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EB Education Revision Guide

How to work with DNA

...helping everybody achieve Even Better

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DNA

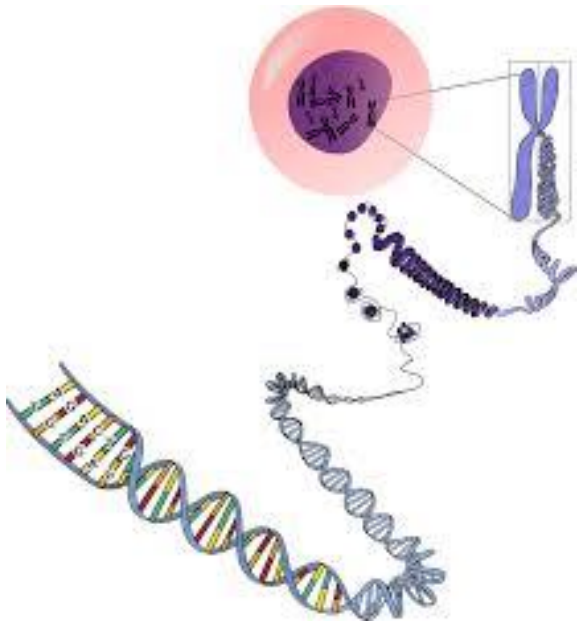
What is DNA?

DNA molecules are large and complex. They carry the instructions for your characteristics. Everyone's DNA is unique (except for identical twins).

DNA is stored as long threads called **chromosomes** in the nucleus of eukaryotic cells.

A **gene** is a section of DNA on a chromosome that codes for a specific protein.

Diagram



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Structure of DNA

What is DNA made of?

DNA is made of two strands, coiled together in the shape of a **double helix**.

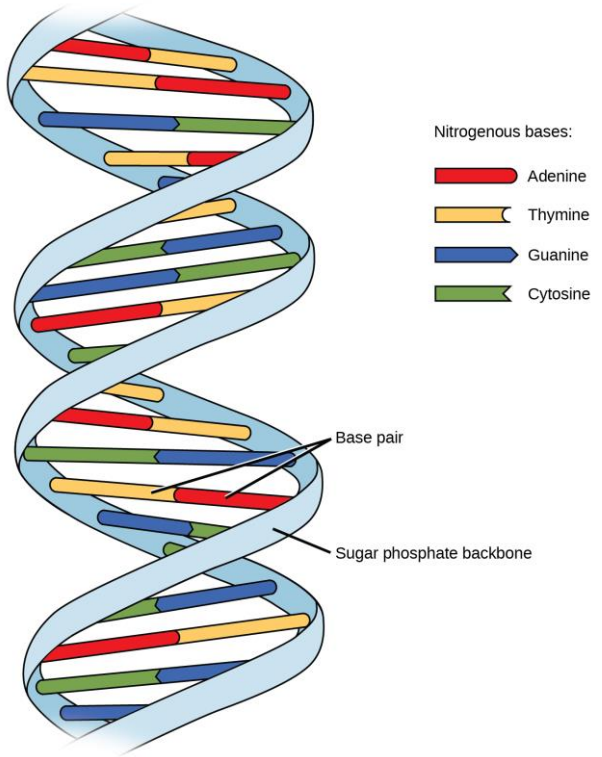
The strands of DNA are made of many repeating units called **nucleotides**.

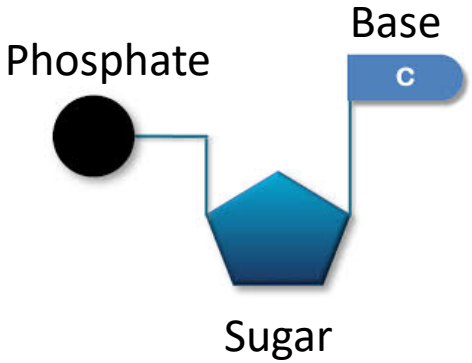
Each nucleotide is made of

- 1 sugar molecule
- 1 phosphate molecule
- 1 base

The sugar and phosphate molecules form the backbone of the DNA strands. The bases link the two strands together.

