

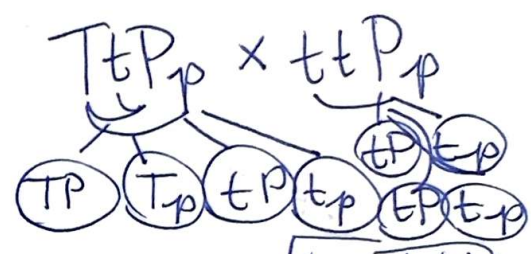
### Punnett Square Worksheet 2 (Dihybrid Crosses & Blood Typing)

1. You are tracking plant height and flower color in a group of plants. Tall (T) is dominant to short (t) and purple (P) is dominant to white (p). If you cross a plant heterozygous for both traits with a plant homozygous recessive for height and heterozygous for flower color, what will the predicted genotypic and phenotypic ratios be for the offspring of the first generation?

Genotype:  
 $2 TtPp : 4 TtPp :$   
 $2 ttPp : 4 ttPp$   
 $2 Ttpp : 2 ttpp$   
Phenotype:  
 6 tall, purple : 6 short, purple : 2 tall, white : 2 short, white

	TP	Tp	tP	tp
tP	TtPp	TtPp	ttPp	ttPp
tp	TtPp	Ttpp	ttPp	ttpp
tP	TtPp	TtPp	ttPp	ttPp
tp	TtPp	Ttpp	ttPp	ttpp

T - tall t - short  
 P - purple p - white



\* can divide all ratios by 2 to simplify

2. Suppose a white, straight haired guinea pig mates with a brown, curly-haired guinea pig. All ten offspring in their first litter have brown fur, but three are curly and two have straight hair. The second litter consists of twelve more brown offspring, where two are curly and four are straight haired. Use B/b for hair color and T/t for hair type.

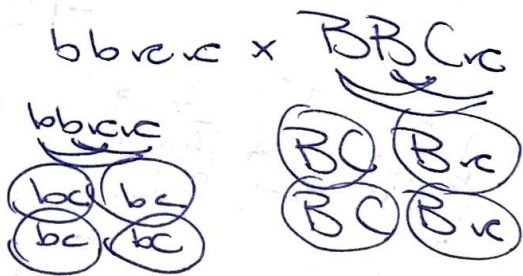
B - brown b - white  
 C - curly c - straight

$bbcc \times BBCC$

\* you know this b/c of the described offspring

8 BC Bc Bc Bc

bcc	BbCc	BbCc	BbCc	BbCc
bcc	BbCc	BbCc	BbCc	BbCc
bcc	BbCc	BbCc	BbCc	BbCc
bcc	BbCc	BbCc	BbCc	BbCc



a. Assuming curly hair is dominant to straight hair, what are the genotypes of the parents?

$BBCc \times bbcc$

b. What is the probability of these parents having an offspring with straight, brown hair AND an offspring with curly, white hair? Show your work.

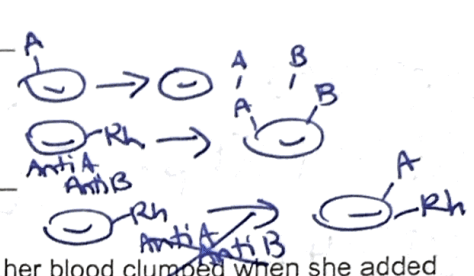
Straight brown x curly white

$$\frac{1}{2} \times 0 = 0\%$$

3. Fill in the blood type table then answer the questions below.

Blood Type	A+	O+	B-	AB-
Antigens	A, Rh	<del>Rh</del>	B	A, B
Antibodies	Anti-B	Anti A Anti B	Anti A	none

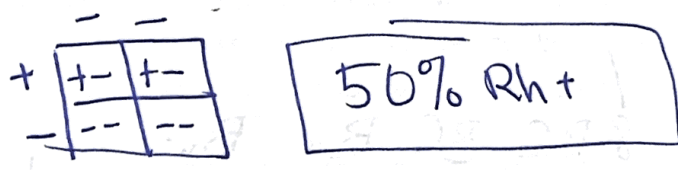
- a. Can a person with type B+ blood receive B+ red blood cells? Y
- b. Can a person with O+ blood receive A- red blood cells? N
- c. Can a person with AB- blood receive O+ red blood cells? N
- d. Can a person with type A+ blood receive O+ red blood cells? Y



4. In her biology class, Reagan completed a blood typing lab. She observed that her blood clumped when she added Anti-Rh, but not when she added Anti-A or Anti-B. Based on these observations, what is Reagan's blood type?

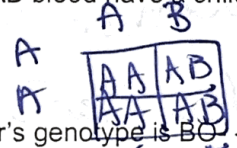
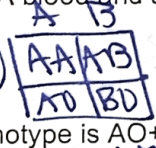
O+

3. Rh+ is dominant to Rh-. A mother heterozygous for the Rh antigen gene and a father who is Rh- have a child. What is the probability that this child will be Rh+? Draw a Punnett square to help you answer.



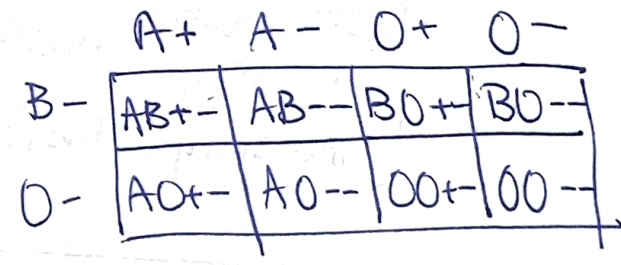
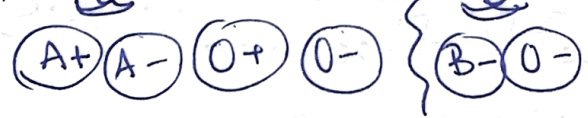
4. A mother with A blood and a father with AB blood have a child. What are the possible genotypes of this child?

Mother could be homozygous or heterozygous



$I^A I^A, I^A I^B, I^A i, I^B i$

A mother's genotype is AO+ and a father's genotype is BO-. Draw a Punnett square to determine their children's possible genotypes.



6. Explain why it is dangerous for a Rh- mother to have an Rh+ child.

Mother can build up Anti-Rh antibodies that can attack <sup>baby's</sup> ~~babies'~~ blood + cause hemolytic anemia

7. A mother with the genotype  $A_2O^{++}$  and a father with the genotype  $OO^{--}$  have four children. Predict the possible genotypes and phenotypes of their offspring.

		$O^-$		
$A^+$	$AO^{+-}$			
$O^+$	$OO^{+-}$			

Genotype

$| I^A i^{+-} : | i i^{+-}$

Phenotype

$| A^+ : | O^+$

8. An  $A^+$  mother and an  $AB^+$  father have six children. One of their children is  $AO^-$ . What is the genotype of the mother? What is the genotype of the father? Explain.

$I^A i^{+-}$