

CHAPTER

6

CONCEPT MAPPING

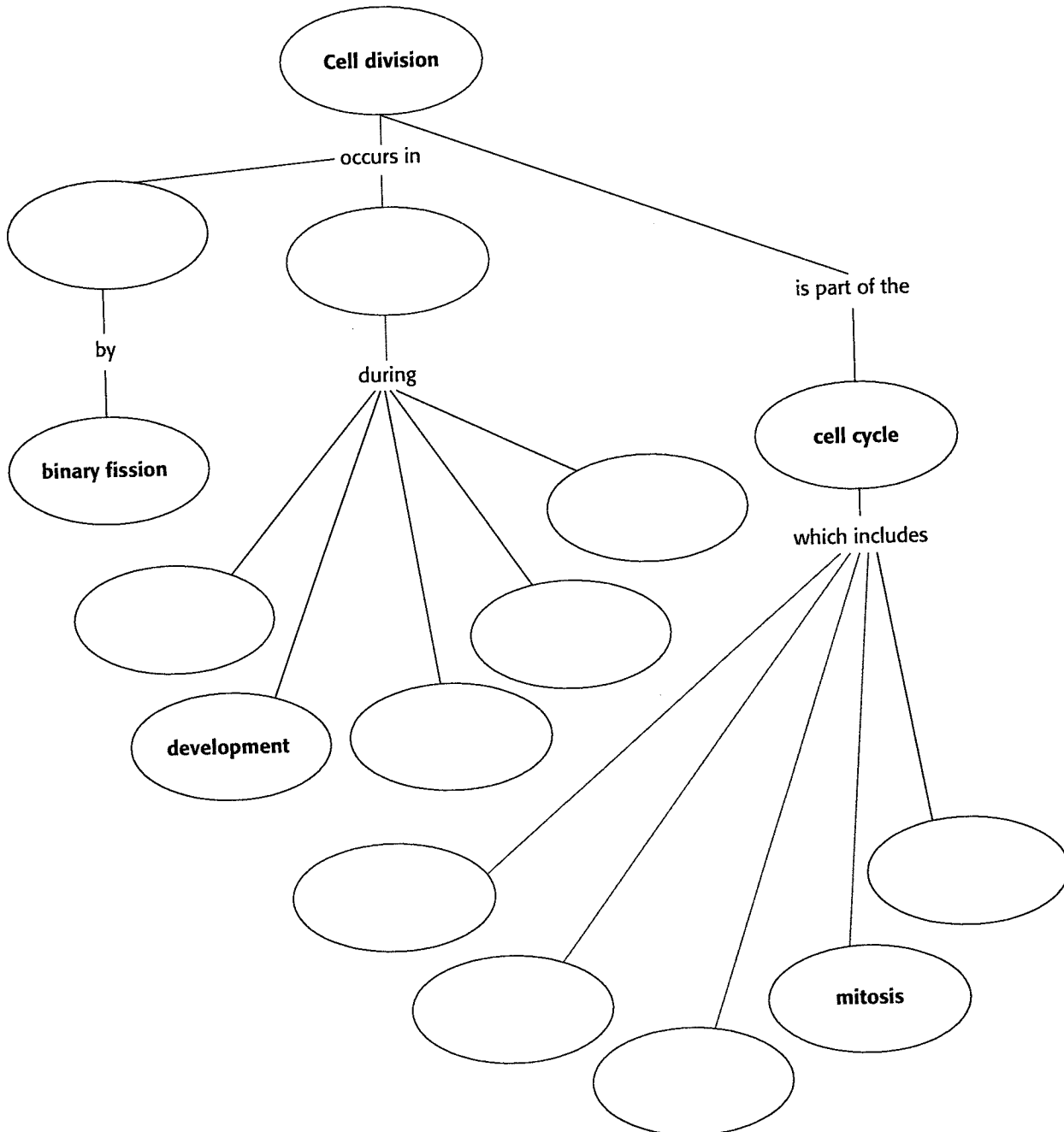
Chromosomes and Cell Reproduction

Using the terms and phrases provided below, complete the concept map showing the principles of cell division.

asexual reproduction
 cytokinesis
 eukaryotes
 first growth phase

growth
 prokaryotes
 repair
 second growth phase

sexual reproduction
 synthesis phase



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CHAPTER

7

TEST PREP PRETEST

Meiosis and Sexual Reproduction

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. An advantage of sexual reproduction is that
 - a. many offspring are produced in a short time.
 - b. it increases genetic diversity.
 - c. production of gametes requires energy.
 - d. organisms remain stable in a changing environment.