Diagram





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Structure of DNA

What is DNA made of?

There are four different bases:

- Adenine (A)
- Thymine (T)
- Guanine (G)
- Cytosine (C)

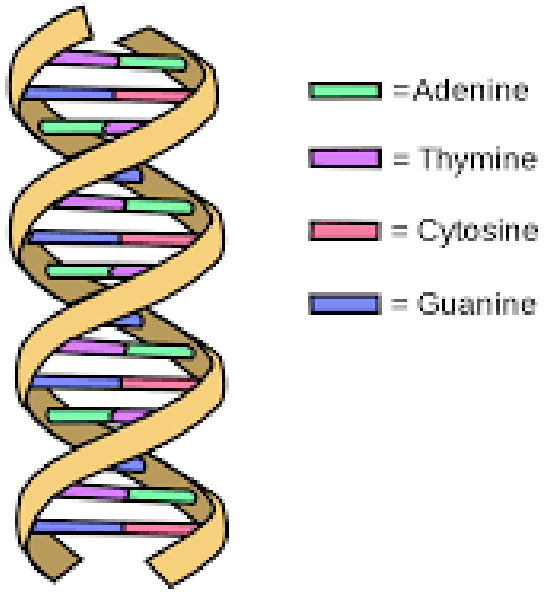
They always pair up in a particular way, called **complementary base pairing**.

Adenine always pairs with thymine.

Cytosine always pairs with guanine.

The complementary base pairs are joined together by **weak hydrogen bonds**.

Diagram



DNA

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Extracting DNA

How to extract DNA from fruit

You can extract DNA from fruit cells with a simple practical.

- Mash some fruit like strawberries or kiwi and place into a beaker
- Add a teaspoon of salt and a small volume of washing up liquid to the fruit and mix it all up

The detergent breaks down the cell membranes to allow the DNA to get out.

The salt makes the DNA stick together.

- Filter the mixture to remove the large insoluble pieces.
- Add some ice-cold alcohol to the filtrate.

The alcohol allows the DNA to precipitate out of the solution as it is not soluble in cold alcohol.

- Use a glass rod to extract the stringy white precipitate of DNA.

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Your turn:

1. The nucleus of a sperm cell contains DNA.
Describe as fully as you can the structure of DNA.

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……
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2. Describe how the strands of a DNA molecule are linked together.

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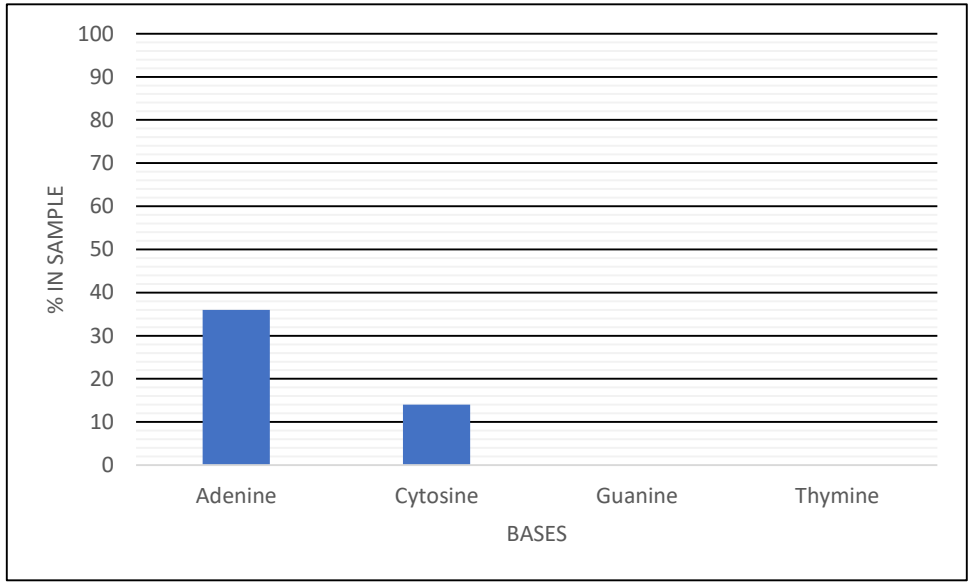
3. Below is a bar chart, which shows the percentage of adenine and cytosine in a sample of DNA.

