

**DESIGNER GENES
SAMPLE TOURNAMENT (05)**

STUDENT NAMES: (PLEASE PRINT)

1. _____
2. _____

Part A.

(In flowers – Gene “R” produces red flowers and gene “r” produces white flowers)
Note: Show the cross using a Punnett Square on the back of the page.

1. _____ What is the **genotype ratio** of a cross Rr X Rr?
2. _____ What would be the **phenotype ratio** of the cross in # 1?
3. _____ What would be the **phenotype ratio** if the trait has incomplete dominance?

Colorblindness is a sex-linked trait. A woman, whose mother is colorblind and whose father has normal vision marries a normal visioned man.

(Note: Show the cross using Punnett Squares on the back of the page.)

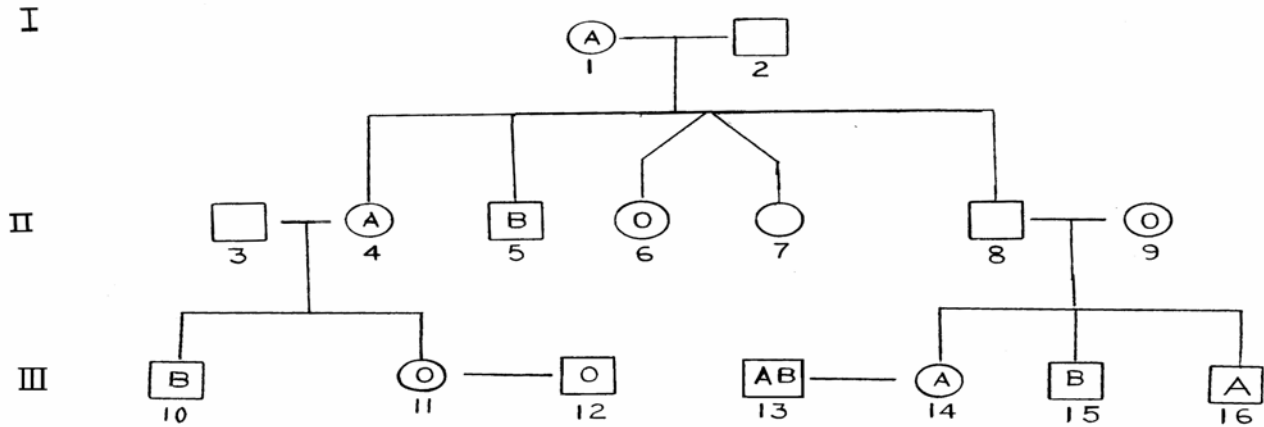
4. _____ What is her **genotype**? What is her **phenotype**?
5. _____ What is the chance that her first offspring will be colorblind if it is a **male**? If it is a **female**?

Part B:

In mice, the gene for color coat (C) is dominant to the gene for albino (c), and gene for straight whiskers (S) is dominant to the gene for bent whiskers (s). Two heterozygous dominant mice are crossed CcSs x CcSs . (Note: Show the cross using a Punnett Square on the back of the page.)

6. _____ What is the **phenotype ratio** for this cross?
7. _____ What is the **genotype ratio** for this cross?
8. _____ What proportion of the offspring would you expect to be **albino**?
9. _____ What portion of the offspring would you expect to have bent whiskers?
10. _____ What would be the expected ratio of offspring phenotypes with both recessive alleles expressed?

Part C Examine the pedigree and answer the following questions.



What is the relationship of the following individuals?

11. _____ # 1 and # 4

12. _____ # 11 and # 12

Give the **possible genotypes** and then the **blood type** for the following individuals.

