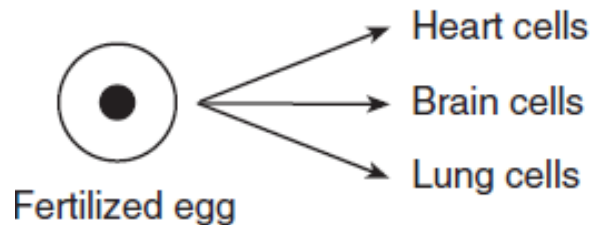


**TEKS 5C** – describe the roles of DNA, ribonucleic acid (RNA), and environmental factors in cell differentiation

1. Unicellular organisms carry out all the necessary life processes in one cell. In multicellular organisms, each cell is specialized to perform a specific function. How do the cells in multicellular organisms become specialized?

- A** A single nucleus coordinates the function performed by each cell.
- B** Cells develop specific functions through the expression of different genes as they mature.
- C** The brain communicates the function required for each cell.
- D** Each cell carries a unique set of genes.

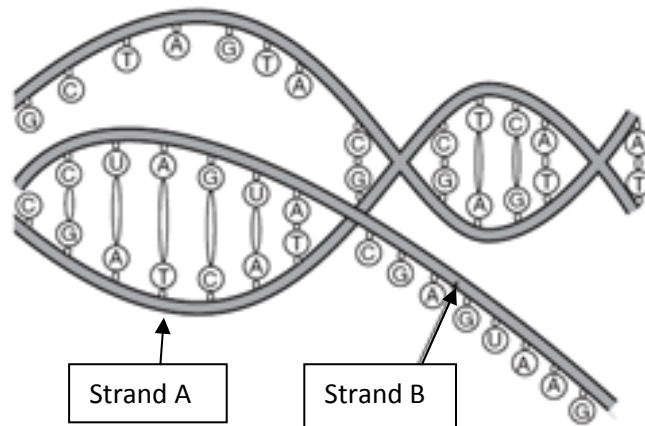
2. Which statement best describes the given diagram?



- A** The DNA in fertilized eggs are different than that of cells of organs.
- B** Heart, brain, and lung cells are the only types of cells fertilized eggs produce.
- C** Cells in fertilized eggs are directed by DNA to become many types of cells.
- D** Only the fertilized egg contains DNA and the tissue cells do not.

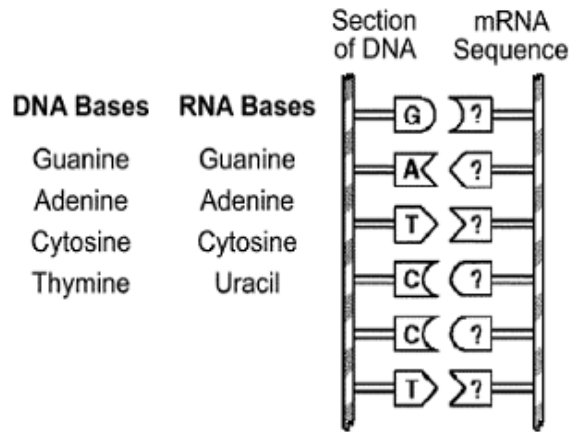
**TEKS 6C** – explain the purpose and process of transcription and translation using models of DNA and RNA

3. The diagram below is a model of the process of transcription.



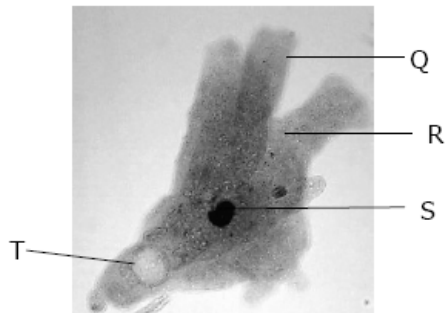
What is the purpose of Strand A?

- A** to act as a template for the synthesis of messenger RNA
- B** to carry the code from the DNA molecule in the nucleus to the ribosome
- C** picks up and transfers specific amino acids to the ribosome
- D** picks up and transfers nucleic acids to the nucleus



4. What mRNA sequence will **best** match the section of DNA shown?

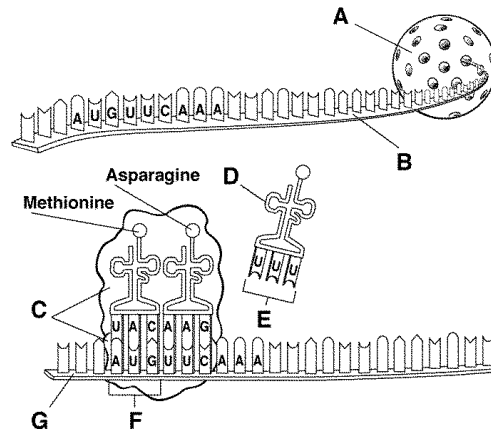
- A** C-T-A-G-G-C
- B** C-U-A-G-G-A
- C** A-G-C-U-U-C
- D** T-C-G-A-A-G



5. The photograph above is an *Amoeba*. The structure where transcription of mRNA takes place is labeled-

- A** Q
- B** R
- C** S
- D** T

Use the diagram below to answer questions 6 & 7.