- _____ 2. Crossing-over occurs

<ol style="list-style-type: none"> a. during prophase II. b. during fertilization. 	<ol style="list-style-type: none"> c. during prophase I. d. at the centromere.
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- _____ 3. Cytoplasm divides unequally in meiosis during production of

<ol style="list-style-type: none"> a. gametes. b. sperm cells. 	<ol style="list-style-type: none"> c. cytokinesis. d. egg cells.
--	--

- _____ 4. The zygote is the only diploid cell in

<ol style="list-style-type: none"> a. the haploid life cycle. b. asexual reproduction. 	<ol style="list-style-type: none"> c. the diploid life cycle. d. animals.
--	---

- _____ 5. Which of the following does NOT provide new genetic combinations?

<ol style="list-style-type: none"> a. random fertilization b. cytokinesis 	<ol style="list-style-type: none"> c. independent assortment d. crossing-over
---	---

- _____ 6. Which of the following is NOT a type of asexual reproduction?

<ol style="list-style-type: none"> a. budding b. fragmentation 	<ol style="list-style-type: none"> c. fission d. alternation of generations
--	---

- _____ 7. If, during an animal's life cycle, the gametes are the only haploid cells, the life cycle is

<ol style="list-style-type: none"> a. alternation of generations. b. a haploid life cycle. 	<ol style="list-style-type: none"> c. a diploid life cycle. d. mutated.
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- _____ 8. DNA replication occurs
 - a. after telophase I.
 - b. prior to prophase I.
 - c. in both meiosis I and meiosis II.
 - d. when the chromosomes align at the cell's equator.

- _____ 9. In telophase II, cytokinesis results in

<ol style="list-style-type: none"> a. two haploid cells. b. two diploid cells. 	<ol style="list-style-type: none"> c. four haploid cells. d. four diploid cells.
--	--

- _____ 10. Asexual reproduction produces

<ol style="list-style-type: none"> a. clones. b. spores. 	<ol style="list-style-type: none"> c. gametophytes. d. polar bodies.
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In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|----------------------------------|---|
| _____ 11. gametophyte | a. random distribution of homologous chromosomes during meiosis |
| _____ 12. crossing-over | b. multicellular, haploid phase in alternation of generations |
| _____ 13. life cycle | c. a method of asexual reproduction in which the body breaks in several pieces |
| _____ 14. clone | d. produces spores in the diploid phase of a plant's life cycle |
| _____ 15. independent assortment | e. small cell with very little cytoplasm that is formed during oogenesis and eventually dies |
| _____ 16. spore | f. all copies of the single parent's genes are passed to the offspring |
| _____ 17. spermatogenesis | g. portions of a chromatid on one homologous chromosome break off and trade places with the corresponding portion on one of the chromatids of the other homologous chromosome |
| _____ 18. sporophyte | h. the process by which gametes are produced in male animals |
| _____ 19. polar body | i. new individuals split off from existing ones |
| _____ 20. fragmentation | j. the union of sperm and egg cells to produce a diploid zygote |
| _____ 21. oogenesis | k. the activities in the life of an organism from one generation to the next |
| _____ 22. budding | l. haploid reproductive cell of plants |
| _____ 23. anaphase I | m. offspring that is genetically identical to its parent |
| _____ 24. fertilization | n. female gamete, also called an egg |
| _____ 25. asexual reproduction | o. the process by which gametes are produced in female animals |
| _____ 26. ovum | p. homologous chromosomes move to opposite poles of the cell |

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Complete each statement by writing the correct term or phrase in the space provided.

