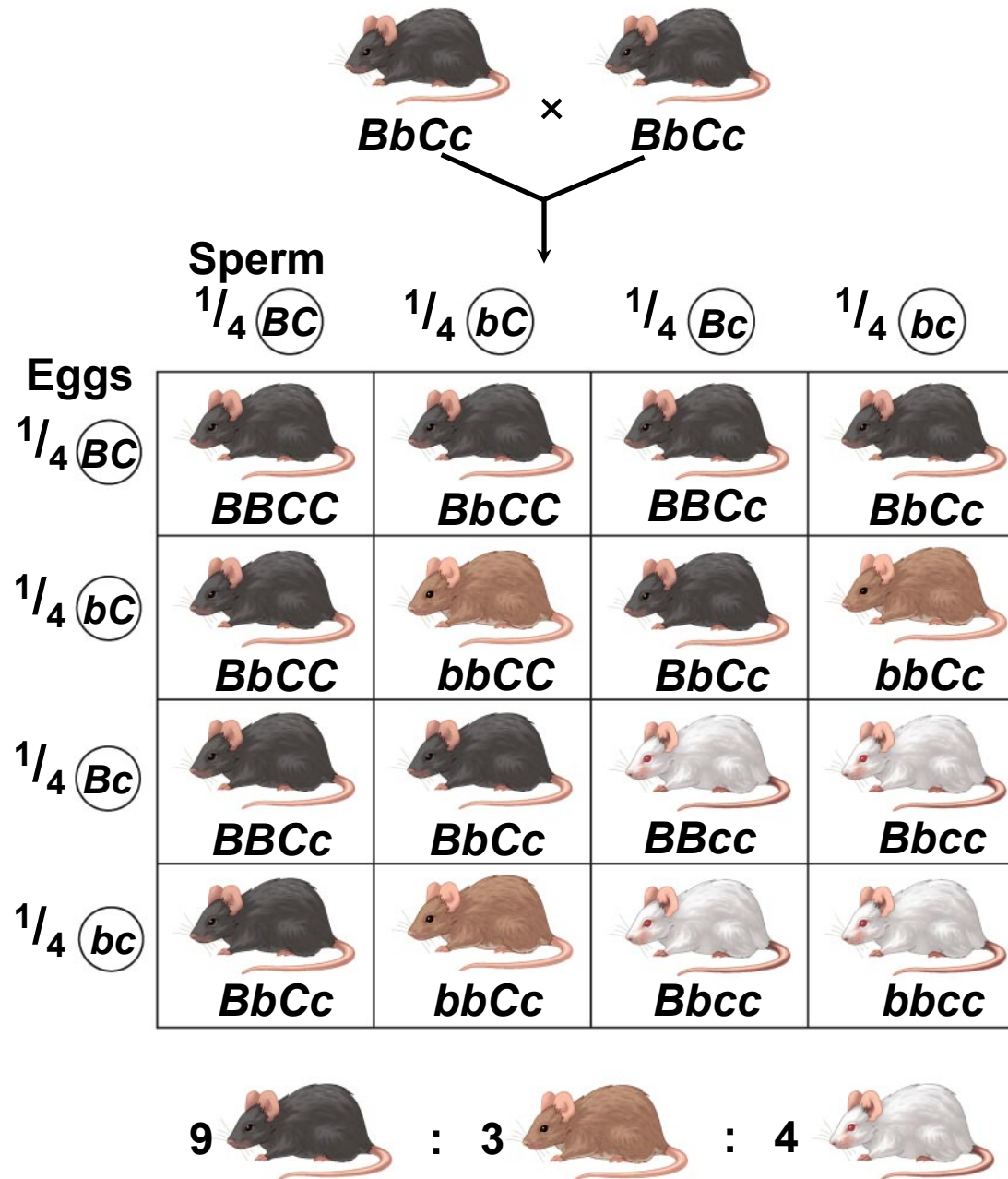
<u>Allele</u>	<u>Carbohydrate</u>
$I^A$	A 
$I^B$	B 
$i$	none

(a) The three alleles for the ABO blood groups and their associated carbohydrates

