From DNA to a protein

CELS worksheet

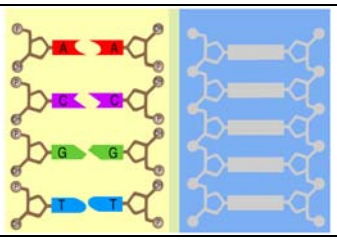
Aims: To recognise the roles of DNA and mRNA in the manufacture of the body's proteins.

DNA is an important chemical which is used by our bodies as a *blueprint*. This blueprint contains information on **amino-acids**, the basic building material for **proteins**.

With this set of tasks you will take a length of DNA and turn it into a sequence of connected amino-acids i.e. a protein. You will use a series of interactive animations to understand the steps involved.

1 Building a DNA molecule

http://gslc.genetics.utah.edu/units/basics/builddna/

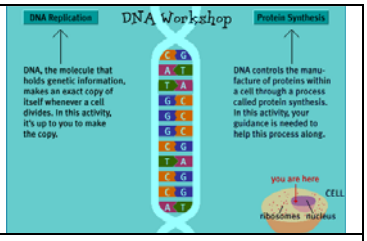


Task: Build the right hand strand of DNA using the sequence, from top to bottom, **AGTAC**

What sequence of bases was needed on the left hand strand?

2 Unzipping and copying a length of DNA

http://www.pbs.org/wgbh/aso/tryit/dna/#



Have a go at the DNA replication task where you will start with one DNA strand and end up with an exact copy.

Where does DNA replication take place?

3 Making a moveable copy of DNA (mRNA)

http://www.dnai.org/a/index.html

➔ Copying the code ➔ Putting it together ➔ Interactive

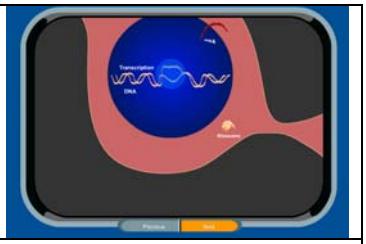
You will need to find and follow the links shown above (➔) – these can be difficult to find on the screen! Once you have found the Interactive section (shown opposite), you can use DNA to make a copy called mRNA which can leave the nucleus.

What is the name of the enzyme which uses DNA to make mRNA?

4 Sending the message to the protein factory

http://gslc.genetics.utah.edu/units/basics/tour/protein.swf

http://www-class.unl.edu/biochem/gp2/m_biology/animation/gene/gene_a2.html



Either link will show you an animation which will help answer the following question.

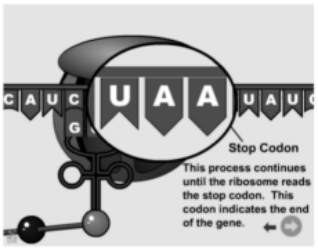
Where does the mRNA go to after it leaves the nucleus?

5 Putting together amino acids into a protein.

http://www-class.unl.edu/biochem/gp2/m_biology/animation/gene/gene_a3.html

OR http://www.dnai.org/a/index.html

(Reading the code ➔ Putting it together ➔ interactive)

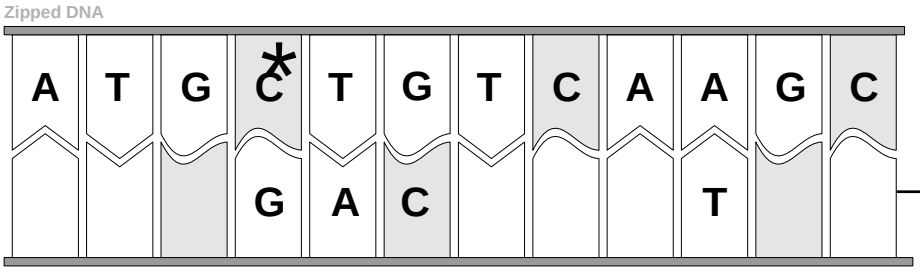


This is animation puts together a fair amount of complicated steps - it shows how the mRNA is used by the Ribosome together with amino acids to make a protein.

