D. dna

Science, Genetics

D. DNA Name the four bases in DNA and describe the structure of DNA using the following terms: The four bases of DNA are adenine, thymine, guanine, and cytosine. nucleotide (sugar, phosphate, base) Sugar: pentose deoxyribose; phosphate: phosporic acid, nitrogen base (A, T, G, C) complementary base pairing A-T; G-C joined by hydrogen bonds. Purines (with double ring) always bond with a pyrimidine (single ring). double helix Double spiral; three dimensional hydrogen bonding Hydrogen bonding between bases Describe DNA replication with reference to three basic steps: unzipping The hydrogen bonds between the paired bases break. The enzyme helicase causes the molecule to unwind (to lose its helix shape). complementary base pairing Free complementary nucleotides in nucleus move into place by complementary base pairing. joining of adjacent nucleotides The complementary nucleotides join to form new strands carried out by the DNA polymerase enzyme (puts many —poly DNA together). Define recombinant DNA Definition: DNA that contains genes from more than one source. Describe three uses for recombinant DNA Drugs Hormones Vaccines Nucleic acids for research Compare and contrast the general structural composition of DNA and RNA DNA RNA Sugar (pentose) Deoxyribose Ribose Bases AGTC AGUC Strands Double stranded with base single stranded pairing Helix Yes No Similarities: Nucleotides are basic structural unit Complementary base pairing by hydrogen bonds Both have a pentose sugar and phosphoric acid E. Protein Synthesis Demonstrate a knowledge of the basic steps of protein synthesis, identifying the roles of DNA, mRNA, and ribosomes in the process of transcription and translation Transcription RNA molecule makes complementary copy of DNA RNA goes

into cytoplasm Translation Initiation: mRNA brings copy of DNA to ribosomal subunit, where when attached, becomes ribosome Elongation: tRNA brings amino acids to the mRNA at ribosome, the amino acids form a polypeptide chain as the ribosome moves sideways to receive incoming tRNA-amino acid complex Termination: mRNA stop codon terminates polypeptide synthesis Determine the sequence of amino acids coded for by a specific DNA Convert DNA gene sequence of bases to RNA (mRNA) Read the mRNA (beginning from 3') in triplets (codons) Find corresponding amino acid for each codon Examples of two environmental mutagens that can cause mutations in humans. Radiation (x-rays, UV rays, radioactive elements) Organic chemicals (cigarette smoke, pesticides -only if mutagen is in gametes) 4. Use examples to explain how mutations in DNA affect protein synthesis and may lead to genetic disorders. Frameshift mutation is where one or more nucleotide is inserted or deleted from DNA. This sometimes results in a completely nonfunctional protein because the sequence of the codons is altered. Point mutation is when a single nucleotide is changed. Nonsense mutation is when the nucleotide replaced encodes for a stop when young. The protein may be too short and unable to function. Missense mutation is when the amino acid is substituted for another one when a nucleotide is changed. This is the cause of sickle-cell disease.