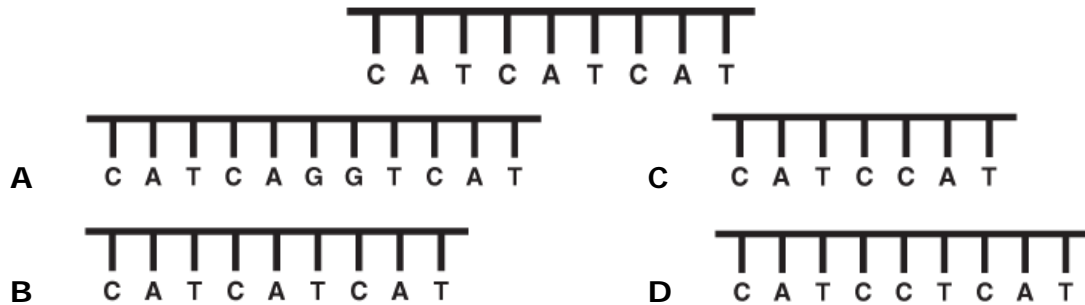


6E – identify and illustrate changes in DNA and evaluate the significance of these changes

1. This illustration is an example of a normal DNA sequence. Which of the following represents a point mutation in the sequence?



mRNA Codons and Corresponding Amino Acids

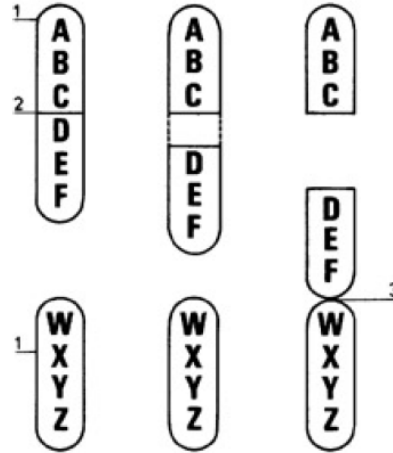
		Codon		Amino acid						
First Base	U	UUU	} Phenylalanine	UCU	} Serine	UAU	} Tyrosine	UGU	Third Base	
		UUC		UCC		UAC		UGC		
		UUA	UUA	UAA		UAG	UGA	} STOP		UGG
		UUG	UCG	UAG	UGG	UGG	} Tryptophan			
C	C	CUU	} Leucine	CCU	} Proline	CAU	} Histidine	CGU	} Arginine	
		CUC		CCC		CAC		CGC		
		CUA		CCA		CAA	CGA			
		CUG		CCG		CAG	CGG			
A	A	AUU	} Isoleucine	ACU	} Threonine	AAU	} Asparagine	AGU	} Serine	
		AUC		ACC		AAC		AGC		
		AUA	ACA	AAA		AGA	} Arginine			
		AUG	ACG	AAG		AGG				
G	G	GUU	} Valine	GCU	} Alanine	GAU	} Aspartic acid	GGU	} Glycine	
		GUC		GCC		GAC		GGC		
		GUA		GCA		GAA	GGG			
		GUG		GCG		GAG	GGG			
		U	C	A	G	Second Base				

2. A mutation has occurred in a mRNA fragment that was originally CUU. Using the codon chart given above, which of the following mutated mRNA fragments would result in an amino acid sequence different from that produced by the CUU fragment?

- A** CUC
- B** CUA
- C** CUG
- D** CAU

3. An insertion of a DNA base into a gene can affect an organism by—

- A** causing future gametes to have additional chromosomes.
- B** changing the sequence of amino acids in a protein.
- C** causing chromosome fragments to form long chains.
- D** changing the structure of ribose sugar in nucleic acids.



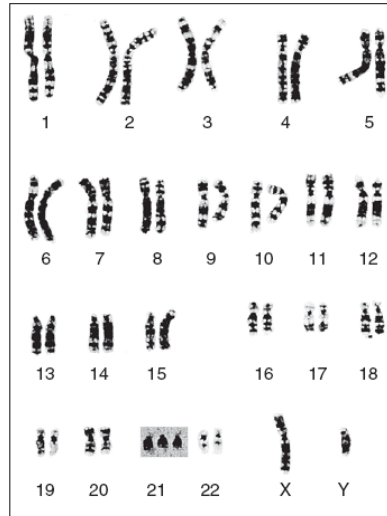
4. Which of the following chromosomal mutations is represented in the diagram above?

- A** translocation
- B** duplication
- C** deletion
- D** inversion

5. Mutations of the DNA are only passed on to future generations if the change occurred in a –

- A** sperm or egg cell.
- B** cancerous liver cell.
- C** brain cell.
- D** mutated skin cell.

