January 26, 2011

MENDEL is known as the father of genetics. To explore the manner that genetic information is passed and expressed from one generation to the next he chose PEA PLANTS as his experimental subject. He chose these organisms because they are easy to keep, the expression of their traits is obvious, and they reproduce SEXUALLY. Another term for reproductive cell is a GAMETE. In all sexually reproducing organisms, SPERM cells are male gametes and EGG cells are female gametes. Plants transport sperm cells in POLLEN grains that are released from the male reproductive structure called the ANTHER. These pollen grains are blown by the wind or carried by a pollinator and become attached to the female reproductive structure called the STIGMA. At the bottom of the pistil is the OVARY which is where female reproductive egg cells are located. When sperm cells meet egg cells FERTILIZATION occurs. A ZYGOTE. is the first cell that is created at fertilization. This zygote has 2 complete sets of genetic information—one from the mother, the other from the father. DNA is the molecule that serves as genetic information for all living things. DNA possesses a code that functions to direct PROTEIN making. This code is organized with numerous locations called GENES that hold the specific information for specific proteins. Since all sexually reproducing organisms possess 2 sets of genetic information, they much possess 2 genes for each protein or trait. There can be different forms of genes for a trait—these forms are called ALLELES. DOMINANT alleles will be expressed as a trait regardless of the other gene or allele that is inherited. RECESSIVE alleles will only be expressed if inherited with another recessive alleles. A GENOTYPE represents the combination of alleles that are

inherited for a given trait. If an individual inherits two dominant alleles, their genotype is HOMOZYGOUS DOM. If they inherit a dominant and a recessive allele, their genotype is HETEROZYGOUS. If they inherit two recessive alleles their genotype is HOMOZYGOUS REC. Finally, the actual physical expression of a genotype is called a PHENOTYPE

Name _____

PUNNET SQUARE PRACTICE

Directions—Complete each of the following punnet square problems in the space provided. Each punnet square will be graded out of four points with the following rubric:

1. One point for assigning the appropriate genotypes.
2. One point for assigning the appropriate haploid alleles to the punnet square.
3. One point for assigning the appropriate genotypic combinations for the offspring.
4. One point for recording the appropriate phenotypic ratios of the offspring.

1. A homozygous dominant black male is crossed with a heterozygous black female. What is the genotype and phenotype of the offspring?

B=Black
b=Red

2. A heterozygous green male plant is crossed with a heterozygous green female plant. What is the genotype and phenotype of the offspring?

G=green
g=yellow

3. A homozygous dominant brown male is crossed with a homozygous recessive red female. What are the genotypes and the phenotypes of the offspring?

B=brown
b=red

BB x bb

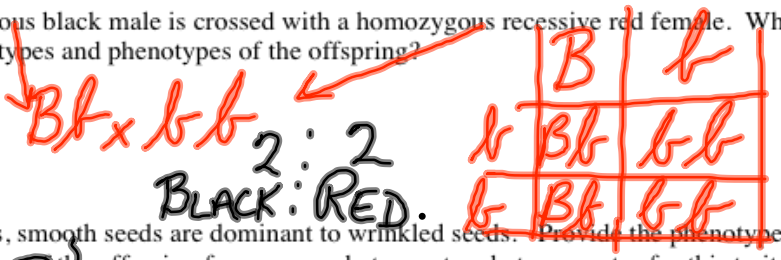
4:0

BROWN.

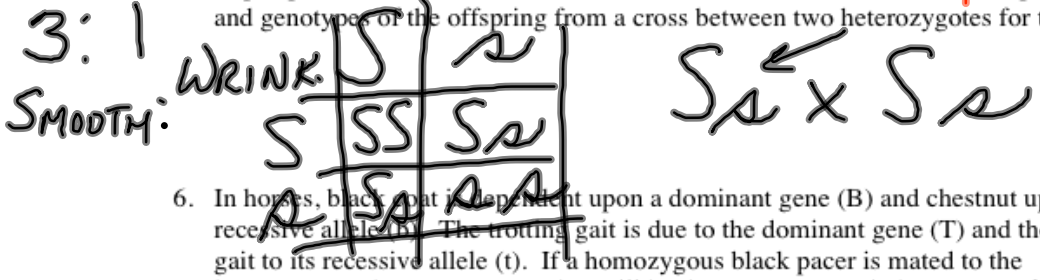
	B	B
b	Bb	Bb
b	Bb	Bb

4. A heterozygous black male is crossed with a homozygous recessive red female. What are the genotypes and phenotypes of the offspring?

B=black
b=red



5. In pea plants, smooth seeds are dominant to wrinkled seeds. Provide the phenotypes and genotypes of the offspring from a cross between two heterozygotes for this trait.



6. In horses, black coat is dependent upon a dominant gene (B) and chestnut upon its recessive allele (b). The trotting gait is due to the dominant gene (T) and the pacing gait to its recessive allele (t). If a homozygous black pacer is mated to the homozygous chestnut trotter, what will be the genotypes and phenotypes of the F1 offspring and in what proportions will they occur?

7. If two F1 horses from the previous problem were mated what would be the phenotypes and genotypes of the F2 horses and in what proportions would they occur?

8.Male checkered, red birds with the genotype CcBb were mated with females with the following genotypes: a. CCBB, b. ccBB c. Ccbb d. ccbb e. CcBb. Perform five separate dihybrid punnet squares to predict the genotypes and phenotypes of the offspring of each cross.

Name_____ Date_____ Period_____

More Punnett Squares
True Dominance vs Incomplete Dominance

Directions: Answer the following questions. Be sure for each question to
1. Set up a key (AA=, Aa=, aa=)
2. Determine the genotypes of the parents and set up the punnett square.
3. Fill in the punnett square to determine the genotypes of the offspring.
4. Give the genotypic and phenotypic ratios of the offspring.
5. Answer any additional questions asked in the question.

1. In Reepbops, nose color is an incompletely dominant trait. The homozygous dominant nose color is red, the homozygous recessive nose color is yellow and the heterozygous nose color is a blend of the two, orange. If you cross a red nosed reebop with a yellow nosed reebop, what will be the chance of having a red nosed offspring? Be sure to give the genotypic and phenotypic ratios before answering the question.

2. Reebops also have incomplete dominance controlling the number of humps. The homozygous dominant individuals have 3 humps, the homozygous recessive individuals have 1 hump and the heterozygous have 2 humps. What will the genotypic and phenotypic ratios be of a cross between two heterozygote parents?

3. Snapdragon flower color is an incompletely dominant trait. Homozygous dominant flowers are red, homozygous recessive flowers are white and the heterozygous flowers are pink. A flowerbed is planted and 50% of the flowers turn out to be white and 50% turn out to be pink. What were the colors of the parental generation of plants?

4. Red eye color is *Drosophilia* (fruit flies) is dominant, white eye color is recessive. A red-eyed fruit fly is mated with a white-eyed fly and the offspring produced are 50% red-eyed, 50% white-eyed. What is the genotype of the red-eyed parent?

5. A black-haired wolf (BB) is mated with a white-haired wolf (bb) and 100% of the offspring turn out to be gray. Is this an example of complete or incomplete dominance? Explain your answer. What will be the chance of having another black-haired wolf if 2 of the gray offspring are mated?

6. A long beaked bird (LL) is mated with a short beaked bird (ll). 100% of the offspring are long beaked. Is this an example of complete or incomplete dominance? Explain your answer. What will be the chance of having another long beaked bird if two of the offspring are mated?