27. Asexual reproduction limits _____ diversity.
28. Spermatogenesis produces _____ sperm cells.
29. _____, although not part of meiosis, increases the number of possible genetic combinations.
30. Asexual reproduction methods include _____, fragmentation, and _____.
31. In the haploid life cycle, gametes are produced by _____, and the zygote is produced by _____.

CHAPTER

8

DIRECTED READING

Mendel and Heredity

► Section 8-1: The Origins of Genetics

Mendel and Others Studied Garden-Pea Traits

Read each question, and write your answer in the space provided.

1. What did T. A. Knight discover?

2. How did Mendel's scientific work differ from the work of T. A. Knight?

3. What are three reasons the garden pea is a good subject for studying heredity?

Mendel Observed that Traits Are Expressed as Simple Ratios

Mark each statement below T if it is true or F if it is false.

- _____ 4. A monohybrid cross is a mating that considers one pair of contrasting traits.
- _____ 5. Cross-pollination assures that each variety of garden pea is true-breeding.
- _____ 6. The P generation consists of the first two individuals that are crossed in a breeding experiment.
- _____ 7. In Mendel's experiment in which he cross-pollinated two P generation plants that had contrasting forms of a trait, the F₁ generation showed both forms of the trait.
- _____ 8. The F₂ generation in Mendel's experiment was obtained by cross-pollinating the F₁ generation.
- _____ 9. The F₂ generation in Mendel's experiment showed both forms of the trait in a ratio of 1:1.

► Section 8-2: Mendel's Theory

Mendel's Work Became a Theory of Heredity

In the space provided, write the letter of the description that best matches the term or phrase.

- | | | |
|-------|-----------------|--|
| _____ | 1. alleles | a. when two different alleles are present, the allele that is completely expressed |
| _____ | 2. dominant | b. when two alleles of a particular gene are the same |
| _____ | 3. recessive | c. when two alleles of a particular gene are different |
| _____ | 4. homozygous | d. an organism's physical appearance |
| _____ | 5. heterozygous | e. the set of alleles that an organism has |
| _____ | 6. genotype | f. different versions of a gene |
| _____ | 7. phenotype | g. when two different alleles are present, the allele that has no observable effect on the organism's appearance |

Complete each statement by writing the correct term or phrase in the space provided.

8. If the allele for yellow peas is Y , the allele for the contrasting trait, green peas, is _____ .
9. If Tt is the genotype of a plant, where T stands for tall and the recessive allele stands for short, its phenotype is _____ .
10. If tt is the genotype of a plant, where T stands for tall and the recessive allele stands for short, its phenotype is _____ .

Mendel's Ideas Gave Rise to the Laws of Heredity

Read each question, and write your answer in the space provided.

11. What is the law of segregation?

12. What is the law of independent assortment?

► Section 8-3: Studying Heredity

Punnett Squares Can Predict the Expected Results in Crosses

Complete each statement by writing the correct term or phrase in the space provided.

1. The Punnett square in Figure 8-9 shows that _____ the offspring will be heterozygous.
2. The Punnett square in Figure 8-10 shows that _____ of the offspring will have yellow seeds.
3. In a test cross to determine if an individual with a dominant phenotype is heterozygous or homozygous for the trait, you always cross the individual with a homozygous _____ individual.
4. If the offspring of a test cross all have the dominant trait, then the genotype of the individual being tested is _____ .
5. If some of the offspring of a test cross have the recessive trait, then the genotype of the individual being tested is _____ .

Probabilities Can Also Predict the Expected Results of Crosses

Complete each statement by writing the correct term or phrase in the space provided.

6. The probability that a gamete from a plant with a Tt genotype will carry a t allele is _____ .
7. The probability of homozygous recessive offspring resulting from a cross between two homozygous dominant individuals is _____ .
8. The probability of heterozygous offspring resulting from a cross between two heterozygous individuals is _____ .