6. An amniocentesis is a medical procedure that is used to detect many genetic disorders in humans before birth. The karyotype below shows the number and structure of homologous pairs of chromosomes in a body cell of a human fetus taken from this medical procedure.



What caused the chromosomal alteration in number 21?

- A part of one chromosome attached to another chromosome (translocation)
- B some of the genes on a chromosome were reversed (inversion)
- C a duplicated chromosome failed to separate (nondisjunction)
- D a part of a chromosome was lost (deletion)

6F – predict possible outcomes of various genetic combinations such as monohybrid crosses, dihybrid crosses and non-Mendelian inheritance

7. Brown eyes (B) is dominant to blue eyes (b). What are the chances of two heterozygous (Bb) individuals having a blue-eyed child?

- A 0%
- B 25%
- C 50%
- D 75%

8. In certain breeds of dogs, deafness is due to a recessive allele (d) of a particular gene, and normal hearing is due to its dominant allele (D). What percentage of the offspring of a normal heterozygous (Dd) dog and a deaf dog (dd) would be expected to have normal hearing?

- A 0%
- B 25%
- C 50%
- D 100%

Bird Traits

Gene	Trait
G	Green feathers (dominant)
g	Yellow feathers (recessive)
L	Long beak (dominant)
l	Short beak (recessive)

GGLI (male) × Ggll (female)

9. What trait will most likely be observed in all offspring in the above set of parents?

- A Green feathers
- B Yellow feathers
- C Long beak
- D Short beak

10. What is the probability a yellow (Y) and wrinkled pea (r) will appear from a cross of Yyrr × YyRr?

- A 1/8
- B 2/8
- C 3/8
- D 4/8

11. Four-o'clock flowers show incomplete dominance for flower color. Purebred white flowers (WW) crossed with purebred red flowers (RR) produce

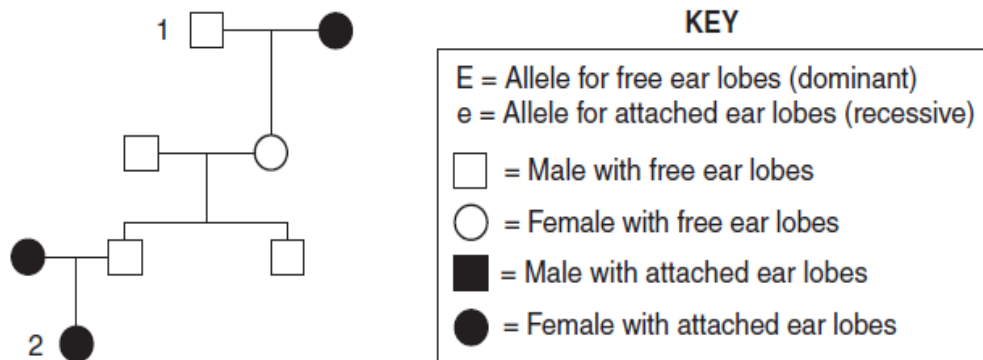
- A** all pink flowers (RW)
- B** some red flowers (RR) and some white flowers (WW)
- C** hybrid red flowers (RW)
- D** red and white striped flowers (RW)

12. Color coat for roan cows (RW) shows codominance. A cow with a white coat has WW as its genotype. A cow with a red coat has RR as its genotype. A roan cow (RW) is crossed with another roan cow (RW), what fraction of the offspring will be white (WW)?

- A** 0/4
- B** 1/4
- C** 1/2
- D** 3/4

13. Justin Bieber ($I^B I^B$) is homozygous for the type B allele, and Selina Gomez (ii) is type "O." Predict the possible blood types of their future babies?

- A** $I^B I^B$ or $I^B I$
- B** $I^B i$
- C** ii or $I^B i$
- D** $I^B I^B$



14. The genotype of individual 1 in the above pedigree could be

- A EE , only
- B ee
- C Ee , only
- D EE or Ee

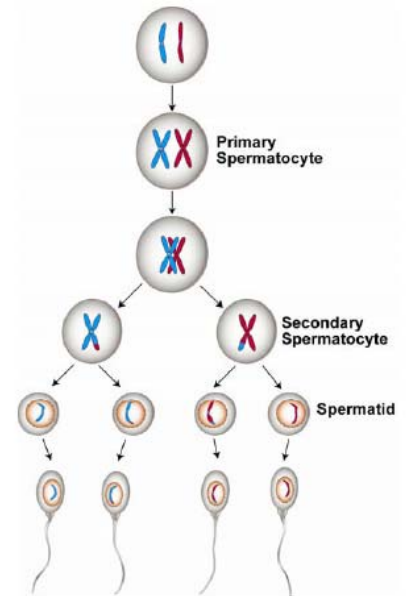
6G – recognize the significance of meiosis to sexual reproduction