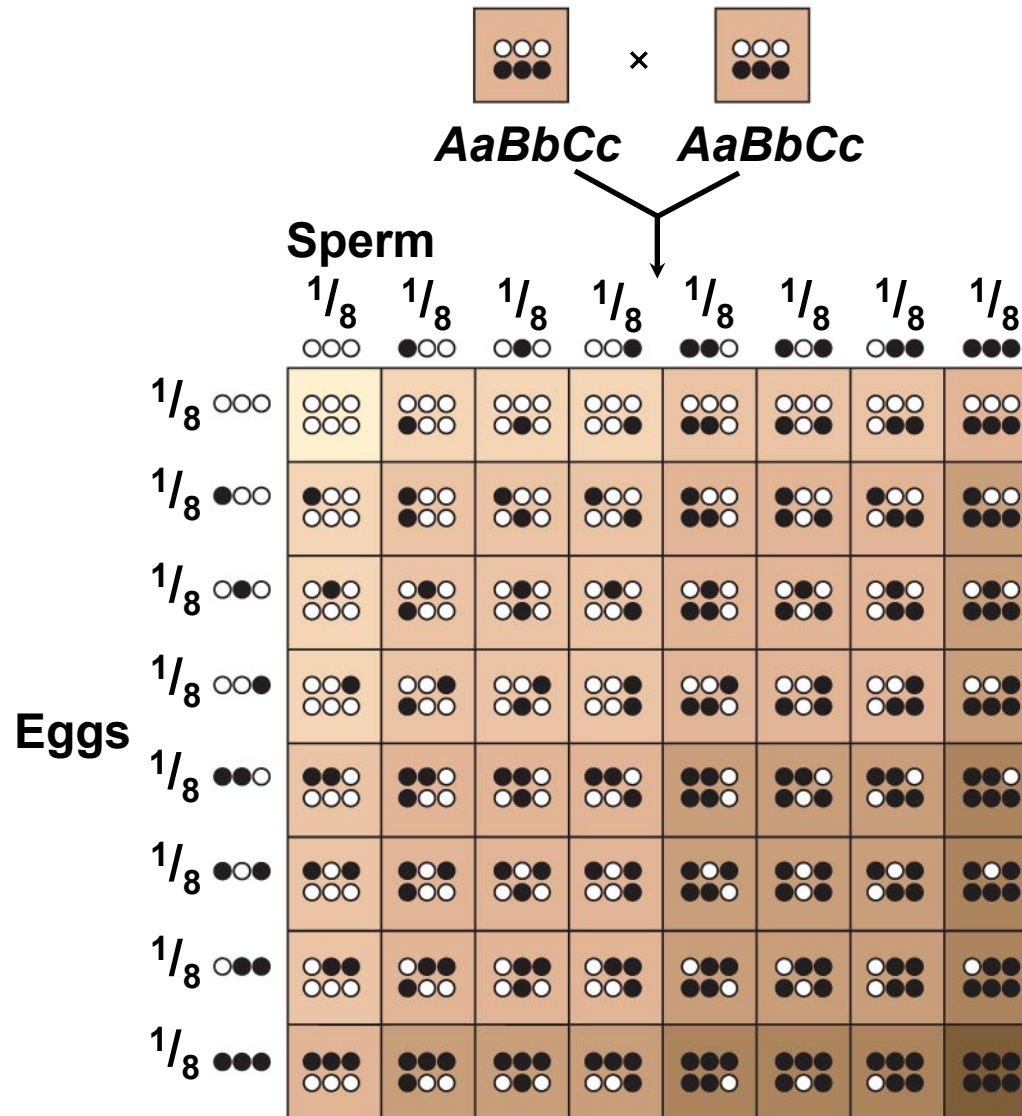
<u>Genotype</u>	<u>Red blood cell appearance</u>	<u>Phenotype (blood group)</u>
$I^A I^A$ or $I^A i$		A
$I^B I^B$ or $I^B i$		B
$I^A I^B$		AB
$ii$		O