Family Pedigrees Can Be Used to Study How Traits Are Inherited

Read each question, and write your answer in the space provided.

9. When studying a pedigree, how do scientists determine if a trait is sex-linked or autosomal?

10. When studying a pedigree, how do scientists determine if a trait is dominant or recessive?

CHAPTER

9

CONCEPT MAPPING

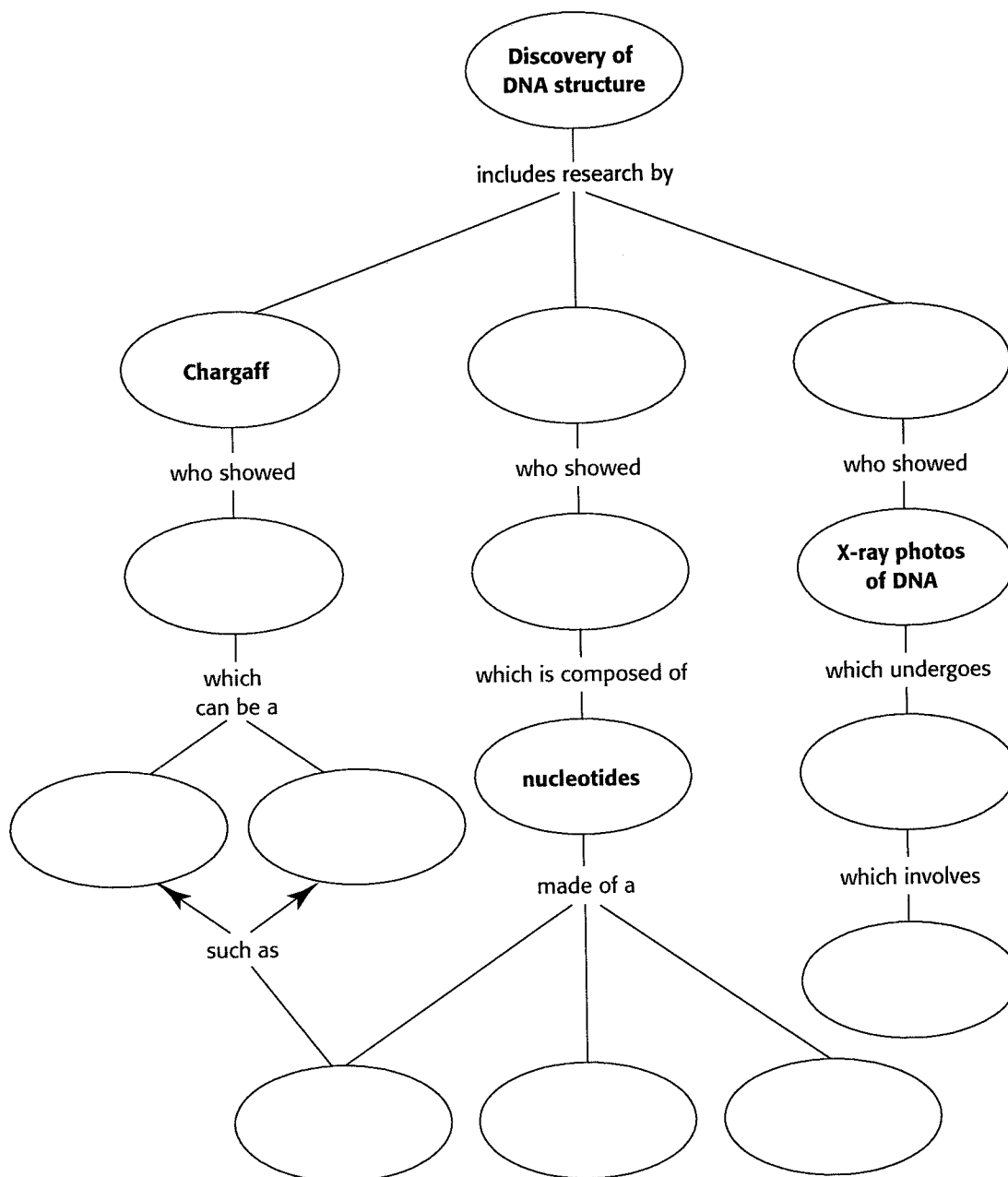
DNA: The Genetic Material

Using the terms and phrases provided below, complete the concept map showing the discovery of DNA structure.

