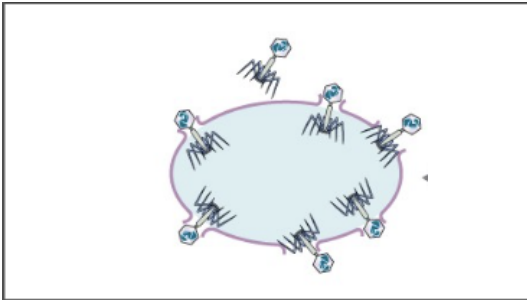


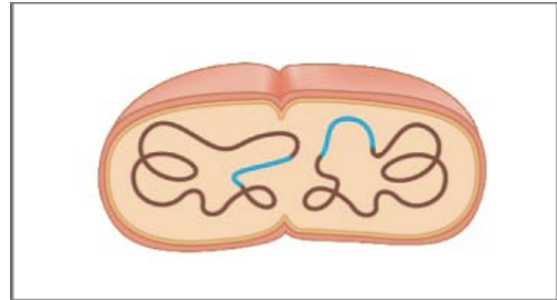
## Review Questions for Exam 2

1. (A) Describe two differences between the lytic cycle and the lysogenic cycle.
  - The lytic cycle results in death of the host cell, while the lysogenic cycle does not.
  - In the lytic cycle, the host DNA is degraded. In the lysogenic cycle, the virus incorporates its DNA into the host genome.
  - In the lytic cycle, the virus replicates within the host cell; virus particles are then released through lysis. In the lysogenic cycle, the virus is replicated when the host cell divides.

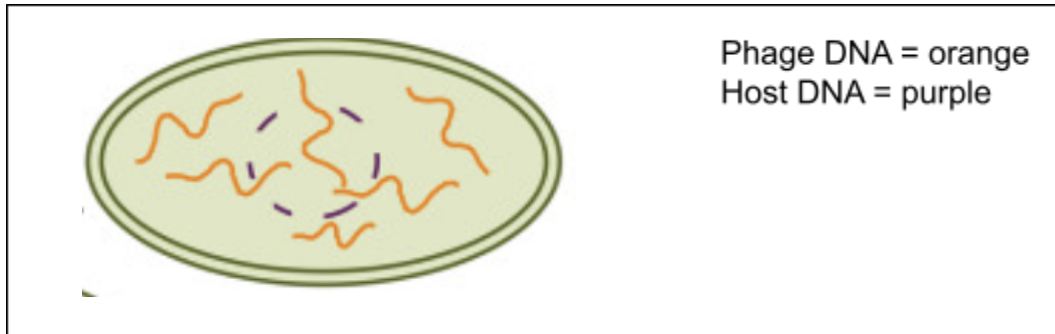
(B) For each image below, indicate whether the phage is in the lytic cycle or the lysogenic cycle. Briefly explain your answer.



