Schematic of chromosomal DNA in the nucleus of a cell

Gene A sequence: makes functional protein

Circle one. The cell is **prokaryotic/eukaryotic**?

Gene A sequence: makes NO protein

Circle one. The cell is **Haploid/diploid**?

*Note: For this question, chromosomes that are similar in size/shape are considered homologous chromosomes.*

Circle one. The cell is **homozygous/heterozygous** for the sequence provided.  **Note:** Compare the two sequences and see if they are same or different.

Circle one. Genotype of cell for Gene A: **AA/ Aa/ aa.**

9/24/18
Nucleus of a cell (genotype AaBb) undergoes **mitosis**.

1. DNA Replication (S phase)

2. Draw the alignment of chromosome during Metaphase

3. Draw the chromosome and show the arrangement of respective alleles in each daughter cell

9/24/18
Cell (genotype AaBbddd) undergoes **NON-disjunction during mitosis.**

DNA Replication (S phase)

Draw the alignment of chromosome during Metaphase

Draw the chromosome and show the arrangement of respective alleles in each daughter cell

Daughter cell 1

Daughter cell 2
Cell (genotype AaBbddd) undergoes **Meiosis**

### Replication

[Diagram showing replication of chromosomes]

- **Paternal homolog**: __________
- **Maternal homolog**: ______

### Alignment 1

- **Daughter cell 1**
  - A
  - B
  - D

- **Daughter cell 2**
  - a
  - b
  - d

### Alignment 2

- **Daughter cell 1**
  - A
  - B
  - D

- **Daughter cell 2**
  - a
  - b
  - d

### Draw two possible alignment of replicated chromosome during Metaphase-I (ASSUME NO RECOMBINATION)

Give the arrangement of alleles on chromosomes in the daughter cells produced from alignment 1 after **Meiosis I**
Meiosis question continued...

Daughter cell 1 from Meiosis 1 from alignment 1  

Daughter cell 2 from Meiosis 1 from alignment 1

Gamete 1  

Gamete 2  

Gamete 3  

Gamete 4

Give the genotype of each gamete

9/24/18
Cell (genotype AaBb) undergoes **Meiosis**

Replication

Draw the alignment of replicated chromosome during Metaphase-I **FOLLOWING RECOMBINATION**

Give the arrangement of alleles on chromosomes in the daughter cells **after Meiosis I**

Daughter cell 1 of Meiosis I  Daughter cell 2 of meiosis -I
Meiosis question continued...

Daughter cell 1 from Meiosis 1

- A
- B
- d

Daughter cell 2 from Meiosis 1

- a
- B
- d

Gamete 1: ABd
Gamete 2: Abd
Gamete 3: aBd
Gamete 4: abd

Give the genotype of each gamete

If the alleles of A and B gene assort independently, in what ratio would the above sets of gametes be produced? **1:1:1:1**

9/24/18
The following statements concern non-disjunction events during meiosis. Write “True” or “False” under each statement.

- Non-disjunction of homologs results in 4 abnormal gametes. T

- Non-disjunction of homologs results in 2 abnormal gametes. F

- Non-disjunction of chromatids in one daughter cell results in 2 normal and two abnormal gametes. T

- Non-disjunction of chromatids in one daughter cell results in 4 abnormal gametes. F
Summary: Monohybrid cross & Punnett square

Eye color $\rightarrow$ Phenotype
Gene A $\rightarrow$ Gene that regulates eye color
Allele A of Gene A $\rightarrow$ Regulates red eye color (dominant phenotype)
Allele a of Gene A $\rightarrow$ Regulates white eye color (recessive phenotype)

Parent 1 (red eye fly) (genotype: AA)
Parent 2 (white eye fly) (genotype: aa)

Genotype of gametes: “A”
Genotype of gametes: “a”

F1 offspring: red eye color, genotype “Aa”

Genotype of gamete from F1: “A” or “a” in equal ratio

Gametes from #2(F1) | Gametes from #1 (F1)
--- | ---
A | a
A | AA (Red) Aa (Red)
a | Aa (Red) aa (White)

Phenotype of F2: Red: white: 3:1
Genotype of F2: AA: 2Aa: aa

9/24/18
Monohybrid cross & Punnett square

Genotype of homozygous Parental plant that has green pears: **AA**

Genotype of homozygous Parental plant that has yellow pears: **aa**

Genotype of gametes from plant that has green pears: **A**

Genotype of gametes from plant that has yellow pears: **a**

**F1 offspring: green pear, genotype “Aa”**

<table>
<thead>
<tr>
<th>Gametes from #2(F1)</th>
<th>Gametes from #1 (F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><strong>A</strong></td>
</tr>
<tr>
<td><strong>a</strong></td>
<td><strong>a</strong></td>
</tr>
</tbody>
</table>

Genotypes ratio: **AA: 2Aa: aa**

Phenotype ratio: **Green (3): Yellow (1)**

Monohybrid cross of F1 X F1