amount of base pairs
DNA polymerases
double helix
five-carbon sugar

Franklin and Wilkins
nitrogen base
phosphate group
purine

pyrimidine
replication
Watson and Crick



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CHAPTER

10

DIRECTED READING

How Proteins Are Made

► Section 10-1: From Genes to Proteins

Proteins Are Made by Decoding the Information in DNA

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|---------------------------------|--|
| _____ 1. ribonucleic acid (RNA) | a. the entire process by which proteins are made |
| _____ 2. uracil | b. a molecule made of linked nucleotides |
| _____ 3. transcription | c. the process of reading instructions on an RNA molecule to put together the amino acids that make up a protein |
| _____ 4. translation | d. the process of transferring a gene's instructions for making a protein to an RNA molecule |
| _____ 5. gene expression | e. a nitrogen base used in RNA instead of the base thymine found in DNA |

Transcription Transfers Information from DNA to RNA

Complete each statement by underlining the correct term or phrase in the brackets.

6. Transcription begins when [RNA / RNA polymerase] binds to the gene's promoter.
7. RNA polymerase adds complementary [DNA / RNA] nucleotides as it "reads" the gene.
8. In eukaryotes, transcription takes place in the [nucleus / cytoplasm].

Read each question, and write your answer in the space provided.

9. What are two differences between transcription and DNA replication?

10. What determines where on the DNA molecule transcription begins and where it ends?

The Genetic Code Is Written in Three-Nucleotide “Words”

In the space provided, explain how the terms in each pair are related to each other.

11. RNA, messenger RNA

12. codons, genetic code

Complete each statement by writing the correct term or phrase in the space provided.

13. Figure 10-4 indicates that UAU is the mRNA codon for _____ .

14. The mRNA codon for starting transcription is _____ .

Many RNAs Are Used to Make a Protein

Study the following six steps in the synthesis of proteins. Determine the order in which the steps take place. Write the number of each step in the space provided.

- _____ 15. The codon in the vacant A site receives the tRNA molecule with the complementary anticodon. The tRNA carries the amino acid specified by the codon.
- _____ 16. Steps 2–5 are repeated until a stop codon is reached. The newly made protein is released into the cell.
- _____ 17. The tRNA at the P site detaches, leaves behind its amino acid, and moves away from the ribosome.
- _____ 18. Enzymes help form a peptide bond between the amino acids of adjacent tRNA molecules.
- _____ 19. The tRNA (with its protein chain) in the A site moves over to fill the empty P site. A new codon is present in the A site, ready to receive the next tRNA and its amino acid.
- _____ 20. An mRNA, two ribosomal subunits, and a tRNA carrying a modified form of the amino acid methionine bind together. The tRNA bonds to the “start” codon AUG.

► Section 10-2: Gene Regulation and Structure

Protein Synthesis in Prokaryotes Is Controlled by “On-Off” Switches

Complete each statement by writing the correct term or phrase in the space provided.

1. To break down lactose, *Escherichia coli* need three different _____, each of which is coded for by a different gene.
2. The three genes are located next to each other and all are controlled by the same _____ site.
3. The piece of DNA that overlaps the promoter site and serves as the on-off switch is called a(n) _____.
4. The group of genes that codes for enzymes involved in the same function, their promoter site, and the operator all function together as a(n) _____.
5. The operon that controls the metabolism of lactose is called the _____.
6. A(n) _____ is a protein that binds to an operator and physically blocks RNA polymerase from binding to a promoter site.

The Control of Protein Synthesis in Eukaryotes Is Complex

Read each question, and write your answer in the space provided.

