Plastic Egg Genetics

Grade level: 6 - 12
Subject: Life Sciences, Genetics
Duration: one class period
Group size: up to 32 students
Setting: classroom

Content Standards:
California Science Content Standard for Public Schools
Life Science/Biology: Grade 7 – 2c, 2d, 2e; Grade 9-12 – 3a, 3c

Materials:

- 8 sets of all colored eggs (6 different colors) for a class size of 32
- corresponding colors and amount in candy or plastic pieces of some type, like buttons, centimeter cubes, or any colored manipulative that will fit. If you use candy, you will have to restock each egg, if you use plastic, you can use it from class to class and year to year.
- one basket for each group of four students to hold plastic eggs
- one worksheet copy for each student

Preparation:
Get some packages of plastic eggs (the kind that split into halves to fill with candy--they are usually available around Easter time) and some matching-colored gumballs, jellybeans, skittles, etc. to fill them. Get enough so that every student gets one or, preferably, two eggs each. Use the genotype and phenotype chart (for them) and key (for you) to accompany the activity. For example, the letters represent the color of HALF of the plastic egg. Using the chart, fill the eggs according to the key:

Chart: PP=purple
pp=pink
Pp=orange
BB=blue
bb=yellow
Bb=green
(an egg may be all purple, thus it is PP crossed with PP, or, it may be orange and pink, representing Pp x pp)

Teacher information page:

Setting up eggs:

1. Make all 12 color combinations per lab group of 4 students.
2. Inside each egg, place the 4 correct colored pieces to show the offspring. You can use candy, but I would use **plastic** pieces of some type, like buttons, centimeter cubes, or any colored manipulative that will fit. If you use candy, you will have to restock each egg, if you use **plastic**, you can use it from class to class and year to year.
3. From the basket at each lab table, each student will select 5 eggs, one at a time.
4. Students may work independently or with a partner, or a combination of both. Maybe have them do 3 together, and 2 on their own.

Answer key:

purple x purple = (PP x PP)= all (PP) or purple possibilities

purple x pink = (PP x pp)= all (Pp) or orange possibilities

pink x pink = (pp x pp)= all (pp) or pink possibilities

orange x orange = (Pp x Pp)= 1 purple (PP), 2 orange (Pp) and 1 pink (pp)

orange x purple = (Pp x PP)= 2 purple (PP) and 2 orange (Pp)

orange x pink = (Pp x pp)= 2 orange (Pp) and 2 pink (pp)

blue x blue = (BB x BB) = all (BB) or blue possibilities

blue x yellow = (BB x bb) = all (Bb) or green possibilities

blue x green = (BB x Bb) = 2 blue (BB) and 2 Green (Bb)

yellow x yellow = (bb x bb) = all yellow (bb) possibilities

green x yellow = (Bb x bb) = 2 green (Bb) and 2 yellow (bb)

green x green = (Bb x Bb) = 1 Blue (BB), 2 Green (Bb), and 1 yellow (bb)

Procedure:

1. Introduce the concepts of dominance, recessiveness, related terms, Punnett Squares, etc.

2. Place a basket of the eggs that you have prepared (one of each combination) to each lab station that contains four students.

3. From the basket at each lab table, each student will select 5 eggs, one at a time.

4. Put a chart up on the board or overhead that indicates what trait is represented by the color of each half of the egg they are holding.

5. Then, students examine their respective eggs, figure out the genotypes of their "parent" eggs, and do a Punnett Square to determine what offspring would be possible from such a cross. Students may work independently or with a partner, or a combination of both. Maybe have them do 3 together, and 2 on their own.

   For example, a (phenotypically) half pink and half purple egg would represent the genotype PP x pp, each half of the egg representing the genetic input of one parent. Then, students would do a Punnett Square to determine what offspring would be possible from such a cross. The Punnett Square calculation reveals that all of the offspring would be genotypically Pp, or phenotypically orange.

6. The candy inside would be appropriate colors to match the results of their Punnett Square so that they could check themselves to see if their calculations were correct.

Optional modifications:

You might use white candy to represent albinos or smash some of the candies to represent the incidence of mutation or genetic disease.

Resource:
http://www.accessexcellence.org/AE/ATG/data/released/0256-AnneBuchanan/

Name: _____ Date: _____

Plastic Egg Genetics

½ Egg Phenotype	½ Egg Genotype
Purple	PP
Orange	Pp
Pink	pp

½ Egg Phenotype	½ Egg Genotype
Blue	BB
Green	Bb
Yellow	bb

½ egg + ½ egg = 1 whole plastic egg

Directions:

1. On your lab table, there are a variety of plastic eggs.
2. **Choose** one egg, but do not open it yet.
3. **Record** the Phenotypes and Genotypes of your egg.
4. **Place** the genotypes of your egg into the Punnett Square.
5. **Determine** the genotypes and phenotypes of the offspring.
6. **Open** your egg – do your results match the results inside the egg?
    a. If yes, then place the egg back together and pick another egg!
    b. If no, check your work and make corrections.
7. Continue until you have completed **5 eggs**.