Lytic; virus production is resulting in lysis of the host cell

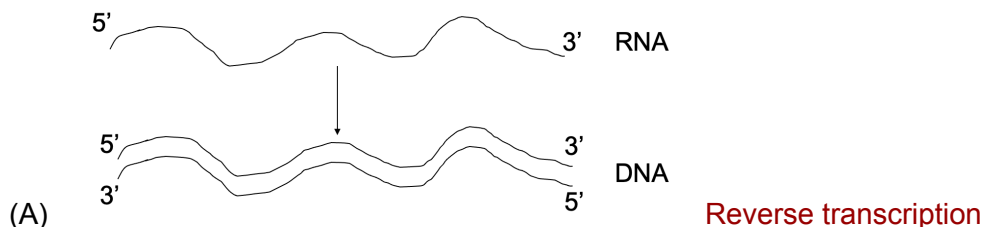


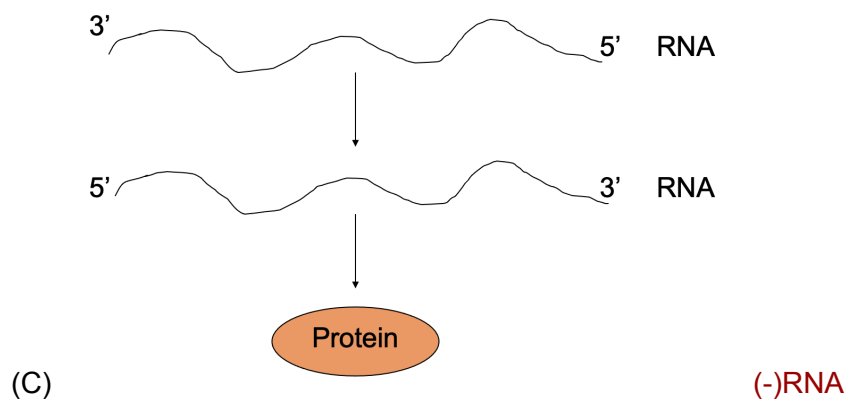
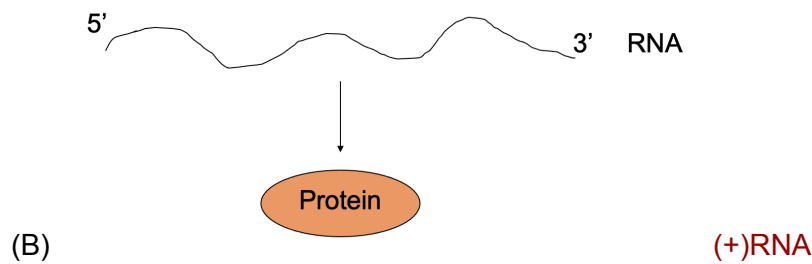
Lysogenic; viral genome is integrated into the host genome



Lytic; host DNA has been degraded

2. Label the following diagrams to indicate whether it depicts (+)RNA, (-)RNA, or reverse transcription.





3. Beside each stage of mitosis or meiosis listed below, note the DNA content present in the cell. As an example of how to do this: A haploid cell has 1X DNA content (one copy of each gene), and a diploid cell has 2X DNA content (two copies of each gene). After undergoing replication, a diploid cell has 4X DNA content.

