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## **Practice for Ch 4 Extra: Punnett Squares Charting and Predicting Allele Probabilities**

- **Principles of Probability**
  - Tossing a coin = 1 in 2 chance of “heads”.
  - Each of the two possible events is equally likely.
- **Mendel and Probability**
  - He was the first to recognize probability principles can be used to predict the results of genetic crosses.
  - If he crossed two hybrids (Tt) x (Tt) = three fourths Tall, so probability for tall plants = 3 in 4.
- **Punnett Square** = a **chart** showing all the possible combinations of alleles that can result from a genetic cross.
  - Geneticists use these charts to show all the possible outcomes of a genetic cross and to determine the probability of a particular outcome.
- **Predicting Probabilities** –
  - Example of crossing a black guinea pig and a white guinea.
  - So the P Generation (parental generation) is BB x bb (purebred Black x purebred white)
  - B = Black (dominant)    b = white (recessive)
- **Phenotype** = physical appearance (visible traits)
  - Tall or short is an example of phenotype
- **Genotype** = its genetic makeup (allele combination)
  - Tt and TT are examples of a genotype for tall.
- **Homozygous** = organism with two identical alleles (TT) or (tt) at a gene site.
  - Purebred
- **Heterozygous** = organism with two different alleles (Tt) at a gene site.
  - Hybrid

**Read the examples below:**

**B = Black dominant    b = white recessive**

<p><b>P – Generation (Parental)</b>  <b>Crossing BB x bb</b>                  (Purebred black x purebred white)</p> <table style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: center;">B</td> <td style="padding: 5px; text-align: center;">B</td> </tr> <tr> <td style="padding: 5px; text-align: center;">b</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> </tr> <tr> <td style="padding: 5px; text-align: center;">b</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> </tr> </table> <p>F<sub>1</sub> Generation Offspring                  (First Filial Generation)                  100% of them are black</p>		B	B	b	Bb	Bb	b	Bb	Bb	<p><b>Crossing Bb x Bb</b>                  (Hybrid x Hybrid)</p> <table style="margin: 10px auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: center;">B</td> <td style="padding: 5px; text-align: center;">b</td> </tr> <tr> <td style="padding: 5px; text-align: center;">B</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">BB</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> </tr> <tr> <td style="padding: 5px; text-align: center;">b</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">Bb</td> <td style="padding: 5px; border: 1px solid black; text-align: center;">bb</td> </tr> </table> <p>F<sub>2</sub> Generation Offspring                  (Second Filial Generation)                  75% are black, and 25% are white</p>		B	b	B	BB	Bb	b	Bb	bb
	B	B																	
b	Bb	Bb																	
b	Bb	Bb																	
	B	b																	
B	BB	Bb																	
b	Bb	bb																	

Now you practice crossing some below, such as Bb x bb

	B	b
b		
b		

How many of their 4 offspring are black? \_\_\_\_\_  
 What percentage will be black? \_\_\_\_\_  
 How many of their 4 offspring are white? \_\_\_\_\_  
 What percentage will be white? \_\_\_\_\_

**Cross a purebred normal with a purebred albino cornsnake:**

**N = normal allele; n = albino recessive allele**

*(Fill in the boxes of the Punnett Square)*

	N	N
n		
n		



How many of the offspring will be normal? \_\_\_\_\_ %  
 How many of the offspring will be albino? \_\_\_\_\_ %  
 How many of the offspring will be purebred? \_\_\_\_\_ %  
 How many of the offspring will be hybrid? \_\_\_\_\_ %