Complete the bar chart to show the percentage of guanine and thymine in the sample.



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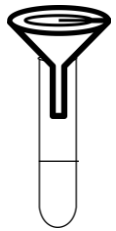
Your turn:

4. DNA can be extracted from strawberries following the stages below.

Stage 1

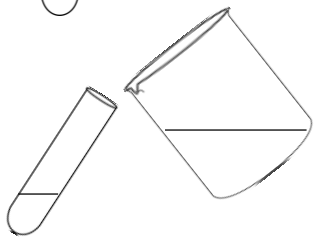
mash strawberry in soapy water

Stage 2



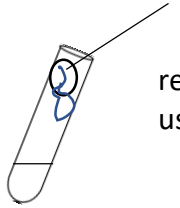
filter into a boiling tube

Stage 3



pour ice cold ethanol slowly into the filtrate

Stage 4



remove the DNA using a wire loop

a) Explain why stages 1 and 3 are needed in the extraction of DNA

Stage 1:

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.....

.....

Stage 3:

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.....

.....

b) Part of a DNA strand is shown below.
Complete the boxes to show the complementary DNA sequence.

DNA strand	T	T	G	T	A	G	G	G	C
Complementary DNA strand									

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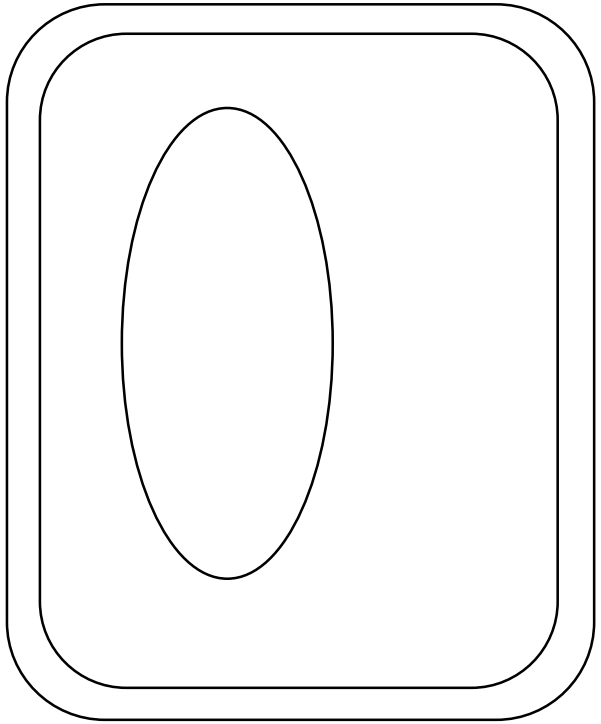
Your turn:

5a) On the diagram below, draw and name the structure which contains DNA.



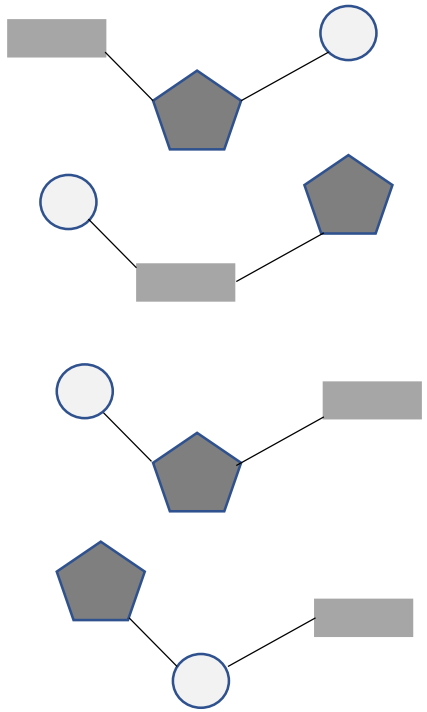
b) Which diagram below represents the structure of a nucleotide of DNA?

