

Sec: _____ Name: _____

Experiment: Determining The Sex and Some of the Traits of An Organism (B. Science 10-11-4a)

Purpose: To study how sex and some traits of offspring are.

Materials: 2 pennies tape

Methods:

Part A: Sex determination

1. Each human cell contains 23 pairs of chromosomes. One of these pairs is different in the male and female. What is the 23 third pair of chromosomes called?
2. Excluding the autosome chromosomes what is the genotype of the female?
3. Following meiosis, what sex chromosome will be in the eggs?
4. Excluding autosome chromosomes what is the genotype for the male?
5. What are the possibility of chromosomes in sperms following meiosis?
6. Now diagram the inheritance of sex chromosomes in the Punnett square. What is the probability that the offspring will be male? Of being female?
7. Now let's demonstrate the probability involved in sex determination. Tape an "X" on one side of a penny, and on the other side, tape a "Y". On another penny, tape an "X" on both sides. One lab partner will flip one coin, the other partner will flip the other coin to find out what chromosome will be in the offspring. Why must 2 coins be used?
8. Continue the flips for at least 30 times. Record the chromosome combination that appears each time in the table in results. What is the approximate ratio of genotypes obtained from flipping the pennies?

Part B: Determining Traits of Offspring

1. Use regular pennies without paper on them. We will let "heads" represent the dominant form of the gene, and "tails" the recessive. What are the two forms of the gene referred to as?
2. You and your lab partner (representing parents) should now flip your coins to determine the genotype of the offspring. Look at the table on the next page of your lab and place a check in the appropriate box in the table according to what appears on the two coins. Repeat for each trait. Now draw a picture of your "offspring".

Results: **Part A: Sex determination**

1. 23 rd pair: _____
3. in eggs: _____
5. in sperm: _____
6. male: _____
female: _____
7. why two coins: _____
8. ratio: _____

2. female: _____
4. male: _____
_____|_____|_____|_____|
_____|_____|_____|_____|
_____|_____|_____|_____|
x and x : _____
x and y : _____

picture of offspring

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Part B: Determining Traits of Offspring

1. Forms of gene called: _____
2. Now draw picture to the left.

Conclusions:

1. What is the predicted ratio of males to females, determined by the Punnett square?
2. What was the actual approximate ratio of males to females when you flipped the coins?
3. How come the actual ratio was somewhat different than the predicted ratio?

4. In part B of the experiment the coin has two alleles (two sides). When it lands only one allele is seen. What Mendelian genetic process is illustrated by having only one allele present.

Discussion:

1. Examine the Punnett square carefully. Which parent actually determines the sex of the offspring?

2. Why is it impossible, to predict accurately, the sex of one particular offspring?

3a. We have been illustrating how chance is what determines which gamete will combine with which gamete to form the sex of the offspring. Read Gen. 17: 15 - 19. According to this record, what other factor can determine the sex of the offspring?

3b. What is the name of the offspring in this story.

FRATERNAL

IDENTICAL



TWO eggs fertilized by different sperms divide into cells



that continue to divide and form separate masses of cells



that develop separately and have separate placentas and fetal sacs



ONE fertilized egg divides into two cells



that continue to divide and form a mass of cells



that separate

3c. What is the second aspect of the miracle involved in this text besides determining the sex of the offspring?

4. Examine the two different types of twins. Which of the two twins will result in two identical babies? (letter A or B)

5. Which of the two twins will result in two rather different babies? (letter A or B)

6. Name the two types of twins. As labeled in the diagram.

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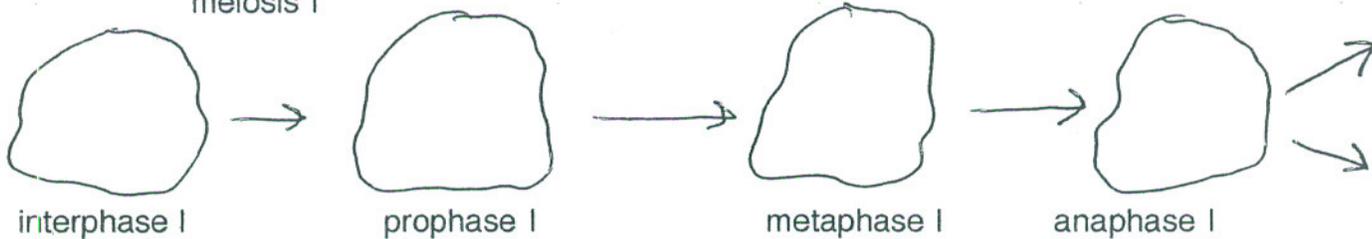
Results:

Part A: Crossing - Over

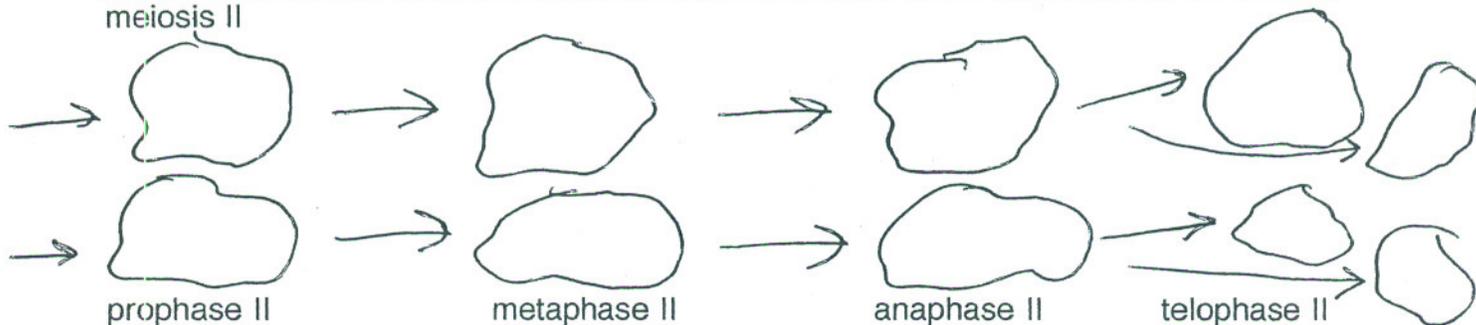
1. name: _____
2. represent: _____
3. more pairs: _____
4. together: _____
5. signature: _____
6. alleles: _____

Part B: The Process of Meiosis

meiosis I



meiosis II



Conclusions:

1. In what cells of the body does meiosis occur?
2. During which stages of the reproductive process does meiosis occur?
3. Shuffling of genetic information is a healthy process that helps one avoid disease. Name the process, during meiosis, that shuffles genetic information.

Discussion:

1. What is the significance of the meiosis process?
2. What would occur if there were no reduction of chromosomes number?
- 3a. Read Psalm 139: 13 - 16 and write out verse 13 - 14.
- 3b. What does verse 13 mean?
- 3c. Now concentrate on verse 16. This text suggest not only that God has a hand in making the child, that even before the child is formed He is involved. What biological process, that we have been recently studying, does this text suggest God is involved in? (Be specific).