6. What is the main purpose of the structure labeled **D** in the diagram above?

- A** Bring the amino acid to the ribosome
- B** Assemble the amino acids into a protein
- C** Copy the DNA strand
- D** Edit the mRNA strand

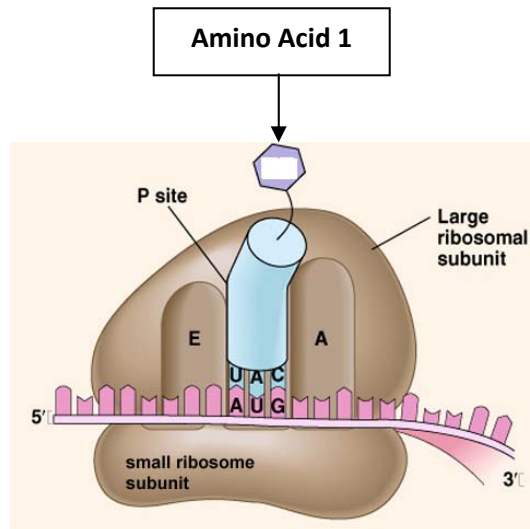
7. The diagram above represents a biochemical process that occurs in a cell. The purpose of this process is to synthesize -

- A** deoxyribonucleic acid
- B** protein
- C** messenger RNA
- D** carbohydrate

Use the chart below to answer the next question.

mRNA Codons and Corresponding Amino Acids

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



8. Use the mRNA codon chart to identify Amino Acid 1 in the given picture.

- A Isoleucine
- B Tyrosine
- C Methionine
- D Serine

## TEKS 6D – recognize that gene expression is a regulated process

9. In many humans, exposing the skin to sunlight over prolonged periods of time results in the production of more pigment by the skin cells (tanning). This change in skin color provides evidence that -

- A the inheritance of skin color is an acquired characteristic.
- B albinism is a recessive characteristic.
- C ultraviolet light can cause mutations.
- D the environment can influence gene action.

10. A boy inherits genes for tallness, but his growth is limited as a result of poor nutrition. This is an example of –

- A an inherited disorder.
- B environmental influence on gene expression and regulation.
- C expression of a hidden trait.
- D a characteristic controlled by more than one pair of genes.

11. The following data tables summarize the results of an experiment using primroses (flowering plants) grown under different conditions of temperature and relative humidity.

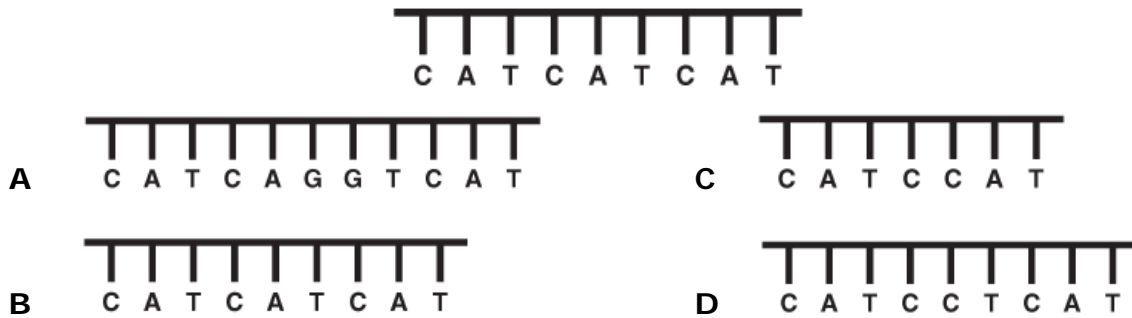
Temperature: 20°C Relative Humidity: 20%		Temperature: 31°C Relative Humidity: 95%	
GENOTYPE	PHENOTYPE	GENOTYPE	PHENOTYPE
AA	red	AA	white
Aa	red	Aa	white
aa	white	aa	white

Which conclusion could be drawn from these data tables?

- A There is an interaction between environment and gene expression.
- B Color in primroses is caused by gene linkage.
- C Many characteristics are not inherited.
- D Crossing-over occurs only when plants are grown at higher temperatures.

**TEKS 6E** – identify and illustrate changes in DNA and evaluate the significance of these changes [mutations]

12. 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

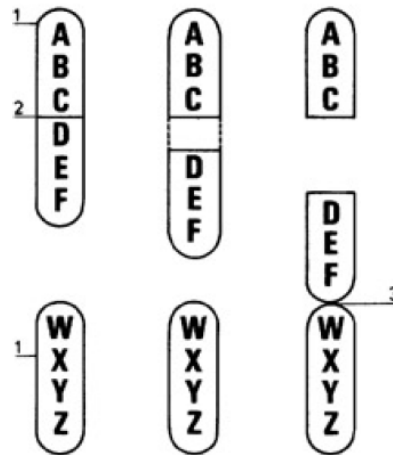
		Codon	Amino acid							
First Base	U	UUU } UUC } UUA } UUG }	Phenylalanine	UCU } UCC } UCA } UCG }	Serine	UAU } UAC } UAA } UAG }	Tyrosine STOP	UGU } UGC } UGA } UGG }	Cysteine STOP Tryptophan	U C A G
		CUU } CUC } CUA } CUG }	Leucine	CCU } CCC } CCA } CCG }	Proline	CAU } CAC } CAA } CAG }	Histidine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

13. 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

14. 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.



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

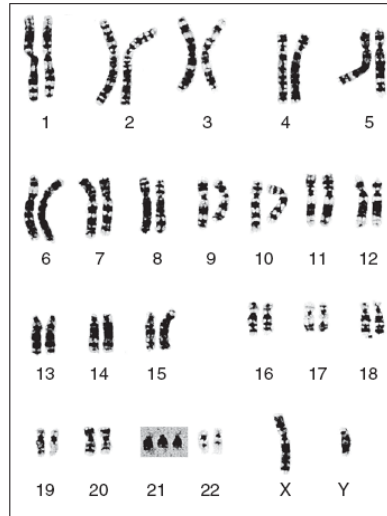
- A translocation
- B duplication
- C deletion
- D inversion

16. 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.



17. 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)