Genetics Practice Quiz

**Given**

Use D or d to indicate the gene for **Darwin's Tubercle**
- The dominant allele = tubercle present
- The recessive allele = tubercle absent

Use E or e to indicate the gene for **Earlobe Form**
- The dominant allele = unattached earlobes
- The recessive allele = attached earlobes

Use P or p to indicate the gene for **PTC Tasting**
- The dominant allele = can taste PTC
- The recessive allele = cannot taste PTC

Use R or r to indicate the gene for **Tongue Form**
- The dominant allele = can roll tongue
- The recessive allele = cannot roll tongue

**SHOW YOUR WORK**

1. a. What is/are the genotype(s) of a person who is homozygous recessive for Tongue Form and is heterozygous for PTC Tasting?

   Pprr

   b. What is his/her phenotype?

   Can taste PTC and cannot roll tongue

2. a. What is/are the genotype(s) of a person who is heterozygous for Earlobe Form and heterozygous for Darwin's Tubercle?

   DdEe

   b. What is his/her phenotype?

   Has a tubercle and unattached earlobes

3. What is/are the genotype(s) of a person who can taste PTC and has attached earlobes?

   eePP or eePp (eeP _)

4. What kinds of gametes can be produced by an individual who is heterozygous for PTC Tasting?

   P and p

5. What kinds of gametes can be produced by an individual who is homozygous dominant for PTC Tasting and heterozygous for Tongue form?

   R
   P
   r
   Pr
   PR
6.

- Rudy is heterozygous for Marfan Syndrome

  (Marfan Syndrome is a dominant condition. Use M and m to indicate alleles).

  a. What is his genotype?  **Mm**

  b. What gametes can this individual produce?  **M** and **m**

- Rudy married Lily who does not have the syndrome.

  a. What is her genotype?  **mm**

  b. What gametes can this individual produce?  **m** and **m**

- Use the Punnett Square to determine the possible genotypes and phenotypes of their offspring.

```
  M   m
 m  Mm  mm
 m  Mm  mm
```

Genotype and ratio of offspring:  **1Mm : 1mm**

Phenotype and ratio of offspring:  **1Marfan : 1Normal**
7.
• An individual is heterozygous for tongue form and PTC tasting.

a. What is his/her genotype? PpRr

b. What gametes can this individual produce? PR, Pr, pR, pr

c. Assume this person marries another individual who is heterozygous for tongue rolling and PTC tasting.

➢ Use the Punnett square to determine the possible genotypes and phenotypes of their offspring.

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d. Answer the following questions.

♢ What fraction of their children will have the same genotype as their parents?

(PpRr) \( \frac{4}{16} = \frac{1}{4} \)

♢ What fraction of their children will be able to neither taste PTC nor roll their tongues

(pprr) \( \frac{1}{16} \)

♢ What fraction of their children will be not be able to roll their tongues, but will be able to taste PTC?

(P_rr) \( \frac{3}{16} \)
8. Assume that a male who is heterozygous for blood type A marries a woman who has type AB blood. What gametes will the male produce? **A and O**

The female? **A and B**

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Using the Punnett square provided, answer the following:

- What genotypes in what ratio will appear among their offspring? **1AA : 1AO : 1AB : 1BO**

- What phenotypes in what ratio will appear among their offspring? **2A : 1AB : 1BO**

9. This pedigree chart represents one form of a genetic syndrome known as Ichthyosis. Symptoms result from lack of an enzyme, and include scaly, brown lesions on the extremities and trunk. In the past, people with this condition sometimes were exhibited in circuses and sideshow an “alligator man.”

What kind of inheritance? **X-Linked Recessive**

Determine the genotype of individuals a through l.

- a. **X X**
- b. **X i**
- c. **X X**
- d. **X Y**
- e. **X X**
- f. **X Y**
- g. **X i**
- h. **X X**
- i. **X Y**
- j. **X X**
- k. **X X**
- l. **X i**
10. Roberto was in a serious car accident and when he was in the emergency room the doctor decided he needed a unit of blood. Roberto’s blood was sent to the lab for typing. Anti-A antibody was added to one test tube of his blood and Anti-B antibody was added to the other. No agglutination or clumping occurred in either sample.

a. What type blood does Roberto have? **Type O**

b. What type(s) of blood could be used in the transfusion? **Type O**

c. Why? Because people with Type O blood have both Anti-A and Anti-B antibodies, so they would have an adverse reaction with Type A, Type B or Type AB blood

11. The Red-R=Green Color Blind Gene is located on the X-Chromosome. The dominant allele codes for normal color vision and the recessive allele codes for red-green color-blindness.

➔ A red-green color-blind man who marries and has children with a woman with two dominant alleles for red-green color-blindness will never have red-green color-blind sons.

香菇 Use the Punnett Square to indicate why.

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12. You are a genetic counselor. Mary comes to talk to you because she has discovered that not only her mother's brother, but also her grandfather's sister had Tay-Sacks Disease. Her family tree is below.

First, you tell her what type of inheritance this is: **Autosomal Recessive**

Next, explain her potential genotype(s) **Tt or TT**

Do you think she should have genetic testing? Why or why not?

Yes, because if she is heterozygous and marries person who is also heterozygous they could have children with Tay-Sacks (tt)