15. Which statement best explains the significance of meiosis in the evolution of a species?

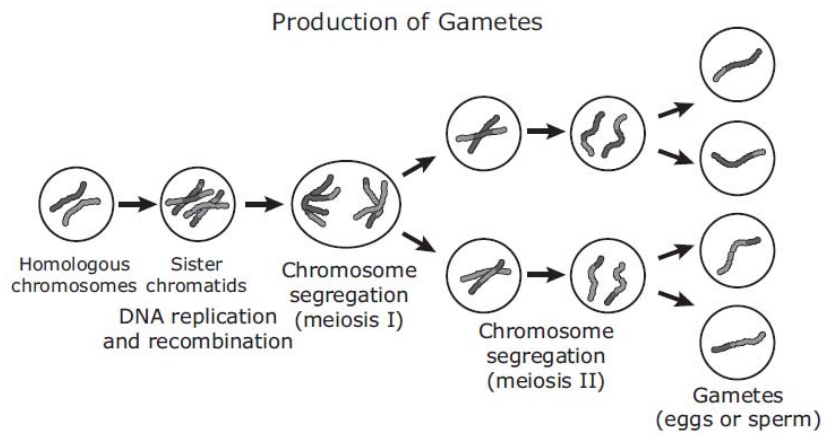
- A Meiosis produces eggs and sperm that are alike.
- B The gametes produced by meiosis allow for asexual reproduction of a species.
- C Meiosis provides for chromosomal variation in an organism's gametes.
- D Equal numbers of eggs and sperm are produced by meiosis.

16. Sex cells of humans that result from meiosis have –

- A 92 chromosomes
- B 46 chromosomes
- C 23 chromosomes
- D 12 chromosomes



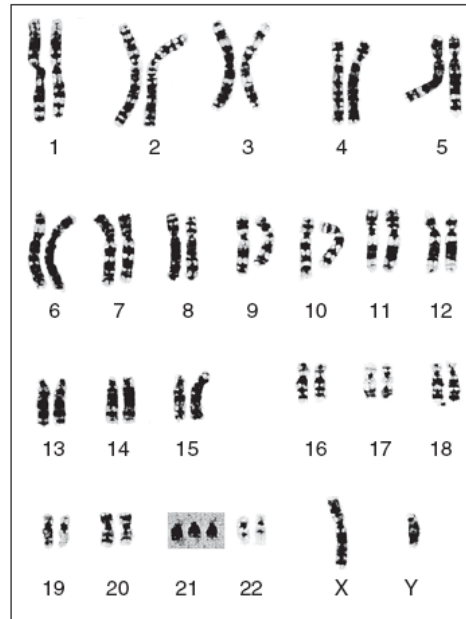
17. The diagram below shows the process of meiosis.



The segregation that occurs during meiosis results in a —

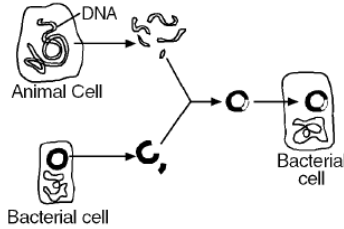
- A decrease in the total number of cells per organism
- B reduction in the number of chromosomes per cell
- C single fertilized egg cell
- D group of genetically identical cells

6H – describe how techniques such as DNA fingerprinting, genetic modifications, and chromosomal analysis are used to study the genomes of organisms



18. Which of the following genetic disorders best describes the karyotype in the graphic above?

- A** inversion, chromosome 18
- B** trisomy, chromosome 21
- C** translocation, chromosome 1
- D** deletion, chromosome 5



19. In 1973, Stanley Cohen and Herbert Boyer inserted a gene from an African clawed frog into a bacterium. The bacterium then began producing a protein directed by the code found on the inserted frog gene. This same technology is used today to produce pure human insulin.

The newly synthesized genetic material in the bacterium is known as –

- A recombinant DNA.
- B messenger RNA.
- C a multiple allele.
- D a gene mutation

20. Scientists found members of a plant species they did not recognize. They wanted to determine if the unknown species was related to one or more of four known species, A, B, C, and D. The relationship between species can be determined most accurately by comparing the results of gel electrophoresis of the DNA from different species. The chart below represents the results of gel electrophoresis of the DNA from the unknown plant species and the four known species.

Results of Gel Electrophoresis of DNA from Five Plant Species

Unknown Species	Species A	Species B	Species C	Species D
—			—	—
—	—	—	—	—
—		—	—	
—		—	—	
—	—		—	—

KEY:
 — = Band in the gel

Which two known plant species is the unknown plant species most closely related to?

- A Species A & B
- B Species C & D
- C Species A & C
- D Species B & D