

Punnett Square Practice Pages

Directions: Complete each Punnett Square and answer the questions.

1. Flower color

- a. Purple is dominant (P)
- b. White is recessive (p)
- c. A PP father and a PP mother

| | | |
|---|----|----|
| | P | P |
| P | PP | PP |
| P | PP | PP |

- d. What color(s) are the parents? Purple
- e. What color(s) are the children? Purple

2. Seed color

- a. Yellow is dominant (Y)
- b. Green is recessive (y)
- c. A yy father and a yy mother

| | | |
|---|----|----|
| | y | y |
| y | yy | yy |
| y | yy | yy |

- d. What color(s) are the parents? green
- e. What color(s) are the children? green

3. Seed shape

- a. Round is dominant (R)
- b. Wrinkled is recessive (r)
- c. An RR father and an rr mother

| | | |
|---|----|----|
| | R | R |
| r | Rr | Rr |
| r | Rr | Rr |

- d. What shape(s) are the parents? Round, Wrinkled
- e. What shape(s) are the children? Round 100%

4. Pod color

- a. Green is dominant (G)
- b. Yellow is recessive (g)
- c. A Gg father and a GG mother

| | | |
|---|----|----|
| | G | g |
| G | GG | Gg |
| G | GG | Gg |

- d. What color(s) are the parents? Green
- e. What color(s) are the children? Green

5. Pod shape

- a. Smooth is dominant (S)
- b. Bumpy is recessive (s)
- c. A Ss father and a ss mother

| | | |
|---|----|----|
| | S | s |
| s | Ss | ss |
| s | Ss | ss |

- d. What shape(s) are the parents? Smooth, Bumpy
- e. What shape(s) are the children? 50% Smooth
50% Bumpy

11. Whiskers in seals

- a. Long whiskers are dominant (W)
 b. Short whiskers are recessive (w)

| | | |
|---|------|----|
| | W | W |
| W | ? WW | WW |
| W | ? WW | WW |

- c. What is the genotype of the missing parent? **WW**
 d. What are the phenotypes of the parents? **Long whiskers**
 e. What are the phenotypes of the children? **Long whiskers**

12. Purple people eater horns

- a. One horn is dominant (H)
 b. No horns are recessive (h)

| | | |
|---|------|----|
| | h | h |
| h | ? hh | hh |
| h | ? hh | hh |

- c. What is the genotype of the missing parent? **hh**
 d. What are the phenotypes of the parents? **no horns**
 e. What are the phenotypes of the children? **no horns**

13. Incomplete dominance in snapdragons (hint: look at your notes)

- a. Red flowers are dominant (R)
 b. White flowers are recessive (r)
 c. An Rr father and an Rr mother

| | | |
|---|----|----|
| | R | r |
| R | RR | Rr |
| r | Rr | rr |

- d. What color(s) are the parents? **Pink**
 e. What color(s) are the children?

25% Red 50% Pink 25% White

14. Codominance in human blood (hint: look at your notes)

- a. Types A and B are dominant (A, B)
 b. Type O is recessive (O)
 c. An ~~OA~~ father and an ~~OB~~ mother

| | | |
|-------|-----------|---------|
| | I^A | i |
| I^B | $I^A I^B$ | $I^B i$ |
| i | $I^A i$ | ii |

- d. What are the blood types of the children?

25% AB, 25% A, 25% B, 25% O

15. Hair color in humans (hint: look at your notes)

- a. Dark hair is dominant (D)
 b. Light hair is recessive (d)
 c. A Dd father and a Dd mother

| | | |
|---|----|----|
| | D | d |
| D | DD | Dd |
| d | Dd | dd |

- d. What color hair do the parents have? **Dark**
 e. What color hair do the children have? **75% Dark 25% Light**
 f. Is there only one gene that affects hair color in humans?
 g. What besides genes influences traits?

Environment

No, hair color is polygenic

DIHYBRID PUNNETT SQUARE PRACTICE PROBLEMS

Problem A: Suppose that black hair (B) is dominant over blonde hair (b) and brown eyes (E) are dominant over blue eyes (e).

The father has black hair (heterozygous) and brown eyes (heterozygous) and the mother has blonde hair and blue eyes.

Genotype of father - BbEe Genotype of mother - bbee

| | | | | |
|----|------|------|------|------|
| | BE | Be | bE | be |
| be | BbEe | Bbee | bbEe | bbee |
| be | | | | |
| be | | | | |
| be | ▼ | ▼ | ▼ | ▼ |

1. What percent of the offspring will be totally heterozygous? 25%
2. What is the phenotype ratio? 4:4:4:4
3. What percent of the offspring will have blonde hair and blue eyes? 25%

Problem B: Using the same traits as above, cross a completely recessive person with a blonde hair and homozygous brown eyed person.

| | | | | |
|----|------|------|------|------|
| | bE | bE | bE | bE |
| be | bbEe | bbEe | bbEe | bbEe |
| be | | | | |
| be | | | | |
| be | ▼ | ▼ | ▼ | ▼ |

1. What percent of the offspring will be totally heterozygous? 0%
2. What is the phenotype ratio? 0:0:16:0
3. What percent of the offspring will have blonde hair and blue eyes? 0%

Problem C: Yellow fruit and dwarf vines are recessive traits in tomatoes. Red fruit and tall vines are dominant. Complete a punnett square and answer the questions for a completely dominant red and tall plant crossed with a heterozygous red and dwarf plant. (You chose the letters you want to use) $RRTT \times Rr\cancel{t}t$

| | RT | RT | RT | RT |
|----------------|------------------|----|----|----|
| R T | RRT T | | | → |
| Rt | RRTt | | | → |
| r T | RrT T | | | → |
| rt | RrTt | | | → |

1. What percent of the offspring will be totally heterozygous? 25%
2. What is the phenotype ratio? 16:0:0:0
3. What percent of the offspring will have yellow fruit and dwarf vines?

