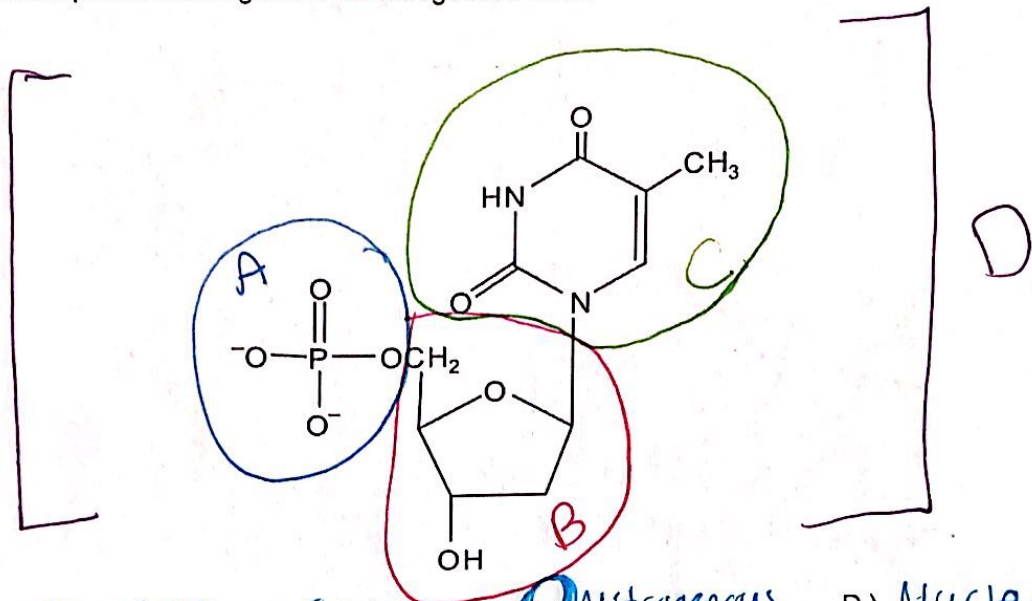


Exam 1 Test Prep: The Stuff of Genetics

1. What part of the diagram is the nitrogenous base?



- A.) Phosphate B.) Sugar C.) Nitrogenous base D.) Nucleotide

2. Where do sister chromatids come from? Homologous chromosomes?

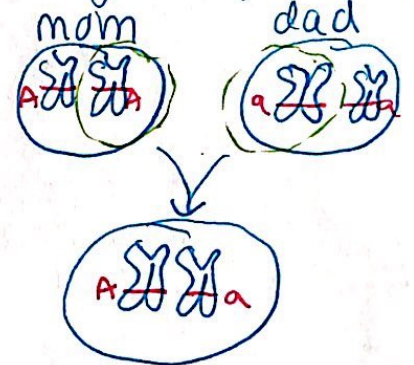
• DNA replication forms sister chromatids

• Homologous chromosomes come from your parents (inheritance)

3. Define a gene.

"A unit of transcription"

A specific stretch of ~~DNA~~ DNA that can be transcribed to make mRNA which may or may not be translated to make a polypeptide which may or may not be a protein.

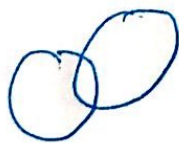


4. Purines have 2 carbon rings and pyrimidines have 1 carbon rings. Which nitrogenous bases fall into each category?

Purines

Adenine

Guanine



Pyrimidine

Thymine

Uracil

Cytosine



Identical copies

gene F

- DNA
- ① Genes
 - ② Regulatory
 - ③ sequences

5. Name and describe all 4 non-functional genetic sequences.

• Pseudogenes



• Viral sequences



• Repetitive sequences

3' CAG 5'

↳ 3' CAAAA G 5'

• Transposable Elements

Ctrl C + Ctrl V

6. What are the three roles of DNA as a hereditary material?

• Replication (not 100% due to mutations)

• Information Content

• Ability to Change

Gene	Alleles
A	A ⁺ A
B	B b
C	C1 C2 C3

7. Variations of one gene are known as alleles.

8. The packaging of DNA is hierarchical. The double stranded DNA strand is wrapped around proteins known as histones. These "beads on a string" are referred to as nucleosomes



9. Draw a graph representing continuous variation and a graph representing discontinuous variation.

Continuous variation

Discontinuous variation



10. Which DNA strand is identical to this one? 3' CAGTCCAGATC 5'

A) 5' GTCAGGTCTAG 3'

B) 3' GATCTGGACTG 5'

C) 3' GTCAGGTCTAG 5'

D) 5' CTAGACCTGAC 3'

Which DNA strand is complementary?

