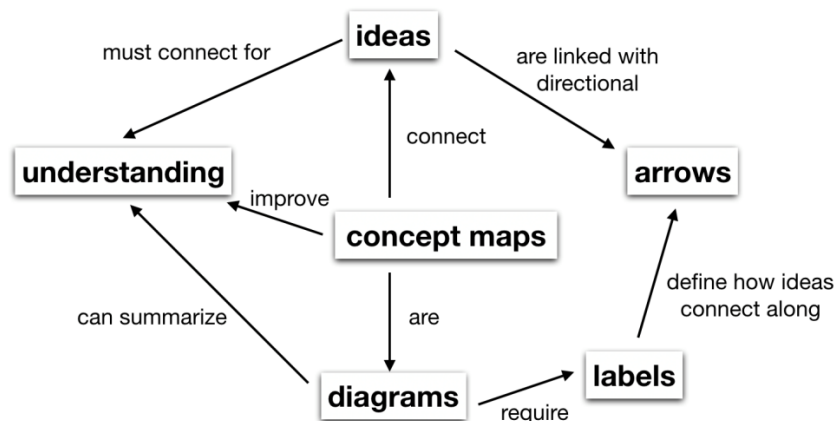


Question: Only 1.5% of the human genome codes for proteins. What does the other 99% do?

Think: Consider the above question individually. Begin by making a list of your ideas about the roles of DNA sequences besides coding for proteins.

Pair: Compare your list of ideas with a partner. Keep this list as this will be covered in a future class

Figure 1: A concept map about concept maps



Draw a concept map to connect the following terms:

genome - euchromatin - nucleosome - DNA - chromosome - protein - heterochromatin - gene

Be sure that all the terms are connected with at least one directional arrow. Each arrow should have a label that is a short phrase that indicates how the ideas are connected.

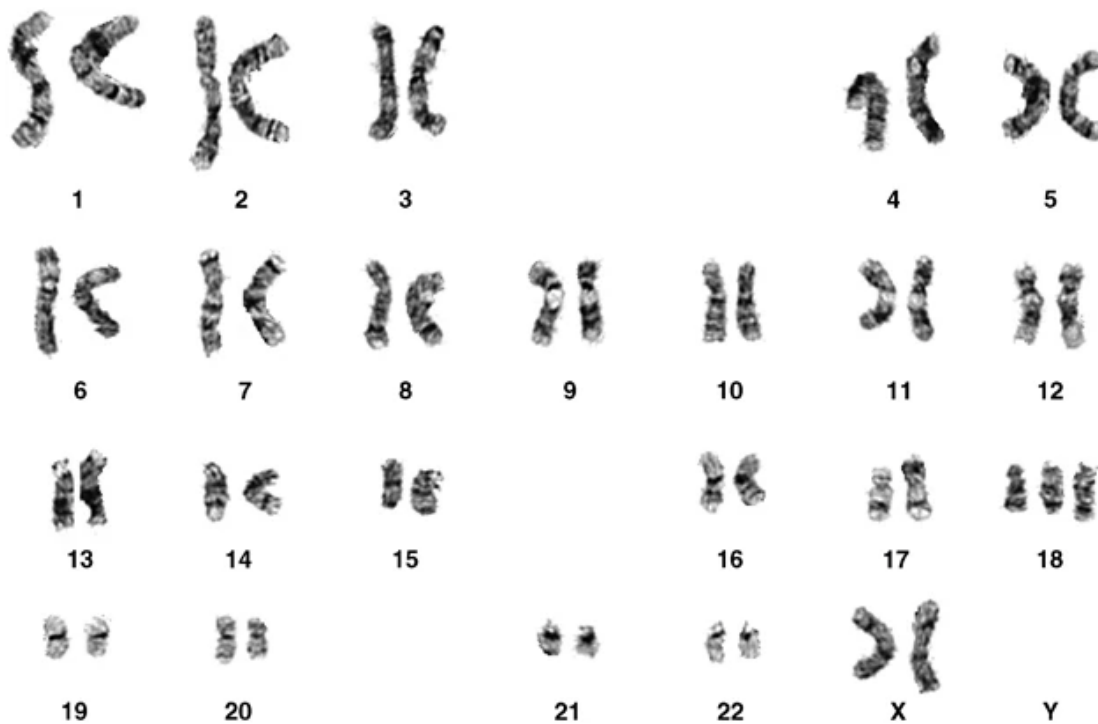
Share your concept map with a partner. Provide your partner with feedback on any points of confusion. Reflect on the similarities and differences between your concept maps and consider adding or refining connections.

Multiple choice questions

- 1) One or more part of the nucleosomes can be epigenetically modified. Which ones cannot be epigenetically modified? More than one answer is correct.
 - a) Histone's core
 - b) DNA sequence
 - c) Histone's Tails
 - d) Scaffold proteins that regulate histone modification e) Histone-1

- 2) Mutations of HDAC proteins induce loss of their activity and it results in changes of the chromatin epigenetic marks. What is the effect on gene expression?
- a) Gene silencing
 - b) No changes
 - c) Activation of gene expression
 - d) Increase H3 methylation
 - e) Depends on other proteins
- 3) How many fluorescent probes (60 nucleotides long) you need to label a genomic region spanning from Chr 6: 13.5 Mb to 13.7 Mb.
- a) roughly 3000 probes
 - b) 400 probes
 - c) 333000 probes
 - d) 1200 probes
 - e) roughly 300 probes
- 4) At mitosis, human chromosome 1 is condensed to a form that measures only 10 μm in length. A single nucleosome core particle is 11 nm long and contains 147 bp of DNA (0.34 nm/bp). What packing ratio (DNA length to nucleosome length) has been achieved by wrapping DNA around the histone octamer?
- a) 0.025
 - b) 4.5
 - c) 3.5
 - d) 0.45
 - e) 0.25
- 5) Which are the less condensed regions of an interphase chromosome that stain diffusely?
- a) Introns
 - b) Exons
 - c) Coding genes
 - d) Euchromatin
 - e) Heterochromatin
- 6) Which of the following information is correct (can be multiple answers)?
- a) The reader complex is a protein complex
 - b) The reader complex is made of proteins and DNA
 - c) The reader complex recognises histone modifications
 - d) The reader complex modifies histone tails
 - e) The reader complex recruits other components with a catalytic activity

7) Observe the karyotype below and select all the correct answers.



- a) The patient is male
- b) The patient is healthy
- c) The patient is trisomic
- d) The patient has chromosomal translocations
- e) The chromosomes were extracted at mitosis

TRUE or FALSE

- 1) The DNA is organized in chromosomes only during mitosis.

TRUE or FALSE

- 2) In the living cell, chromatin usually adopts the extended “beads-on-a string” form.

TRUE or FALSE

- 3) The four core histones are relatively small proteins with a very high proportion of positively charged amino acids; the positive charge helps the histones bind tightly to DNA, regardless of its nucleotide sequence.

TRUE or FALSE

4) Genes are highly expressed during mitosis.

TRUE or FALSE

5) Core histones are highly conserved across evolution

TRUE or FALSE

6) Histone-3 in the nucleosome can be methylated and acetylated on the same position at the same time.

TRUE or FALSE