Example of how to fill in data:

Punnett Squares

Phenotype:

My egg is ½ Blue
and ½ Green

Genotype:

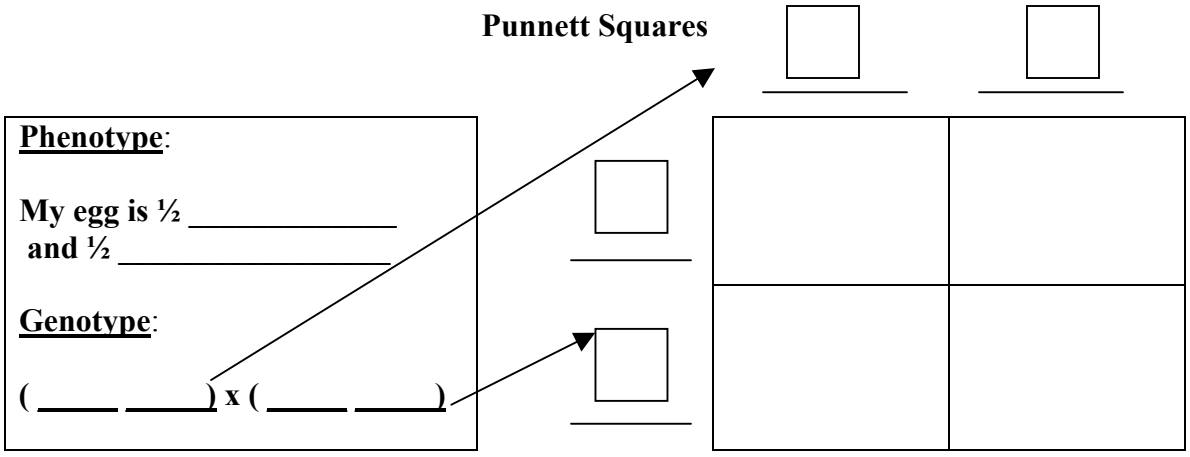
(B B) x (B b)