11. What kind of cells have introns and exons? Define intron and exon.

Eukaryotic cells

- Exon - "expressed" - the genes/the good stuff
- Intron - "Interfering" - thrown in/no purpose

12. A specific location on a chromosome is known as?

A. Locus/Loci

13. The bonds between two complementary strands of DNA are hydrogen bonds. The bonds that link nucleotides on a single strand of DNA are phosphodiester bonds.

no space
↓
✓

14. What is the difference between heterochromatin and euchromatin?

Heterochromatin - tightly packaged (cell division/mitosis)

Euchromatin - loosely packaged (DNA replication/transcription)

space
→
U

15. Purines pair with pyrimidines and pyrimidines pair with purines.

16. A strand of DNA contains 17% of Thymine, what is the amount of Guanine.

- A) 33%
- B) 34%
- C) 66%
- D) 17%

$$\begin{array}{r}
 17\% \text{ T} \quad 100\% \text{ CAGT} \\
 + 17\% \text{ A} \quad - 34\% \text{ AT} \\
 \hline
 34\% \text{ AT} \quad 66\% \text{ CG}
 \end{array}$$

17. Define karyotype.

A representation of the chromosomes in a cell organized large to small (except x/y)

$$\begin{array}{r}
 66\% \text{ CG} = 33\% \text{ G} \\
 \div 2 \\
 33\% \text{ C}
 \end{array}$$

18. How many hydrogen bonds are in the DNA below?

5' CATTGCCTA 3'

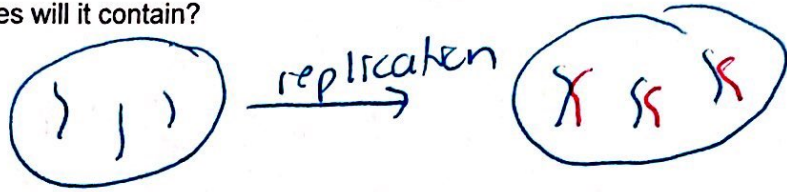
3' GTAACGGAT 5'

- ~~A) 0~~
- B) 22
- ~~C) 19~~
- ~~D) 8~~

$$\begin{array}{r}
 C/G = 3 \times 4 = 12 \\
 A/T = 2 \times 5 = 10 \\
 \hline
 22
 \end{array}$$

19. A cell contains 3 unreplicated chromosomes. Following DNA replication, how many replicated chromosomes will it contain?

- A.) 3
- B.) 6
- C.) 9
- D.) 12



20. Match the genome with its description.
- Smallest: A.) Viral
 Largest: B.) Nuclear - Eukaryotic
 C.) Prokaryotic
 D.) Organelle (Mitochondria/Chloroplast)

- B. Linear, Introns
- D. Circular, Endosymbiosis
- A. RNA/DNA, Circular/Linear
- C. Circular, Plasmids(circular)

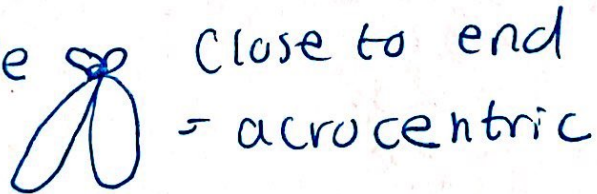
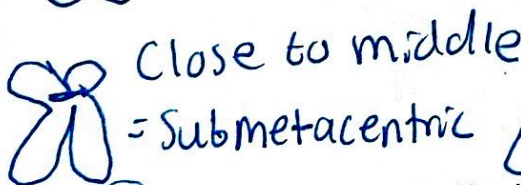
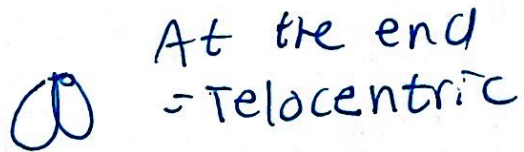
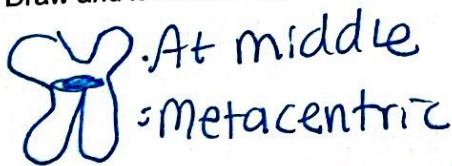
21. What are the three types of RNA and what do they do?