Key:

Sugar

Phosphate:

Base



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Answers:

1. The nucleus of a sperm cell contains DNA.
Describe as fully as you can the structure of DNA.

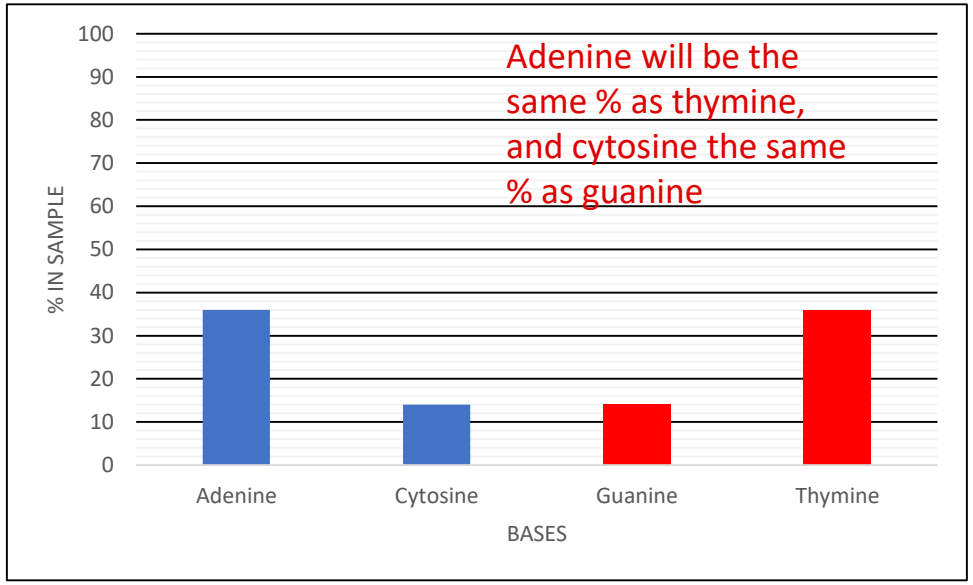
DNA is a double helix
The strands are made of sugar and phosphate molecules forming a sugar-phosphate backbone
The strands are held together by complementary base pairings, A and T, and C and G
Base pairings are held together by weak hydrogen bonds

2. Describe how the strands of a DNA molecule are linked together.

Hydrogen bonds between the complementary base pairs

3. Below is a bar chart, which shows the percentage of adenine and cytosine in a sample of DNA.

Complete the bar chart to show the percentage of guanine and thymine in the sample.



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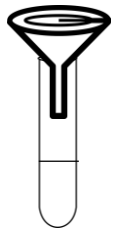
Answers:

4. DNA can be extracted from strawberries following the stages below.

Stage 1

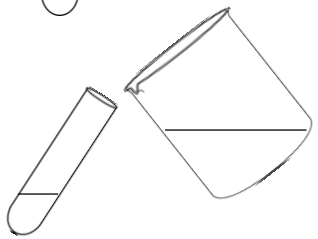
mash strawberry in soapy water

Stage 2



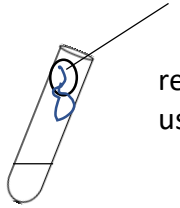
filter into a boiling tube

Stage 3



pour ice cold ethanol slowly into the filtrate

Stage 4



remove the DNA using a wire loop

a) Explain why stages 1 and 3 are needed in the extraction of DNA

Stage 1:

To break down the cell membranes and release the DNA

Stage 3:

To precipitate the DNA from the solution

b) Part of a DNA strand is shown below.
Complete the boxes to show the complementary DNA sequence.

