

## Answers Exercises **Sept 23.**

1. *In mammals, the male genome is generally bigger than that of females.*  
False. Since females have 2 X chromosomes and males have 1 X and 1 Y chromosome, the male genome is smaller.
2. *In genome organizational hierarchy which is correct...*  
Chromosome > Chromatin > DNA
3. *If a female human has a recessive mutation only on one X chromosome, it cannot induce a phenotype.*  
In females, one X chromosome is inactivated, so recessive mutations can in some circumstances produce phenotypes.
4. *Which of the following statements is most correct -*  
Gene promoters but not enhancer sequences are easy to identify from genomic sequences. In contrast (generally) to promoters, enhancer sequences are often harder to identify
5. *Intron sequences are translated into peptides and then removed to produce the mature protein sequence.*  
False. Introns are removed from the pre-mRNA by RNA splicing before translation into proteins.
6. *Intronic sequences cannot be identified by computational analysis of genome sequences.*  
False. Intron/exon boundaries can be identified through conserved sequence features
7. *Across evolution, as animals become more complex, the size of their genomes **AND** the number of protein coding genes changes such that genome size and the number of protein coding genes are not related to animal complexity*
8. *Alternative splicing can increase the peptide diversity produced by protein encoding genes by*  
Using alternative exons can increase protein diversity or  
Skipping exons can also increase protein diversity
9. *Mitochondria have their own genomes*  
True. Mitochondria have their own genomes that encode a subset of mitochondrial proteins.
10. *Histones are not involved in gene regulation but are required to form chromatin.*  
False. Histones can regulate gene expression including through epigenetic regulation
11. *Epigenetics is ...*  
Regulation of gene expression by chemical modification of DNA (or DNA regulatory proteins such as histones)

12. *Transcription factors commonly have*  
Transcription factors commonly associate with DNA through a DNA binding domain
13. *In most cell types in the body, chromosomes are found in*  
Pairs i.e. Diploid. Most cells are diploid apart from germ cells
14. *Most known mammalian genomes have...*  
more non-coding genes than protein coding genes
15. *For routine sequencing, NGS technology is the first choice.*  
False. Sanger sequencing is mostly used for routine sequencing.
16. *Primers are required for Sanger sequencing*  
True. A primer is required for Sanger sequencing.
17. *Proteins can be reverse transcribed into RNA or DNA*  
False. Proteins cannot be reverse transcribed into RNA as far as we know.
18. *tRNA stands for...*  
transfer RNA
19. *Spliceosomes...*  
have protein and RNA components
20. *Gene regulatory elements constitute only a small portion of the human genome.*  
False. Gene regulatory elements make up an estimated 40% of the human genome
21. *The DNA sequence ATGAGTAAAGAAGAACTT would encode a peptide beginning with...*  
This sequence translates into a peptide sequence begins with Methionine
22. *The genetic code has no redundancy*  
False. Several codons can encode the same amino acid
23. *Once a pre-mRNA has completed splicing, it is always immediately translated.*  
False. mRNAs may undergo many additional modifications and regulatory steps.
24. *Transcription factors usually ...*  
Bind DNA
25. *Most genes are spliced by...*  
the U2 spliceosome
26. *Chromosomes are most easily visible at interphase.*  
False. Chromosomes are most easily visible at prophase.

27. *A protein encoding gene with 3 exons can make...*

not enough information to answer. Many different peptides could be produced through slicing and other mechanisms.

28. *NGS and Sanger sequencing technologies are both based on in vitro DNA replication.*

Correct. Both technologies are based on this foundation.

29. *Most proteins use Methionine as the first amino acid.*

True. The majority of proteins do begin with Methionine

30. *Animal cloning requires...*

removing the nucleus from a host egg cell.