- mRNA - "messenger RNA" → information for translation (ribosome)
- tRNA - "transfer RNA" → brings amino acids for translation
- Regulatory RNA → regulates gene expression

22. How is DNA faithfully replicated?

Double-Stranded so one serves as a template

23. Draw and label the 4 types of centromeres.



24. True/False: Sex chromosomes are either X or Y.

25. Describe the two ways that mutations can occur.

- SNPs (Single Nucleotide Polymorphism)
- Indels (Insertion/Deletion)

26. What do kinetochores attach to?

Centromeres

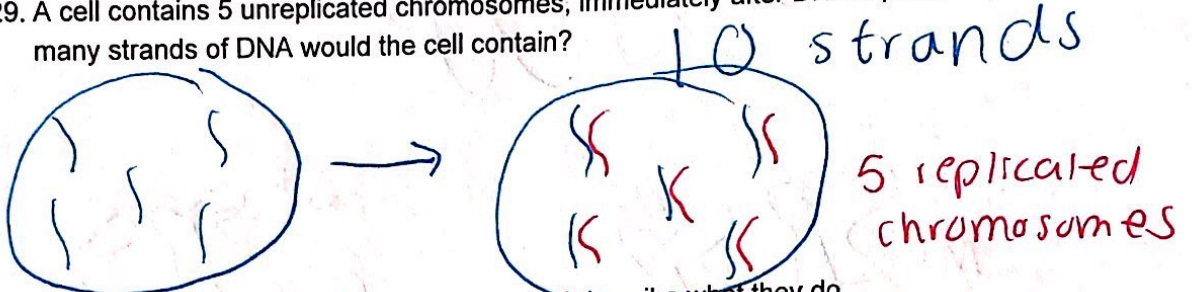
27. How is the size of DNA measured?

Base Pairs (bp)

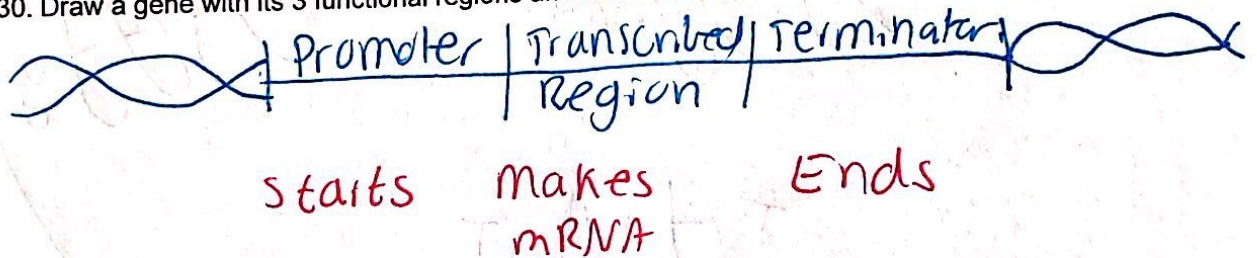
28. The specific DNA sequence at the ends of the chromosomes are?

- ~~A.) Telocentric~~ ~~B.) Kinetochores~~ C.) Telomeres ~~D.) Centromeres~~

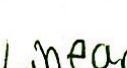
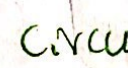


29. A cell contains 5 unreplicated chromosomes, immediately after DNA replication how many strands of DNA would the cell contain?