	B	**B**
B	**BB**	**BB**
b	**Bb**	**Bb**

My Results: 2 (BB) Blue and 2 (Bb) Green

Inside the Egg: **2 Blue Pieces and 2 Green Pieces**

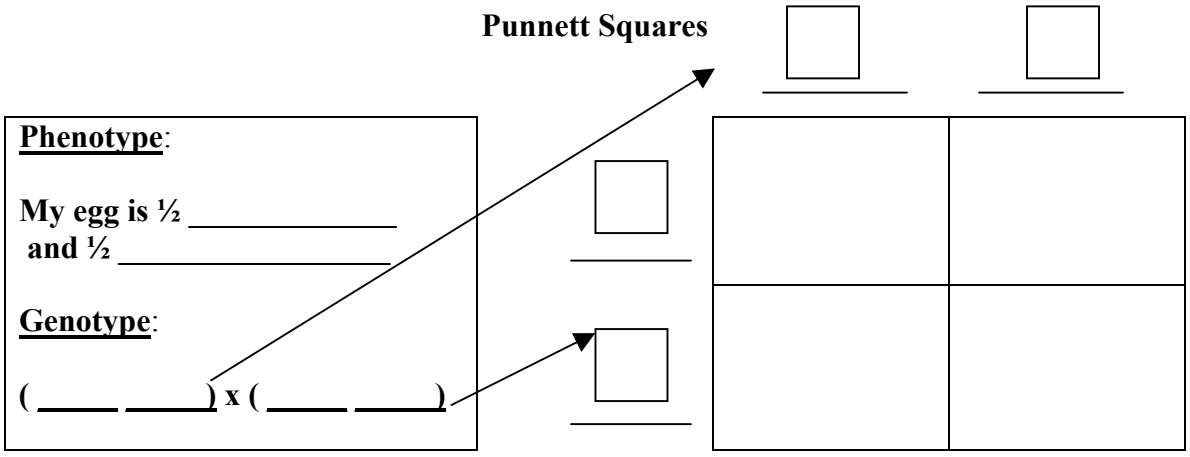
Punnett Squares



My Results: _____

Inside the Egg: _____

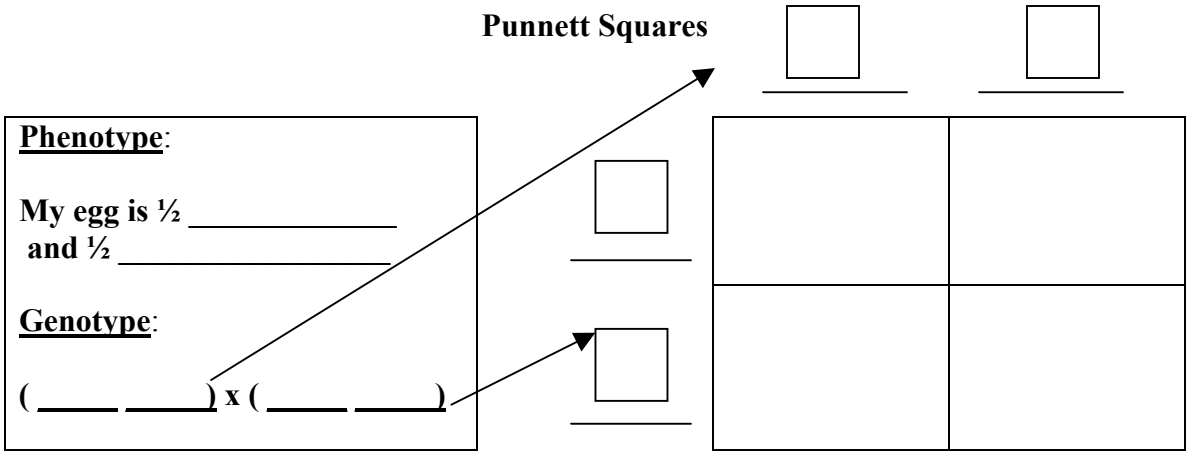
Punnett Squares



My Results: _____

Inside the Egg: _____

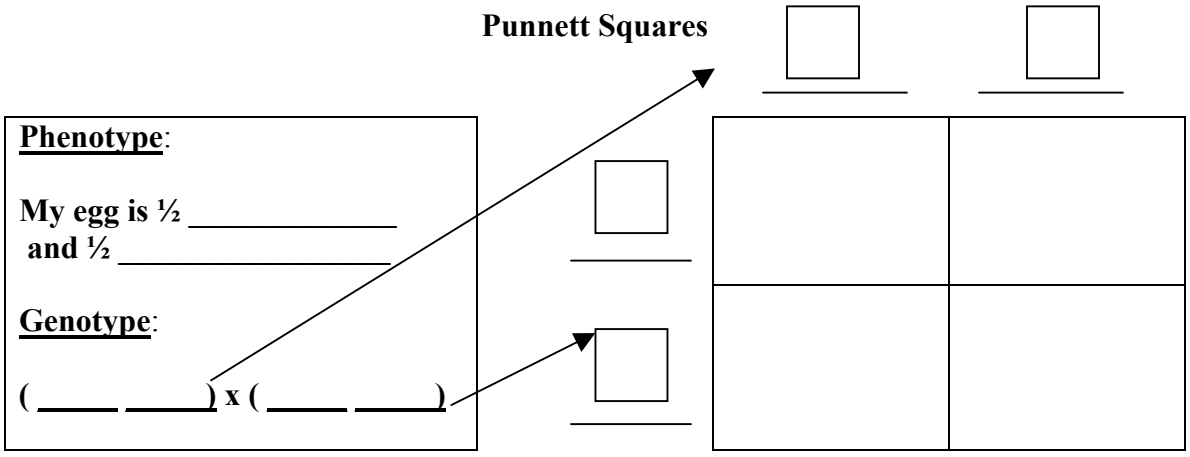
Punnett Squares



My Results: _____

Inside the Egg: _____

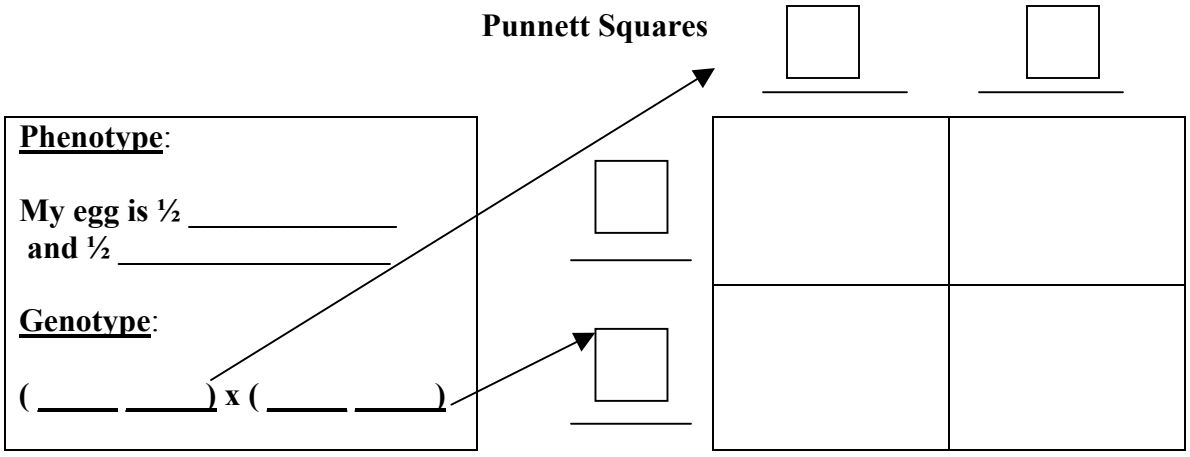
Punnett Squares



My Results: _____

Inside the Egg: _____

Punnett Squares



My Results: _____

Inside the Egg: _____

Results:

Egg	½ Color	Genotype	½ Color	Genotype	Results #XX	#Xx	# xx
Example	Blue	BB	Green	Bb	2 BB Blue	2Bb Green	
1							
2							
3							
4							
5							