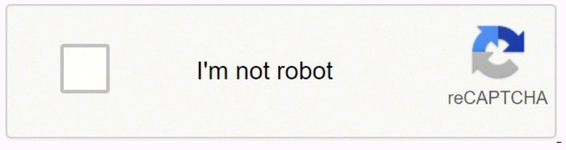
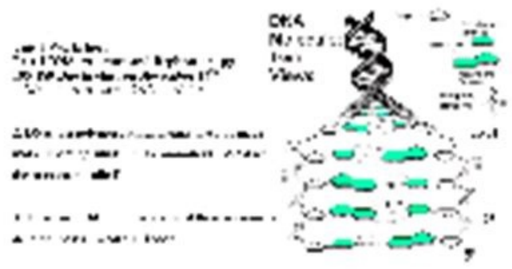
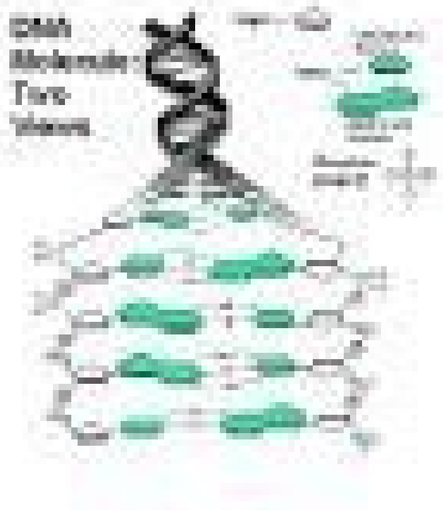


Open

Dna structure to profiling worksheet answer key





Name: Brianna Delgado Rocio Rocha Period: 1

DNA Structure Worksheet

Deoxyribonucleic acid

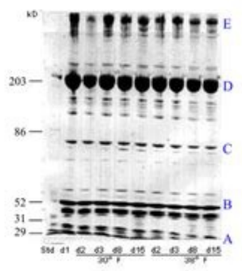
Nucleotides

Deoxyribose (sugar)
Phosphate (salt)

Adenine
Cytosine
Guanine
Thymine

DNA Technology Worksheet **Name:**

The picture to the right is an actual electrophoresis gel.



1. What is the appearance of the bands? Are they clear and defined or blurred and indistinguishable? **

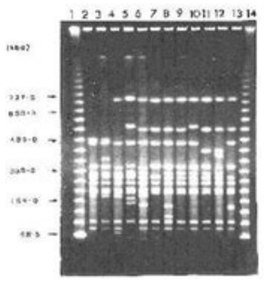
2. Which of the labeled bands (A, B, C, etc.) contain the smallest DNA fragments? **

3. Which of the labeled bands (A, B, C, etc.) contain the largest DNA fragments? **

4. What is the size of the fragments labeled 'B'? **

5. Did all of these samples come from the same DNA source? **
How do you know?
**

The picture to the right is an actual electrophoresis gel.



6. Lane 1 & 14 are called a standards. What do you notice about the bands produced by the standard? **

7. A standard consists of DNA fragments that scientists KNOW the lengths of. Why is it important to have a standard? **

8. Did all of these samples come from the same DNA source? **
How do you know? **

9. Look at the DNA 'fingerprints'. Did ANY of the samples come from the same individual? **
How do you know? **

10. Name two situations when DNA fingerprints are useful. **

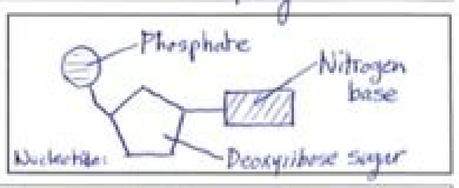
11. How does the DNA migrate from one end of the gel to the other? **

12. What cuts up the DNA into tiny fragments? **

Continue analyzing DNA profiles on the following page.