30. Draw a gene with its 3 functional regions and describe what they do.



31. What are the four ways genomes can differ among species?

- Number of Chromosomes
- Amount of DNA
- Format of DNA Linear  vs circular 
- Organization of Genes  vs 

32. What usually has the most DNA?

- ~~A.) Mitochondria~~ ~~B.) Viruses~~ C.) Nucleus ~~D.) Bacteria~~

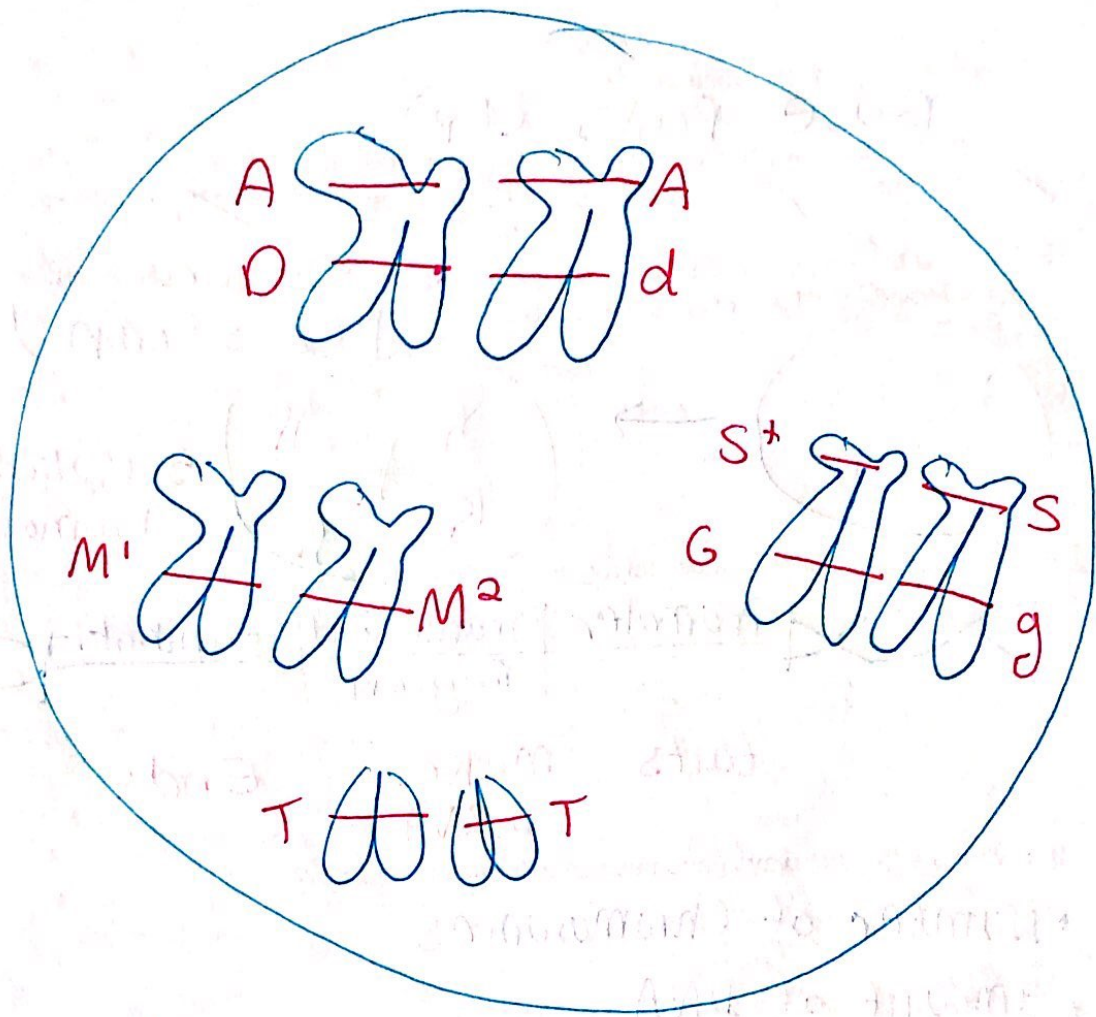
33. Homologous chromosomes contain different versions of the same genes.

34. The only words used to describe chromosomes are?

Homologous vs. Non-homologous

35. Draw the cell with the following genotype. AD/Ad; M¹/M²; S⁺G/Sg; T/T Describe the ploidy, haploid and diploid numbers, and homozygous/heterozygous genes.

On Back



Diploid cell

↓
 $2n = 8$

Homozygous
for

- Gene A
- Gene T

Heterozygous
for

- Gene D Gene G
- Gene M
- Gene S