(A) Metaphase II of meiosis 2X

(B) Prophase of mitosis 4X

(C) After Telophase I of meiosis (i.e., in the daughter cells) 2X

(D) After Telophase of mitosis (i.e., in the daughter cells) 2X

(E) Prophase I of meiosis 4X

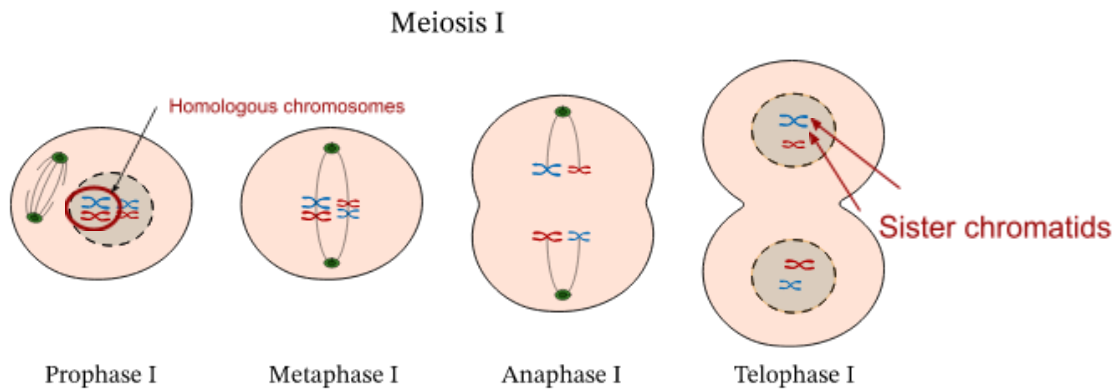
(F) Interphase of mitosis 4X

(G) After Telophase II of meiosis (i.e., in the daughter cells) 1X

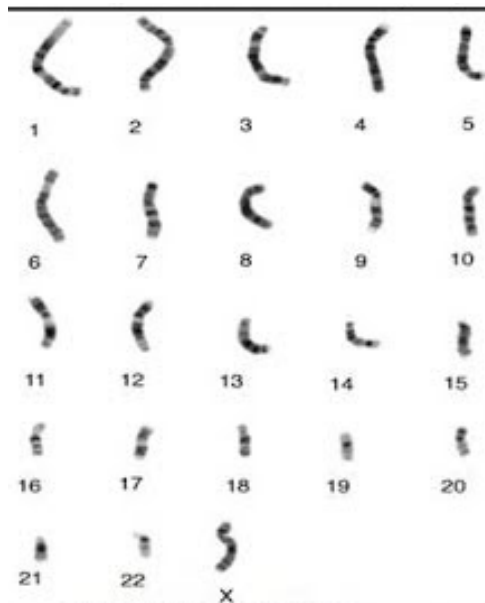
4. (A) What is the difference between homologous chromosomes and sister chromatids?

Homologous chromosomes consist of maternal and paternal copies of a chromosome. Homologous chromosomes are not genetically identical to one another. Sister chromatids are identical copies of the same chromosome. Sister chromatids are linked at the centromere.

(B) Label at least one pair of homologous chromosomes and at least one pair of sister chromatids in the picture below.



5. The image below shows the chromosome content of a cell with chromosomes arranged in order of size (this is called a karyotype). Is this cell haploid or diploid? Explain your answer.



Haploid - it only contains one of each chromosome!

6. Fill in the table below contrasting mitosis and meiosis. For rows that refer to the products of meiosis, daughter cells, etc., assume that we are referring to Meiosis II.

	Mitosis	Meiosis
Number of daughter cells	2	4
Number of cell divisions	1	2
Daughter cells contain homologous chromosomes.	Yes	No
Daughter cells are genetically identical to one another.	Yes	No
Crossing over occurs.	No	Yes

7. You go to the plant store and purchase two plants of the same species. One plant has pink flowers, and the other has white flowers. The florist tells you that they are “true-breeding,” meaning that they are homozygous for flower color. As a curious biologist, you would like to know whether the allele for pink flowers is dominant or recessive.

(A) Describe the test cross you would do to determine whether pink flowers are dominant to white flowers, or vice versa.

Since both plants are true-breeding, you can do a test cross using the plants that you purchased. If pink flowers are dominant, then all of their progeny will have pink flowers. Conversely, if white flowers are dominant, then all of their progeny will have white flowers.

(B) Let's say your test cross from part (A) shows that pink flowers are dominant to white flowers. If you were to cross two plants from the F1 generation in part (A), what results would you expect? Clearly indicate the genotypes and phenotypes of the parents and progeny, and show your work using a Punnett square.

Because pink flowers are dominant to white flowers, both parents (from the F1 generation) will have pink flowers, and their genotype is Aa. The genotypes of their progeny will be  $\frac{1}{4}$  AA,  $\frac{1}{2}$  Aa, and  $\frac{1}{4}$  aa.  $\frac{3}{4}$  of their progeny will have pink flowers, and  $\frac{1}{4}$  will have white flowers.

	A	a
A	AA	Aa
a	Aa	aa

8. Bill and Maggie are considering having a child, and, since you are a geneticist, they ask you about the probability that their child will have dark or light eyelashes. Bill has dark eyelashes, and Maggie has light eyelashes. You know that dark eyelashes are dominant to light eyelashes. What would you tell them?

You can't give them a definitive answer without knowing Bill's genotype. Since Bill has dark eyelashes, his genotype is either AA or Aa. If Bill's genotype is AA, then it is certain that their child will have the genotype Aa and have dark eyelashes. If Bill's genotype is Aa, then there is a 50% chance that their child will have the genotype Aa and have dark eyelashes, and a 50% chance that their child will have the genotype aa and have light eyelashes.