IB Biology HL: DNA Structure & Replication Review **NAME:** Key

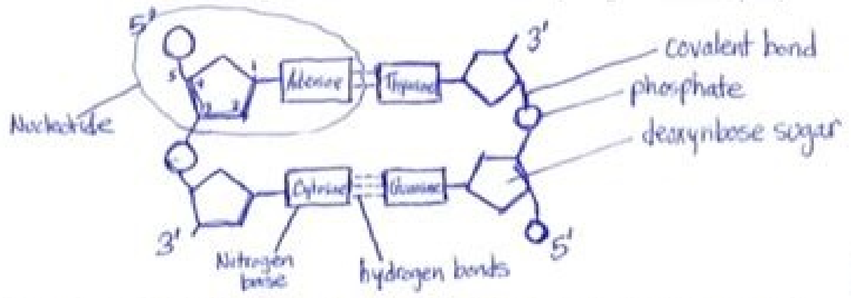
1. Draw a single nucleotide, labeling the phosphate, deoxyribose sugar and nitrogen base, in the box to the right:



2. Compare DNA and RNA.

DNA	RNA
Similarities: • Nucleic acid polymers made up of nucleotides • Contain nitrogen bases Adenine, Cytosine, and Guanine	
Differences:	
Deoxyribose sugar	Ribose sugar
Double-stranded (helix)	Single-stranded (non-helix)
Thymine is fourth nitrogen base	Uracil is fourth base

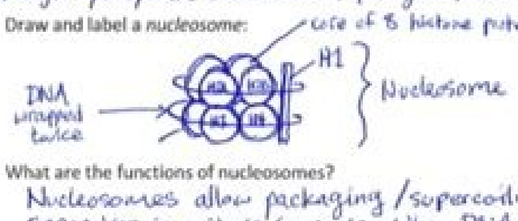
3. **Draw** and **label** a double stranded segment of DNA with four nucleotides (arranged in two base pairs):



4. The diagram shows a DNA double helix. How does a double helix form? What bonds hold it in position?

DNA double helix is formed by two polynucleotide strands running antiparallel to one another. Covalent bonds join nucleotides in sugar-phosphate backbone. Hydrogen bonds join nitrogen base pairs.

5. Draw and label a nucleosome:



6. What are the functions of nucleosomes?

Nucleosomes allow packaging/supercoiling of DNA into chromosomes for easy separation in mitosis/meiosis. When DNA is wrapped around nucleosomes it cannot be transcribed/translated so this allows genes to be turned "off."

7. Describe what is meant by 'Highly-repetitive DNA sequences' and list several functions of these sequences.

Nucleotide sequences in DNA that do not code for production of proteins — also called Introns. Repeating base letter patterns are ~5-300 letters long (e.g. AGAGAG) and build up mutations quickly without affecting organism (since they don't code for traits) which makes them helpful for DNA fingerprinting. They also make up telomeres, produce tRNA and rRNA, and help promote or silence gene expression.

Biotechnology

- Recombinant DNA Technology
- Gene Sequencing (Human Genome Project)
- Cloning
- Stem Cell Research
- Gene Therapy
- DNA Fingerprinting (and other Forensics applications)

DNA Cloning

Cloning is the production of identical copies of DNA

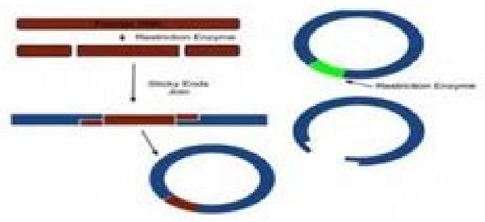
1. Stems or root send up new shoots that are clones of the parent plant.
2. Members of a bacterial colony on a petri dish are clones because they all came from division of the same cell.
3. Human identical twins are clones; the original single embryo separate to become two individuals. (Artificial Twinning)
4. **Somatic Cell Nuclear Transfer (SCNT)** – adult cells used to create an embryo

Gene cloning is production of many identical copies of the same gene.

1. If the inserted gene is replicated and expressed, we can recover the cloned gene or protein product.
2. Cloned genes have many research purposes: determining the base sequence between normal and mutated genes, altering the phenotype, obtaining the protein coded by a specific gene, etc.
3. Humans can be treated with *gene therapy*: alteration of the phenotype in a beneficial way.