13. _____ Individual # 2

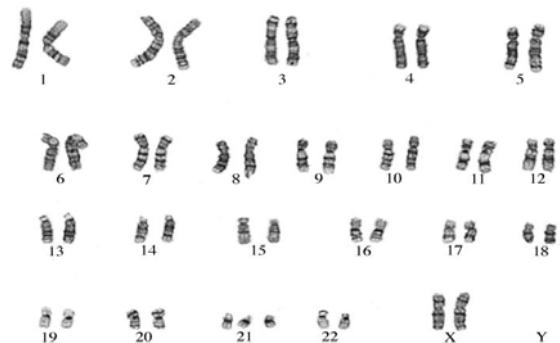
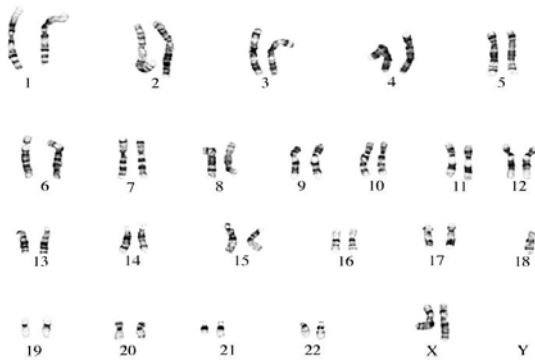
14. _____ Individual # 3

15. _____ Individual # 8

Part D. Examine the provided karyotypes and answer the following questions.

Individual A

Individual B



16. _____ What is the sex of individual A?

17. _____ What is the sex of individual B?

18. _____ What defect does individual A have?

19. _____ What defect does individual B have?

20. _____ How many chromosomes are in a normal somatic (body) cell of individual A?

Part E. Examine the data provided and answer the following questions.

For question 21, You are given the following gene to gene distances

B-C	3 map units
D-C	7 map units
A-B	8 map units
D-A	12 map units

21. _____ Draw a complete map that includes all genes and the distances between the genes.

For Question 22, consider the cross: $AaBbCc \times AaBbCc$

22. _____ How many different kinds of gametes can each parent produce?
Show the combinations for each parent below:

For question 23, Albinism is an absence of pigment. Two normal adults marry and have a child that is an albino.

23. _____ Is albinism dominant or recessive? What is the probability that the next child will be an albino?

For question 24, in humans, 1 in 10,000 females have a rare sex-linked recessive genetic disorder.

24 _____ What is the frequency of the affected males?

For question 25, a small fragment of DNA has been collected at a crime scene.

25. _____ What is the name of the procedure in DNA analysis which allow one to make many copies of a piece of DNA?

Part F:

Examine the information concerning the paternal case. Use the evidence from the blood samples and DNA analysis to answer the questions.

PARENTAL CASE		
<u>Blood Analysis</u>		<u>DNA ANALYSIS KEY</u>
Mother	I ^A i	#1-Sample from mother's blood
Child	i i	#2-Sample from child's blood
Possible Father #1	I ^A I ^B	#3-Sample from possible father #1
Possible Father #2	I ^A i	#4-Sample from possible father #2
Possible Father #3	I ^B i	#5-Sample from possible father #3

DNA ANALYSIS

1	2	3	4	5
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

26. _____ What is the blood type of the child? What is its genotype?
27. _____ What is the blood type of the mother? What is her genotype?
28. _____ What are the blood types of the possible fathers?
29. _____ Based upon the blood types, which of the possible fathers **could be** the biological father of the child?
30. _____ Based upon all of the evidence, which of the possible fathers is most likely the father of this child?

DESIGNER GENES -SAMPLE TOURNAMENT (05) - Answer Key

1. 1:2:1
2. 3:1
3. 1:2:1
4. $X^C X^c$
5. 50% 0%
6. 9:3:3:1
7. 1:2:1:2:4:2:1:2:1
8. 4/16
9. 4/16
10. 1/16
11. mother and daughter
12. wife and husband
13. $I^B i$ type B
14. $I^B i$ type B
15. $I^A I^B$ type AB
16. female
17. female
18. Monosomy 18
19. Trisomy 21 (Down's Syndrome)
20. 45 chromosomes
21. D 4 B 3 C 5 A
22. six ABC, ABc, Abc, aBC, aBc, abc
23. recessive $\frac{1}{4}$ or 25%
24. 1/100 ($1/100 \times 1/100 = 1/10,000$)
25. PCR Polymerase Chain Reaction
26. type O ii
27. type A $I^A i$
28. types AB, A, B
29. father's 2 & 3
30. father 2