Problem D: Using the same traits as above, cross a dwarf and homozygous red plant with a yellow and heterozygous tall plant. (You chose the letters you want to use)

$RR\cancel{t}t \times rrTt$

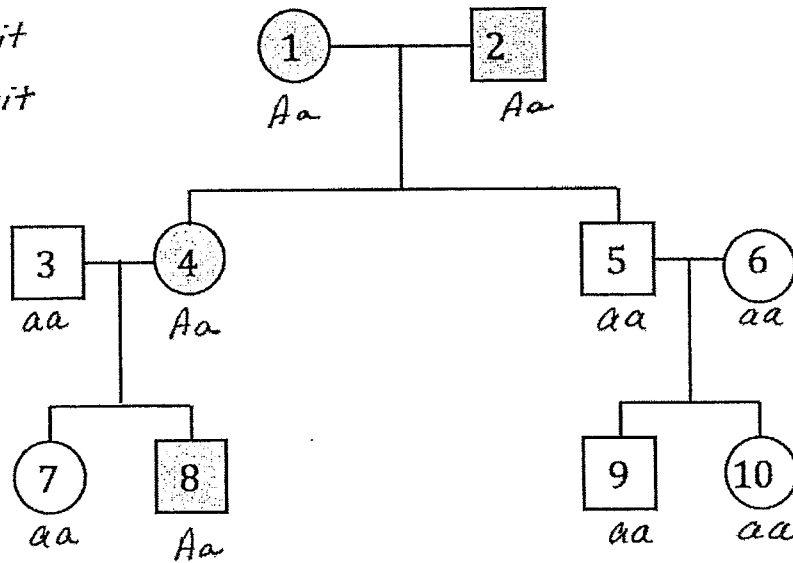
| | Rt | Rt | Rt | Rt |
|----------------|------------------|----|----|----|
| r T | RrT t | | | → |
| rT | RrTt | | | → |
| rt | Rrtt | | | → |
| rt | Rrtt | | | → |

1. What percent of the offspring will be totally heterozygous? 50%
2. What is the phenotype ratio? 8:8:0:0
3. What percent of the offspring will have red fruit and dwarf vines?

50%

The trait represented by the colored circles and squares below is inherited as a dominant gene. This is not a sex-linked trait. Shaded individuals show the dominant trait. What is the probably genotype of each individual?

A = dominant trait
 a = recessive trait



Are there any homozygous dominant individuals in the pedigree above? How do you know?

No. There is no possibility that any individual could inherit the dominant allele from each parent, and still produce offspring that are recessive.

What is the probability of the trait appearing in offspring if 7 should marry 9?

aa x aa
 (7) (9)

No possibility of the dominant trait appearing in their offspring.

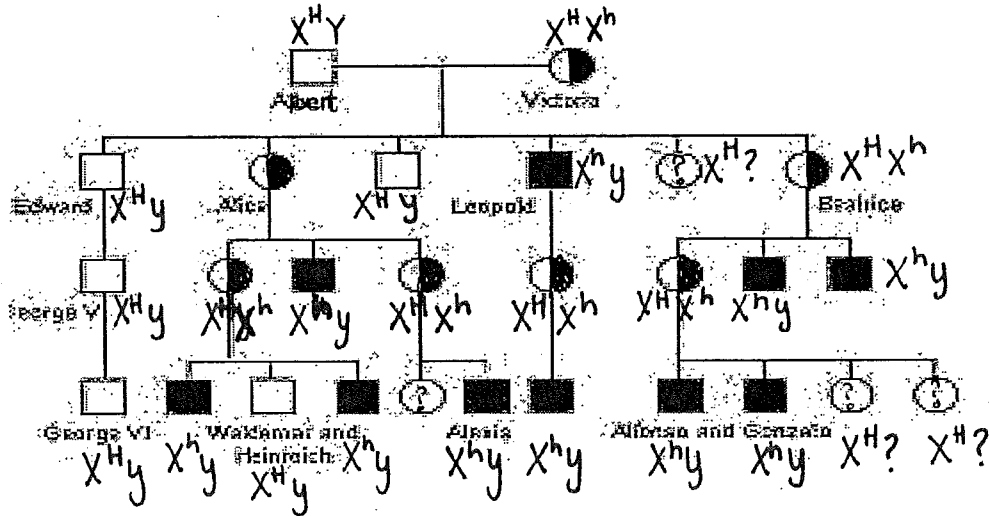
What is the probability of the trait appearing in offspring if 8 should marry 10?

Aa x aa
 (8) (10)

| | | |
|---|----|----|
| | A | a |
| a | Aa | aa |
| a | Aa | aa |

There is a 50% chance of the trait appearing in the offspring.

Queen Victoria was the world's most famous carrier of hemophilia. Her son, Leopold, and two carrier daughters, Alice and Beatrice, spread the gene fairly widely through the royal families of Europe, Prussia and Russia. Fortunately, no modern monarchs have inherited the allele. Indicate the ~~probable~~ genotypes of each of the people below. Remember, hemophilia is a sex-linked trait and shaded individuals have the disease.



The pedigree table below shows the blood types of three generations of family members. Notice that some of the blood type phenotypes have been given to you. What is the genotype of the individuals 1 - 6? Give the probable genotype of all other family members.

