3U Modelling Meiosis Activity

**Review**

1. Why do you need meiosis?

2. Define the following terms:

a) centromeres f) gametes

b) spindle fibers g) haploid

c) centrioles h) diploid

d) sister chromatids i) tetrad

e) homologous chromosomes j) crossing over

**Materials**

Plate, beads and 4 segments of pipe cleaners

**Procedure**

Using your plate as the cell and the 4 pipe cleaners as 2 pairs of homologous chromosomes (use beads to make 2 sets of matching sister chromatids) demonstrate how meiosis works. Make sure to include crossing over of the chromosomes. Once you have completed all stages of meiosis, demonstrate the two types of gametogenesis, make sure to show how many viable cells are produced.

**Observation (Meiosis)**

Working through the different stages draw what is occurring at each stage, give a description, state the number of chromosomes at each stage (if the cell is haploid, diploid or tetrad) in the tables provided and answer the questions

**Interphase**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

**Prophase I**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

**Metaphase I**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

1. How would your new cells be different if you had lined up the homologous chromosomes differently during this phase? (Hint: go back and try this and use an illustration to help explain your answer)

**Anaphase I**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

**Telophase I**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

**Prophase II**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

1. Explain the difference between prophase I and prophase II?

**Metaphase II**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

1. Explain the difference between metaphase I and metaphase II?

**Anaphase II**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

1. Explain the difference between anaphase I and anaphase II?

**Telophase II**

|  |  |  |  |
| --- | --- | --- | --- |
| Diagram | Description | Number of chromosomes | Haploid, Diploid or Tetrad |
|  |  |  |  |

1. Explain the difference between telophase I and telophase II?

**Analysis**

1) Are cells genetically identical?

2) How many chromosomes would be in a human egg or sperm cell at the end of meiosis II?

3) What do you think would be a consequence of chromosomes exchanging unequal amounts of DNA?

4) What are two reasons why meiosis is important in sexual reproduction?

5) Which part of meiosis (I or II) is responsible for halving the number of chromosomes?

6) What are two elements of meiosis that add variation to our population?

7) When does crossing over occur? How did you model this?

8) If the number of chromosomes were not reduced during meiosis, how many chromosomes would a human zygote have?

**Presentation**

In your group of 3, choose 1 of the stages of meiosis I to present to the class. You are each to present a different stage in Meiosis I in the correct order (and your teacher will present 1 stage). Describe what is occurring at your chosen stage, and give a description of the positions of the chromosomes in the cell, and state the number of chromosomes at each stage.