7. What are enhancers?

8. Why is there more opportunity for gene regulation in eukaryotic cells than in prokaryotic cells?

9. Why have no operons been found in eukaryotic cells?





10. When can gene regulation occur in eukaryotic cells?

DNA Coloring Page

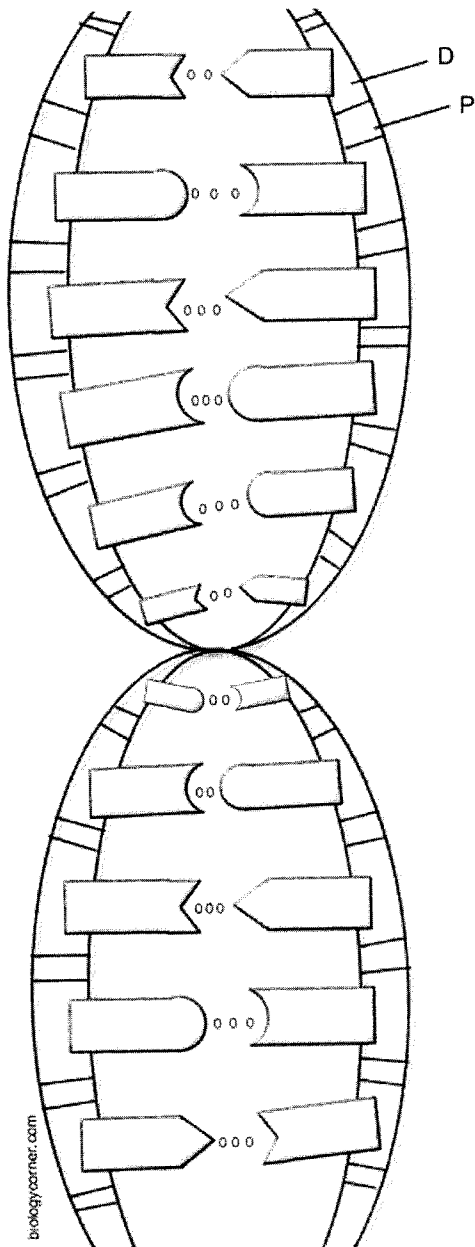
Use the following key to color the DNA Strand

Color deoxyribose (D) blue

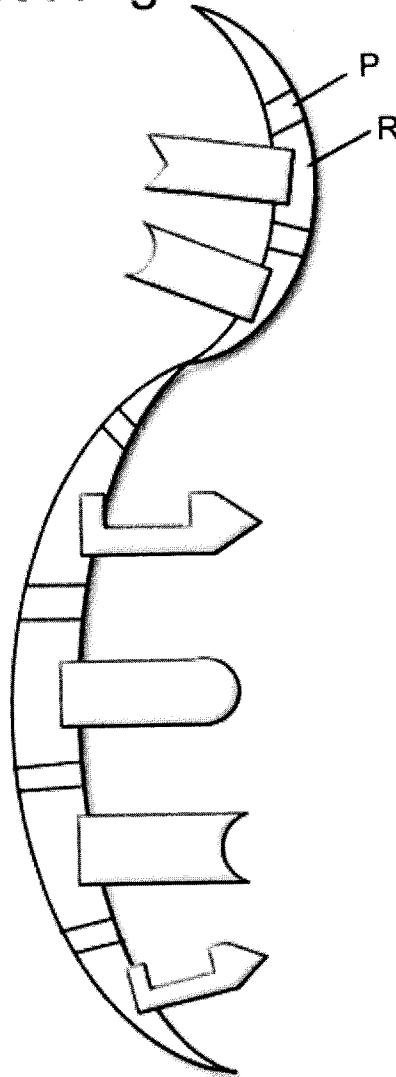
Color the phosphate group (P) red

Color the thymines orange.  Color the adenines green. 
Color the guanines purple.  Color the cytosines yellow. 

In the messenger RNA, the uracil should be brown



Messenger RNA



Use the same key to color the DNA Replication picture. Some things in this picture are drawn differently.