DNA strand	T	T	G	T	A	G	G	G	C
Complementary DNA strand	A	A	C	A	T	C	C	C	G

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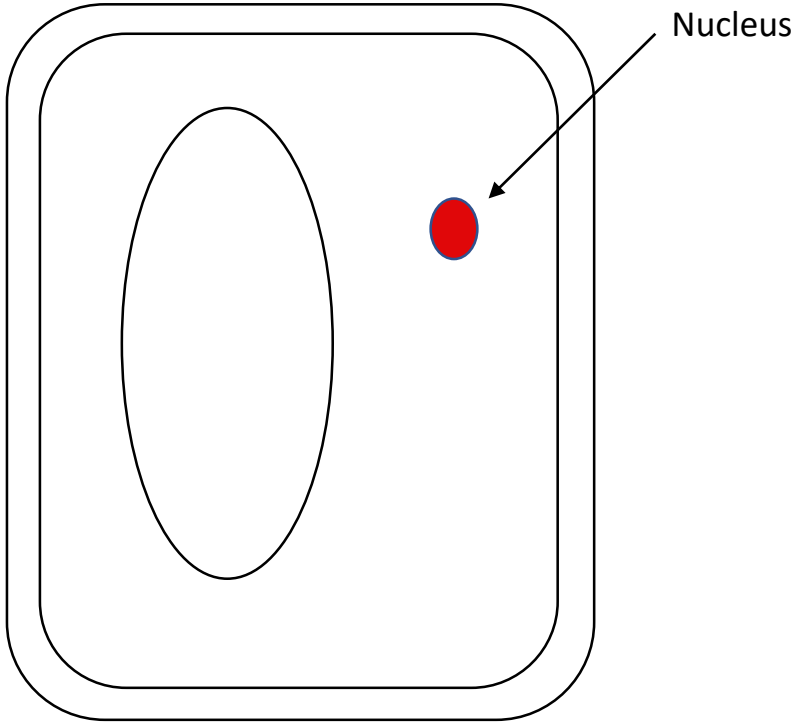
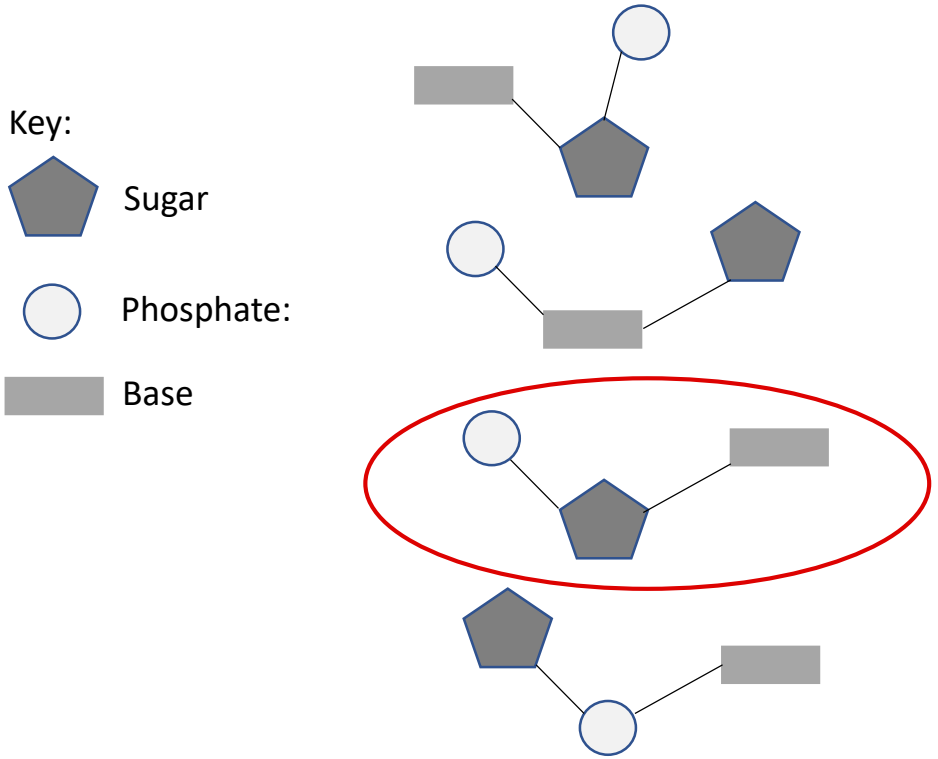
Answers:

5a) On the diagram below, draw and name the structure which contains DNA.



b) Which diagram below represents the structure of a nucleotide of DNA?



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For more help and resources, or to work with us as a tutor, please contact us

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