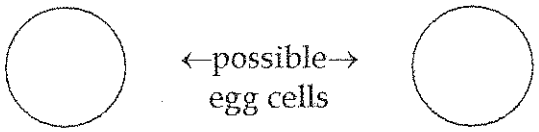
Name _____ Date _____ Pd. _____

PUNNETT POWER PRACTICE

Punnett squares show how genes are passed through haploid egg and sperm to offspring. They show all the possible genetic combinations that could result in offspring.

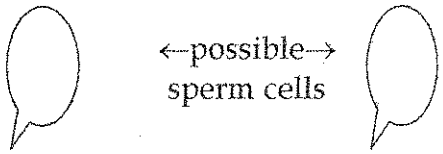
1. Attached earlobes is a dominant trait and free (dangling) earlobes is a recessive trait. A mother's genotype is Aa for attached earlobes. The father's genotype is aa for free earlobes.

Knowing that meiosis assures that a parent only passes on 1 allele to their offspring, label the 2 possible eggs this mother could produce.



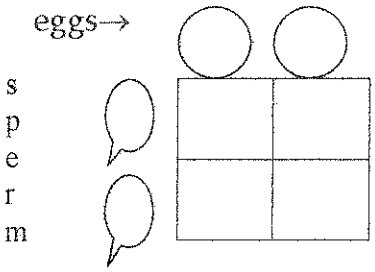
- How many different types of eggs can this mother produce? _____

Now do the same for the father's sperm:



- How many different types of sperm cells can this father produce? _____

Now draw a Punnett square showing the cross between this mother (Dd) and this father (dd).



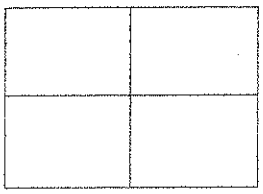
- What percentage of the offspring will have attached earlobes? _____
- What % of the offspring will have free earlobes? _____
- What % will be homozygous dominant? _____
- What % of the offspring will be heterozygous? _____
- What % of the offspring will be homozygous recessive? _____

2. A female cat is homozygous dominant for curly ears (EE). She mated with a male cat that is homozygous recessive (ee) and has straight ears.

   a) What is the female's phenotype? _____

   b) What is the male's phenotype? _____

   c) Create a Punnett square for the cross:

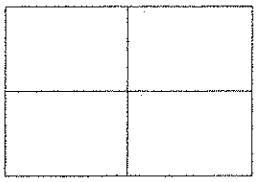


   d) What are the percentages for the possible genotypes? What are the percentages for the possible phenotypes?

Genotypes	Phenotypes
EE -	curly ears -
Ee -	
ee -	straight ears -

3. A recessive allele causes tigers to have no fur pigment (white) and crossed eyes. The dominant allele creates tigers with a normal appearance. A white female tiger (tt) mates with a male heterozygote (Tt) who has normal pigmentation and eyes.

   a) Complete this Punnett square:

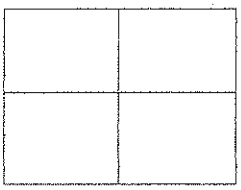


b) What are the percentages for the possible genotypes? What are the percentages for the possible phenotypes?

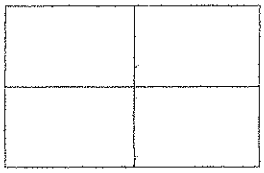
Genotypes	Phenotypes
TT -	White, cross-eyed -
Tt -	
tt -	Normal color/eyes -

4. Albinism (white skin/fur) in guinea pigs is a recessive trait (aa). Complete all four Punnett squares below. Draw a circle around the square that predicts 25% albino offspring.

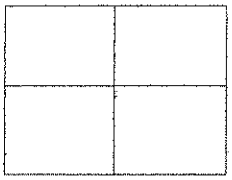
AA x Aa



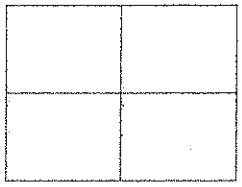
AA x aa



Aa x Aa



aa x aa



Let's kick it up a notch:

5. Suki and Billy Bob both cry when they are happy and when they are sad. (Sad movies are the worst.) They both have dimples, a dominant trait.

Using the letter D, what are their 2 possible genotypes? _____ or _____

They hope their children will have this genetic trait as well, since dimples help catch the tears rolling down their faces. They tell a genetic counselor that Suki's mom and Billy Bob's mom had dimples, but their fathers did not have dimples.

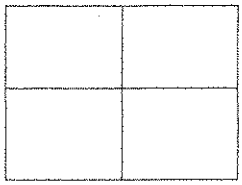
a) What was the genotype of Suki's father? _____ --Billy Bob's father? _____

b) Look at their father's genotype. What is the only allele that both Suki and Billy Bob could have inherited from their fathers?

_____

c) Suki and Billy Bob have the same genotype. What is it? _____

d) Draw a Punnett square to show Suki & Billy Bob's possible children.

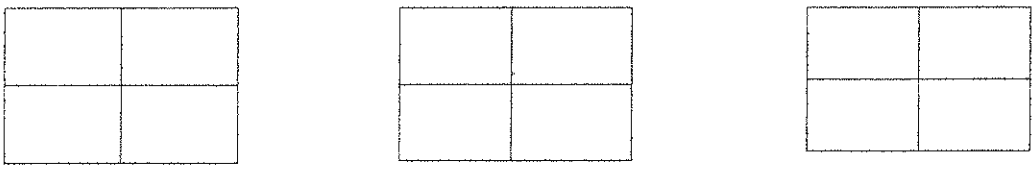


e) List all three genotypes below and their expected percentages.

f) List both phenotypes below and their expected percentages.

6. George has his own button pushing business. He is very good at his job because he has polydactyly, a dominant trait for extra fingers. George wants to get married and have kids and someday pass along his business to his children. He wants his children to have the same advantage in button pushing that he has. If George is heterozygous for polydactyly (Ff), who should he marry to ensure that all his kids (100%) will also have extra fingers? Complete the following Punnett squares and circle who George should marry.

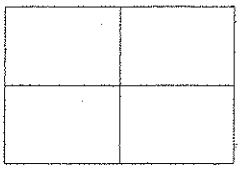
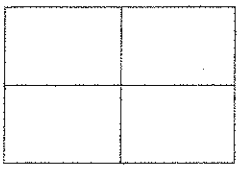
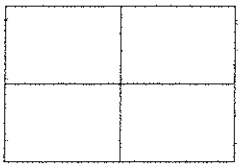
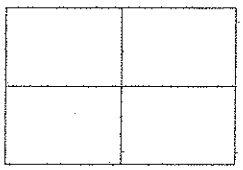
Betty (Ff) Sally (ff) Marge (FF)



7. The following problems show crosses of pea plants with known phenotypes. Using the information provided on the offspring produced, decide what the genotypes of the parents are. We will be looking at flower color where purple is dominant (F) and white is recessive (f).

FOLLOW THESE STEPS:

1. Fill in the offspring percentages.*
2. Complete the inside of the Punnett square by filling in offspring according to these percentages.
3. "Pull" the parents' genotypes "out" of the square (top and side)
4. Write the parents' genotypes in the blanks on the left.

Parents		Offspring
a) purple x white genotypes: _____x_____		22 purple, 21 white _____% purple, _____% white ↑ *start here ↑
b) white x white genotypes: _____x_____		0 purple, 19 white _____% purple, _____% white
c) purple x purple genotypes: _____x_____ or _____x_____		77 purple, 0 white _____% purple, _____% white
d) purple x purple genotypes: _____x_____		77 purple, 24 white _____% purple, _____% white