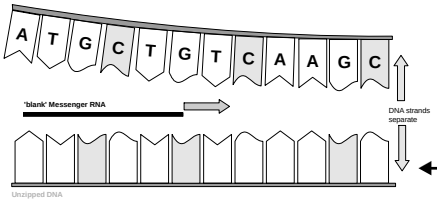
What is a codon?

From DNA to a protein

The DNA strand shown below has information for making a particular protein. One side shows a complete sequence of bases or nucleotides (ie A,T,G and C). **Complete the lower strand..**

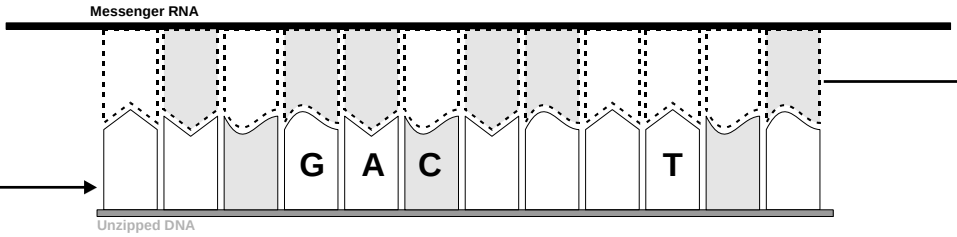


The two sides unzip temporarily; the bottom half can then be used to create a close copy called *messenger RNA*.



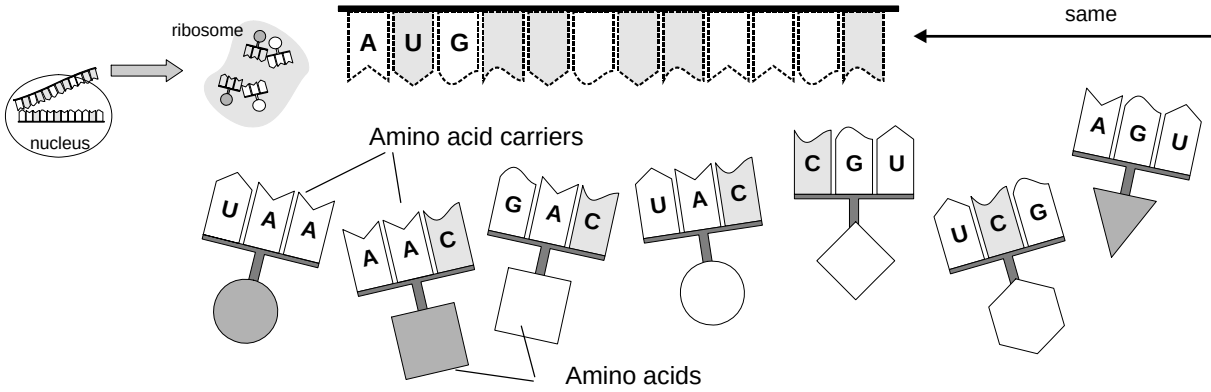
same

DNA remains inside the nucleus whereas mRNA is able to move out into the rest of the cell. The structure of mRNA is slightly different using chemical 'U' instead of 'T' (a different nucleotide). **Complete the original lower DNA** (A,C,G & T) **and upper mRNAsequences** (A,C,G & U).

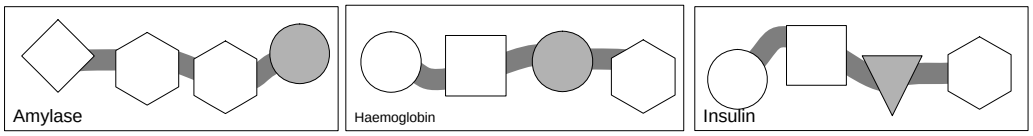


same

Once mRNA leaves the nucleus, it enters the cell's protein factory. Here other RNA pieces carrying amino acids are attracted to the mRNA. According to the sequence of bases, in groups of three,the carriers start to link up the amino acids to form a protein.



Fill in the sequence of bases on to the mRNA strand. Show which carriers are attracted to each triplet of bases and circle the protein below which would be made in this case.



If a mutation in the DNA changed **'C*'** to a **'T'** an incorrect chain would made with no function.