(b) Blood group genotypes and phenotypes

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**Phenotypes:**

**Number of**

**dark-skin alleles: 0**

**1**

**2**

**3**

**4**

**5**

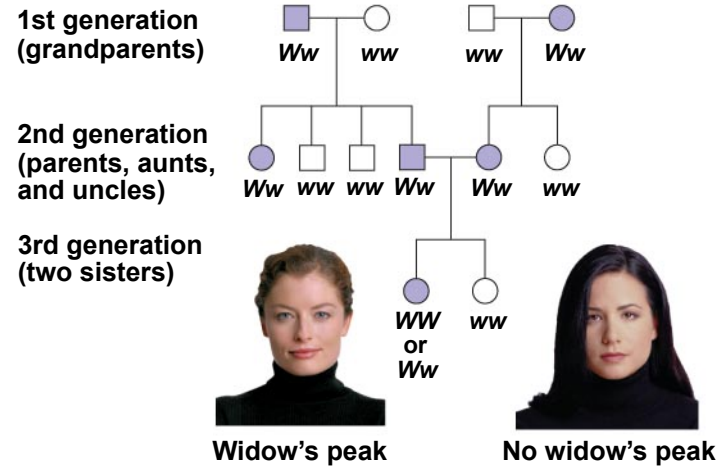
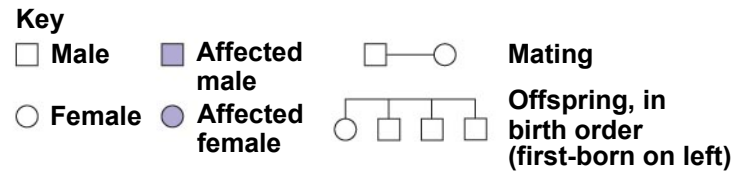
**6**

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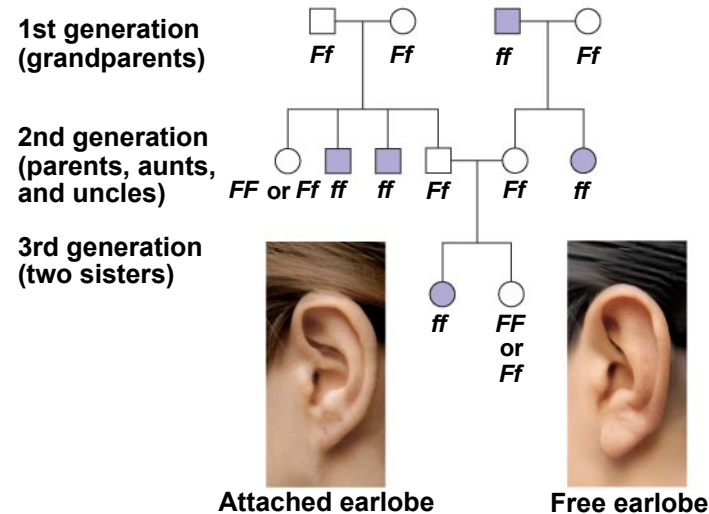


