DNA:

How is this linear information related to our inherited traits?
DNA directs our cells:

Our cells translate:

Proteins are the link between:

Why are some people lactose intolerant or turn red when they drink?

**Protein Synthesis**: (p. 192; Fig. 10.6A & p. 194; Fig. 10.8B)
Two phases in making proteins (Prokaryotic cells):
1) **Transcription**:
2) **Translation**:

Three phases in making proteins (Eukaryotic cells):
1) **Transcription**:
2) **RNA Processing**:
3) **Translation**:

**REMEMBER**: DNA → RNA → Protein

=> 1 gene - 1 polypeptide (protein)

**NOTICE**: 2 languages: nucleotides → amino acids →

How does RNA differ from DNA?

<table>
<thead>
<tr>
<th>RNA</th>
<th>DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar:</td>
<td></td>
</tr>
<tr>
<td>Nitrogenous bases:</td>
<td></td>
</tr>
<tr>
<td>Strands:</td>
<td></td>
</tr>
</tbody>
</table>

**Genetic code**: (p. 194; Fig. 10.8A)

Why does the genetic code have to be read in groups of 3's?
Codons:

- 1 start codon - AUG - methionine
- 3 stop codons - UAA/UAG/UGA
- 60 codons - for the 20 amino acids

**TRANSCRIPTION**: (p. 195; Fig. 10.9A & B)

**RNA polymerase**:
- Three functions:
  a) [Diagram of DNA strand]
  b) What bonds are being broken?
  c) (5’ → 3’ direction)

**Promotor region of DNA**:
- Initiator site
- Elongation
- Termination

**Types of RNA from transcription**:
- a) messenger RNA (mRNA):
- b) transfer RNA (tRNA):
- c) ribosomal RNA (rRNA):

What is the complementary RNA strand that would be transcribed from the following DNA sequence?

```
DNA  5' - TACTTCAAAATC - 3'
     3' - ATGAAGTTTTAG - 5'
DNA  5' - TACTTCAAAATC - 3'
RNA  ____________________
```
RNA PROCESSING: (p. 217; Fig. 11.7)

1) Guanine cap
2) Poly-A tail
3) Introns:
4) Exons:

Splicesome:

Ribozymes:

TRANSLATION: (p. 198 - 200; Fig. 10.13 - 10.15)

Occurs:

Players involved in translation:
1) mRNA:
2) tRNA: functions as: carries: recognizes: Anticodon:
3) aminoacyl tRNA synthetase:
4) ribosomes: coordinates the coupling of:
   - small subunit
   - large subunit: has the 2 (3) binding sites
     a) A site:
     b) P site:
     c) E site: exit site (new site in which the tRNA in the P site enters)
3 Stages of Protein Synthesis - "The process": (p. 199; Fig. 10.13B and 10.14)

a) **Initiation:**
   1) Binding of:
      a) 
      b) 
      c) 

   2) Large subunit attaches:

b) **Elongation:**
   1) Codon recognition:

   2) Peptide bond formation:

   3) Translocation:

c) **Termination:**

   stop codons (UAA/UAG/UGA):

   releasing factors attaches:

**Polyribosome:**

The proteins produced are in the 1° level of protein structure, which the genes determine.
Some proteins are modified further before they do their specific jobs.

**What are some of the possible roles for these proteins?**

The following tRNA has the anticodon UAC. What is the DNA base code for this tRNA? What amino acid would this tRNA carry?

<table>
<thead>
<tr>
<th>Amino acid</th>
<th>tRNA</th>
<th>mRNA</th>
<th>DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UAC</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dictionary of the genetic code for amino acid: codons**

Changes in the Genome:

Mutations:
Could be:  a) disastrous:

               b) advantageous:

If mutations occur in the gametes (sperm or ovum), then they can be transferred to offspring

Gene mutation:
Point mutations:

2 types of mutations:
1) Base substitution:
   a) could make no difference at all, why?
      GGC → GGU in mRNA; still codes for glycine
   b) could be:
   c) could be detrimental (useless protein)

Ex. sickle cell anemia: GAA → GUA
   mRNA (valine instead of glutamic acid)

Missense or nonsense

2) Insertion or Deletions:
   Frameshift mutation:
   This is more disastrous effect on the resulting protein than substitutions.  Why?

Virsuses:
Are these living or non-living?

What is the genetic material of viruses?

Viruses are a problem to all organisms.

What is HIV?  AIDS?

What type of virus is HIV? (p. 205; Fig. 10.21)

What types of cells do they tend to attack in the human body and why?