Genetics Practice
AP Biology

Name: _____

A, B, and O code for different proteins on the surface of red blood cells. The O allele is recessive. A and B are dominant to O. A and B are codominant to each other.

Fill in the table below and then answer the questions that follow

Blood Type	Genotype
Homozygous for type A	$I^A I^A$
Heterozygous for type A	$I^A i$
Homozygous for type B	$I^B I^B$
Heterozygous for type B	$I^B i$
Type AB	$I^B I^A$
Type O	$i i$

1. Nadine's mom has type AB blood and her dad is heterozygous for type B blood. What is the probability that Nadine has
   a. type A blood 25 %
   b. type B blood 50 %
   c. type AB blood 25 %
   d. type O blood 0

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

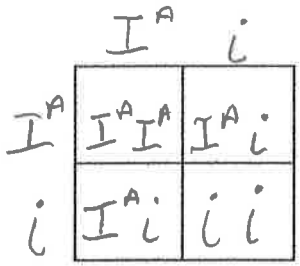
2. Tricia's mom has type AB blood and her dad has type O blood. What is the probability that Tricia has
   a. type A blood 50 %
   b. type B blood 50 %
   c. type AB blood 0
   d. type O blood 0

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

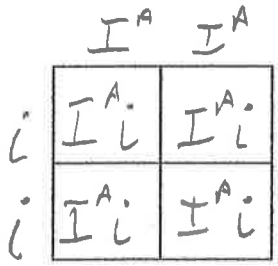
3. Aasif's mom and dad both have type AB blood. What is the probability that Aasif has
   a. type A blood 25 %
   b. type B blood 25 %
   c. type AB blood 50 %
   d. type O blood 0

	I^A	I^B
I^A	$I^A I^A$	$I^B I^A$
I^B	$I^A I^B$	$I^B I^B$

4. Stephen's mom and dad are both heterozygous for type A blood. What is the probability that Stephen has
   a. type A blood 75 %
   b. type B blood 0
   c. type AB blood 0
   d. type O blood 25 %



5. Wendy's mom has type O blood and her dad is homozygous for type A blood. What is the probability that Wendy has
   a. type A blood 100 %
   b. type B blood
   c. type AB blood
   d. type O blood

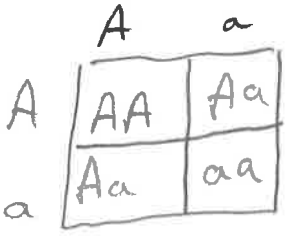


6. Ralph is blood type O. His father was blood type A and his mother was blood type B. What were the genotypes of his parents? I^Ai I^Bi

7. A snapdragon pure breeding for red flowers is bred with one for white flowers. The F_1 generation flowers are all pink.
   a. What type of inheritance is this?
      Incomplete Dominance
   b. What would you predict for the phenotypic ratios for the F_2 generation?

Aa x Aa

25 % Red
50 % Pink
25 % White



8. A red flower is crossed with a white flower. The F_1 flowers have both red and white petals. What type of inheritance is this?

Codominance

9. In cats, brown coat color is a single gene trait caused by a dominant allele. Homozygous recessive cats are white. If a brown female has a litter of kittens some of which are white, what is her genotype?

Bb

10. For the following crosses, determine the probability of obtaining an offspring with the indicated genotype.

Cross	Offspring	Probability
AAbb x AaBb	AAbb	AA = 1/2 bb = 1/2 (1/2)(1/2) = 1/4
AaBB x AaBb	aaBB	aa = 1/4 BB = 1/2 (1/4)(1/2) = 1/8
AABbcc x aabbCC	AaBbCc	Aa = 1 Bb = 1/2 Cc = 1 (1)(1/2)(1) = 1/2
AaBbCc x AaBbcc	aabbcc	aa = 1/4 bb = 1/4 cc = 1/2 (1/4)(1/4)(1/2) = 1/32

11. The probability of having 3 girls in a row is:

$(1/2)(1/2)(1/2) = 1/8$

12. A woman is pregnant with fraternal triplets. What is the probability that all three are girls? (Fraternal triplets are born at the same time, but they developed from three different eggs fertilized by three different sperm.)

$(1/2)(1/2)(1/2) = 1/8$

13. In the F_2 of a dihybrid cross involving two independently assorting genes, what proportion of the offspring will be true-breeding? AABB or aabb or AAbb or aaBB

F_2 AaBb x AaBb

AABB
Aa: $(1/2)(1/2) = 1/4$
BB: $(1/2)(1/2) = 1/4$
AABB $(1/4)(1/4) = 1/16$

aabb
aa: $(1/2)(1/2) = 1/4$
bb: $(1/2)(1/2) = 1/4$
aabb $(1/4)(1/4) = 1/16$

AAbb
AA: 1/4
bb: 1/4
AAbb $(1/4)(1/4) = 1/16$

aaBB
aa: 1/4
BB: 1/4
aaBB = 1/16

$1/16 + 1/16 + 1/16 + 1/16 = 4/16$

1/4

14. A dominant allele P causes the production of purple pigment; pp individuals are white. A dominant allele C is also required for color production; cc individuals are white. What proportion of offspring will be purple from a ppCc x PpCc cross? P_pCc or P_pCC or P_pcC

P_pCc
P_p $(1)(1/2) = 1/2$
Cc $(1/2)(1/2) = 1/4$
P_pCc $(1/2)(1/4) = 1/8$

P_pCC
P_p: $(1)(1/2) = 1/2$
CC: $(1/2)(1/2) = 1/4$
P_pCC $(1/2)(1/4) = 1/8$

P_pcC
P_p: 1/2
cC: 1/4
P_pcC: 1/8

$1/8 + 1/8 + 1/8 = 3/8$