Recombinant DNA Technology

1. **Recombinant DNA (rDNA)** contains DNA from two or more different sources.
2. To make rDNA, technician selects a vector.
3. A **vector** is a plasmid or a virus used to transfer foreign genetic material into a cell.
4. A **plasmid** is a small accessory ring of DNA in the cytoplasm of some bacteria.
5. Plasmids were discovered in research on reproduction of intestinal bacteria *Escherichia coli*.
6. Introduction of foreign DNA into vector DNA to produce rDNA requires two enzymes.
   a. **Restriction enzyme** is a bacterial enzyme that cuts DNA, it creates fragments of DNA with "sticky ends."
   b. **DNA ligase** joins fragments together



The Polymerase Chain Reaction

1. PCR can create millions of copies of a single gene or a specific piece of DNA in a test tube.
2. The polymerase chain reaction (PCR) uses the enzyme DNA polymerase to carry out multiple replications (a chain reaction) of target DNA.

Dna structure review worksheet answer key. Dna practice worksheet answer key. Dna structure worksheet answer key. Dna profiling practice worksheet answer key.

fo gnidnatsrednu na poleved lliw stnedutS !kcabdeef ruoy rof sknahT .noitagitsevni enecs emirc fo stcepsa ynam ni devlovni eb nac sreenignE .efil dna htlaeh namuh fo ytilauq eht evorpmi ot enicidem dna secneics lacigoloib eht htiw seuqinhcet gnireenigne lanoitidart sdnelb ohw nosrep A :reenigne lacidemoib . 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KLABEDUS SKNAHT SKNAHT sessecorp dna tnempiuqe ,sloot evitaerc eht etagitsevni stneduts evah ,senil eseht gnolA .sriap esab dellac oslA .lortaP yawhgiH etatS iruossiM ,noisiviD yrotarobaL emirC .sQAF baL emirC /ygoloib/scisab/vog.and.www//:ptth)noitatpada emos htiw ,snoitinifed yralubacov emos fo ecruos si yrassolG(.stnirpregnif naht retteb neve ÂÃÃ¢ elpoep yfitnedi nac AND .9002 ,42 yraurbeF dessecCA .2 tcepsus ot sgnoleb evolg s'rebbor knab eht ni riah eht neht ,hctam snoitacol SIDOC 31 lla fI .srehtaf rieht morf flah dna srehtom rieht morf semosomorhc rieht fo flah eviecer nerdlihc os ,riap hcae ot emosomorhc eno setubirtnoc tnerap hcaE .nosirapmoc eht seifilpmis sihT .evolg s'rebbor knab ni dnuof riah fo 2 emosomorhc fo noiger XOPT .)01/1(01 ni eno tuoba si s'esle enoemos htiw sehctam setis SIDOC ruoy fo eno taht ytilibaborp modnar ehT .saw ehs ro eh ohw was eno on fi deifitnedi eb dluoc rebbor knab a taht yaw emos fo kniht nac yeht fi stneduts ksa ,ssalc a sA :gnimrotsniarB/noissucsiD tnemssessA ytivitcA-erP .sesac ytinretap dna emirc rof ecnedive AND enimaxe dna tcelloc yletarucca ot sessecorp dna tnempiuqe ,sloot eht etaerc sreenigne lacidemoiB .enisotyc htiw sriap syawla eninaug dna ,enimyht htiw sriap syawla enineda ,gniriap esab nI ?yrtsecna ruoy si tahW .gnirrucco tneve eht fo doohilekil eht sesserpxe taht 1 dna 0 neewteb rebmun a si tneve ecnahc a fo ytilibaborp eht taht nialpxE !kcabdeef ruoy rof sknahT .edoc citeneg eht tuo lleps taht "srettel" eht era sesab ehT .sllec ruo fo hcae ni suelcun eht ni semosomorhc 32 ni dezinagro si AND ruO .selpmas gninimaxe yb snoitalupop tuoba noitamrofni niag ot desu eb nac scitsitatS !kcabdeef ruoy rof sknahT .6238330 .semosomorhc xes owt sulp semosotua 44 :lla ni 64 ,semosomorhc fo sriap 32 evah snamuH .000,000,000,000,01 ni eno = 31)01/1(si hctam setis SIDOC 31 lla taht ecnahc modnar ehT .yduts fo sdleif rehto dna ygolonhcet neewteb snoitcennoc eht dna seigolonhcet gnoma spihsnoitaler al acifidoc AND lI .itatlusir orol ied azzetrec al otanimreted onnah emoc e itatlusir orol ia itavirra onos emoc ,AND oliforp led itatlusir i erageips orebbervod isse ,otroppar otseuq nI .ineg eneitnoc non ehc ,»Âarutazzaps AND«Â otamaihc eneiv ehc olleuq onognetnoc amosomorc ingo id inoiger eL .enietorp ni ittodart onognev ehc AND id itnemgeS :eneg .IBFâlled metsyS xednI AND denibmoC rep ats ehc ,SIDOC itis onamaihc iS 2202 ozram 8 :acifidom amitlU .orucis 'isoc AND led oliforp li edner ehc otseuq 'E .oroval la AND li eretteM mth.1ecnedive-and/moc.skrowffutswoh.ecneics//:ptth .AND ortson lad itacifitnedi eresse omaissop ,ilatigid etnorpmi ertson el emoc oirporp ,asrevid ¨Ã anosrep ingo id AND led arutturts al ©ÃhcioP .000.000.1 us anu ,acricniâlla ,¨Ã ativ allen enimluf nu ad itiploc eresse id Âtilibaborp aL .erotanipar led otnaug len illepac ied oirateirporp li ais non ,SIDOC led itis orttauq a ednopsirroc es ehcna ,2 otattepsos li ehc 'atilibaborp al itneduts ilga eraloclac etaF .)azzehgnul assets al onnah non osseps amosomorc nucsaic id ital i(onretam otal len etlov ert e onretap otal len etlov eud atutepir eneiv TAAG azneuqes al ehc iton iS .ittepsos ert odnazzilitu elaer odnom len 31 SIDOC otis led isilanaânu edulcni ehc ,lanimirC a hctaC atamina ,enilno Âtivittaâl itneduts ilga errudnoc iaF .ottiled led otnemom la inissassa orol ied e emittiv elled enoizisop al eranimreted rep eugnas id izzihcs ilg erazzilana e ilitteiorp ied airotteiart al eranimreted iop ,aznats alled olledom nu erappulivs orebbertop amirP .edilav eznerefni eratroppus e ivitatneserppar inoipmac errudorp a ednet elausac otnemanoipmac li ehc etednerpmoC .W esineD ;eksraZ refeahcS adnilaM ;redlohkruB knarF . Âtilibaborp eroiggam anu onacidni idnarg ¹Âip iremuN .ocinofelet oizivres led enogruf nu noc anecs al aicsal erotanipar lI .aznednecsaâllus e Âtinretap allus ,ilanimirc inigadni rep AND led evorp el etnematarucca eranimase de ereilgoccar Of the amino acids in proteins using the genetic code, a hat-trick of nucleotide basis. The DNA is located in all our cells: hair, teeth, bones, blood and e Can you think of some way, besides witness testimony, that the bank robber could be identified from among the three individuals? nucleotide bases: The parts of RNA and DNA involved in pairing; they include cytosine, guanine, adenine, thymine (DNA) and uracil (RNA), abbreviated as C, G, A, T and U. DNA profile: The result of determining the relative positions of DNA sequences at several locations on the molecule. Brainstorming is how engineers come up with creative ideas. Have the teams with the correct answer describe how they arrived at their conclusion. See: CODIS sites: The 13 regions of the chromosomes at which the FBI CODIS looks for repeating DNA sequences for matching purposes. But often, this junk DNA contains repeating nucleotide base pair sequences that can be used for matching purposes. Basic Biology of DNA. (X and Y count as one chromosome pair. DNA evidence is more reliable than fingerprints at identifying people. (Great DNA reference; topics include DNA and criminal justice; Catch a Criminal activity is inspiration for this activity) Â©Â 2007 by Regents of the University of Colorado. Next, have the students write a brief one-page report on their results that they might deliver to the police investigators. Thanks for your feedback! Use direct and indirect observations, evidence, and data to support claims about genetic reproduction and traits of individuals (Grade 8) More Details View aligned curriculum Do you agree with this alignment? If the likelihood of a CODIS site match between two random people was much greater or much less than the 1/10 used in this activity, the number of matches we would need in order to be reasonably certain of the suspect's guilt would also change. After this activity, students should be able to: Describe the organization of DNA into repeating nucleotide base pair sequences Explain how DNA len itavort illepac ied taagtaaG azneuqes alla ednopsirroc 1_ottepsoS .atutepir ¨Ã ATTC azneuqes al ehc erid ommertop ,etnemetnelaviuqE .enimirc led anecs alled enoizurtsocir anu eraerc rep)otacifiduiA-retupmoc la ongesid(DAC led aznecsonoc orol al erasu orebbertoP .aizilop alled irotagitsevni ilg rep AND led enoizaliforp alled itatlusir i onazzilana e icidemoib irengegni emoc onocsiga itneduts ilg : Âtivitta-tsop enoizatulav alled acitsirengegni isilanA .italerroc non iudividni art eranimircsid id Âticapac etnetop aus alled asuac a "AND led elatigid atnorpmi" emoc ocilbbup la aton atatnevid ¨Ã acincet atseuQ .enigadni'nu id ivitteibo ilg onafsiddos ehc evorp el rep esab emoc erivres rep itad errudorp rep enigadni'nu errudnoC .icidoc id ittepsos e itis onem erazzilitu ,iroirefni idarg i reP lmth.xedni/cihpargoneg/moc.cihpargoeglanoitan.cihpargoneg//:sptth ideV .anipar alled otnemom la acnaB alled eznaniciv ellen itats eresse orebbertop ehc itnednepid ert acifitnedi acinofelet Âteicos aL .CD ,notgnihsaW ,ilanoizaN eimedaccA eL ,secneicS fo ymedacA lanoitaN alled nairaM dnalhsoK id azneicS alled ezneicS id oesuM .taaG id atutepir azneuqes al noc AND led otal li odnadraug olos omaits ehc iton iS .aciteneg aigolaeneg alled ilovepasnoc onos enosrep ¹Âip erpmes ,itazzirengegni isilana e atloccar id itnemurts id Âtilibinopsid al e AND li erednerpmoc len issergorp i noC .ardauqs ingo ni oroval id oilgof nu egnips e itneduts id eippoc ni essalc al eredivid itneduts ilg noc Âtivitta'led amirP .itnenitnoc euqnic ni iratnolov id aiailgim id aianitnec ad AND id inoipmac i odnazzilana e odneilgoccar anamu enoizargim alled icirots illedom i erappam rep ocigoloportna oiduts onu - yteicoS cihpargoeG lanoitaN alled ocitsifargoneg ottegorp lus eragadni id itneduts ilga ideihC .ittepsos eud e otuicsonocs oiracnab ordal led 2 amosomorc led XOPT enoiger alled otnorfnoC . Âtinretap e Âtilanimirc id isac a enosrep el eragelloc rep otasu ¨Ã one chromosome, but the other chromosome doesn't match. The 23 human chromosomes and 13 chromosomal places where the FBI seeks DNA repetitive DNA (Grade 7) More details View the aligned curriculum Do you agree with this alignment? Are we all related? Describe the role of biomedical engineering in DNA profiling. Biomedical engineers also help investigators analyze gene sequencing for DNA profiling. However, this content does not necessarily represent the policies of the Department of Education or the National Science Foundation, and should not be accepted by the federal government. Thank you for your feedback! You understand that the probability of a random event¨ a number between 0 and 1 expressing the probability the event occurs. Suspect 2 corresponds to the GAATGAAT sequence on one chromosome and the GAATGAAT sequence on the other chromosome, so you can say that suspect 2 corresponds to the TPOX position. chromosome: One of the filiform "packages" of genes and other DNA in the nucleus of a cell. DNA: Deoxyribonucleic acid contains the genetic instructions that control the biological development of our cells and the proteins that cells produce. Thank you for your feedback! Use mathematical representations to describe and/or support scientific conclusions and design solutions. junk DNA: DNA sections which do not code for genes; "the majority of the Â genome consists of junk DNA." Unwanted DNA contains sequences of repeated base pairs that can be used for matching purposes. (Degrees K - 12) More details View aligned curriculum Do you agree with this alignment? Thank you for your feedback! Advances and innovations in medical technologies are used to improve healthcare. Why? To confirm that the hair belongs to suspect 2, the other 12 chromosomal positions (see Figure 1) must also match. Basic: Two nucleotide bases that form a "DNA