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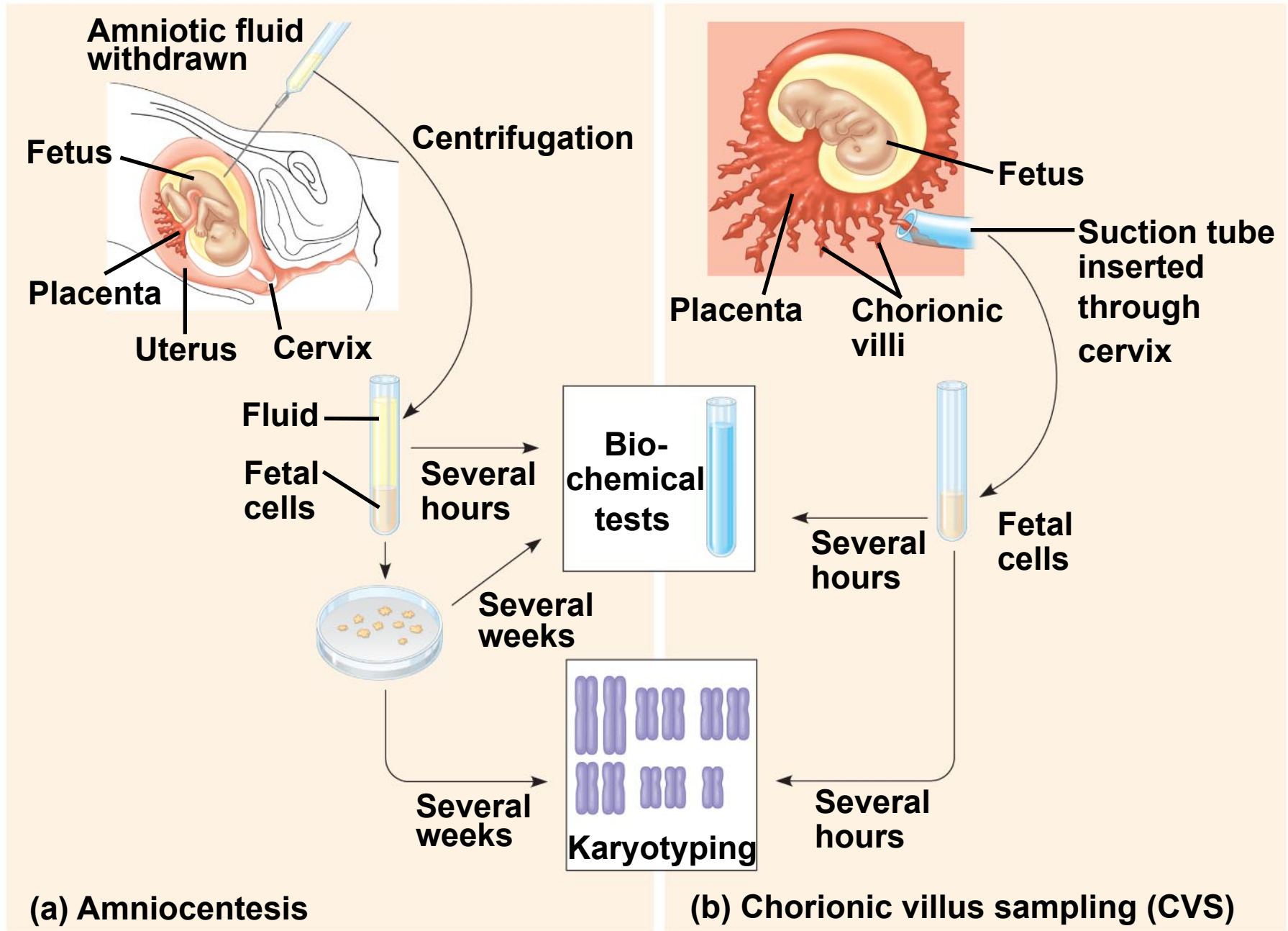







(a) Is a widow's peak a dominant or recessive trait?
















































































































































































































































(b) Is an attached earlobe a dominant or recessive trait?





Degree of dominance	Description	Example
Complete dominance of one allele	Heterozygous phenotype same as that of homozygous dominant	 $PP$ $Pp$
Incomplete dominance of either allele	Heterozygous phenotype intermediate between the two homozygous phenotypes	 $C^R C^R$ $C^R C^W$ $C^W C^W$
Codominance	Heterozygotes: Both phenotypes expressed	 $I^A I^B$
Multiple alleles	In the whole population, some genes have more than two alleles	ABO blood group alleles $I^A, I^B, i$
Pleiotropy	One gene is able to affect multiple phenotypic characters	Sickle-cell disease



Relationship among genes	Description	Example																																																																								
Epistasis	One gene affects the expression of another	<p><math>BbCc</math>  <math>\times</math>  <math>BbCc</math></p> <p><math>\swarrow</math></p> <table><tr><td><math>BC</math></td><td></td><td></td><td></td><td></td></tr><tr><td><math>bC</math></td><td></td><td></td><td></td><td></td></tr><tr><td><math>Bc</math></td><td></td><td></td><td></td><td></td></tr><tr><td><math>bc</math></td><td></td><td></td><td></td><td></td></tr></table> <p>9  : 3  : 4 </p>	$BC$					$bC$					$Bc$					$bc$																																																								
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$bC$																																																																										
$Bc$																																																																										
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Polygenic inheritance	A single phenotypic character is affected by two or more genes	<p><math>AaBbCc</math>  <math>\times</math>  <math>AaBbCc</math></p> <p><math>\swarrow</math></p> <table><tr><td><math>OO</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>Oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>OO</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>Oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>OO</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>Oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td><math>oo</math></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	$OO$								$Oo$								$oo$								$OO$								$Oo$								$oo$								$OO$								$Oo$								$oo$							
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