ladder step". A DNA nucleotide consists of a molecule of sugar, a molecule of phosphoric acid and a molecule called base. Remember that we have 23 pairs of chromosomes, each containing a chromosome of ours eht fo elpmas a gninimaxe yb noitalupop a tuoba noitamrofni niag ot desu eb nac scitsitats taht dnatsrednU !kcabdeef ruoy rof sknahT .evolg s'rebbor knab eht ni riah a dnuof ecilop eht ,esac ruo nI).setis SIDOC ton era sLEMA ehT .vog.ASU ,evitaitinI AND s'tnediserP ,AND cisneroF tuobA .draeh ylluftcepser eb dluohs saedi llA ".yllis" si noitseggus ro aedi on ,gnimrotsniarb ni taht stneduts dnimeR .ygolonhcet ni secnavda decneulfni sah ecneics dna ecneics fo ssergorp eht ecneulfni ygolonhcet ni secnavdA !kcabdeef ruoy rof sknahT .tcepsus cificeps a morf emac evolg eht ni riah eht taht wohs ot hctam tsum semosomorhc htoB .2 emosomorhc no noiger XOPT eht eton ,ytivitca siht roF .eneg a fo noisrev a ,ro ,elella na sniatnoc ereh gniredisnoc era ew taht snoiger eht fo hcaE .)setis SIDOC ruof htiw hctam a no desab ylekil smees 2 tcepsuS :rewsnA(.tcejbus eht fo yretsam rieht eguag ot srewsna rieht weiver ;teehskrow ytivitca eht etelpmoc stneduts evaH :teehskroW tnemssessA deddebmE ytivitcA .elella emas eht evah elpoep owt yna taht ytilibaborp a etamitse nac snaicitsitats ,yaw siht nI .nosrep rehtona sa secneuqes SIDOC 31 emas eht evah ot era uoy naht gninthgil yb kcurts eb ot ylekil erom semit noillim 01 era uoy oS .draob eht no saedi rieht droceR .emirc eht ni setacilpmi gniliforp AND rieht tcepsus hcihw etats maet hcae evaH .1 erugiF .secneuqes riap esab gnitaeper fo sehctam rof erapmoc ot reisae ti gnikam ,snmuloc atad tcepsus eht ot txen thgir meht dloh dna teehskrow eht morf snmuloc atad SIDOC ecnedive yrebbor eht tuo tuc ot spleh ti semitemoS .snoitacol AND cificeps 31 setaulave hcihw ,esabatad SIDOC eht fo txetnoc eht ni desu nehw eliforp AND euqinu a sah)sniwt lacitnedi tpecxe(nosrep hcaE .01/1 si esle enoemos dna nosrep eno rof etis SIDOC a neewteb hctam modnar a fo doohilekil eht taht dlot era eW .ytilibaborp enimreted ot desu era sledom lacitamehtaM !kcabdeef ruoy rof sknahT .rehtom ruo morf rehto eht generalizations about a population from a sample are valid only if the sample is representative of that population. (scroll down for DNA analysis and profiling questions/answers) DNA Casework. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (Grades 6 - 8) More Details View aligned curriculum Do you agree with this alignment? So now let's compare the TPOX regions of the DNA found in the bank robber's glove with the TPOX regions of the DNA of two suspects. A robbery takes place at a bank. Have them raise their hands to respond. Therefore, the probability of two CODIS sites matching is 1/10*1/10 = 1/100 (one in 100). How DNA Evidence Works. CODIS: Acronym for the FBI's DNA identification system: Combined DNA Index System. DNA Profiling. In DNA, the code letters are A, T, G and C, which stand for the chemicals adenine, thymine, guanine and cytosine, respectively. Though all humans share 99.9% of their genes, our DNA differs from everyone else's by three million nucleotide base pairs. (Answer: (1/10)4 = 1 in 10,000, not good enough ¢ÃÂÂ need more CODIS site data) Have students act as biomedical engineers and analyze the results of the DNA profiling for the police investigators as described in the post-assessment activity. Biomedical engineers design artificial body parts, medical devices, diagnostic tools, and medical treatment methods. They are usually simply called bases in genetics. Which allele you have at a particular site is determined by your parents' genetic data and meiosis, as well as any errors in replication. 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