Mutations & Genetic Engineering Quiz Review

12-4 p. 315

23. **Gene** and **chromosomal**; both change the DNA sequence that affects genetic information. Gene mutations involve a change in one or several nucleotides in a single gene, whereas chromosomal mutations involve changes in the number or structure of whole chromosomes.

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15. Large DNA molecules are cut up using **restriction enzymes** that recognize and cut specific nucleotide sequences in DNA.

16. **Gel electrophoresis** enables scientists to separate and analyze DNA fragments, to compare genomes of different individuals and organisms, and to identify a specific gene.

18. During a **polymerase chain reaction**, or **PCR,** a short piece of complementary DNA (a primer) is added to both ends of the DNA fragment to be copied. The DNA is heated to separate the two strands, and then cooled. DNA polymerase makes copies of the region between the two primer sequences. The copies also serve as templates to make more copies. 30 – 40 cycles of heating and cooling can quickly produce thousands of copies of DNA.

21. Successfully transferring the luciferase gene from an animal to a plant indicated that the basic mechanisms for gene expression are shared by plants and animals.

22. A **transgenic organism** is an organism that contains genes from another organism (often a different species). They are used to produce important substances for health and industry (e.g. human insulin is produced by transgenic bacteria; cows that produce human proteins in milk; plants that produce natural insecticides).

23. To **clone** Dolly the sheep, Ian Wilmut removed the nucleus of an egg cell and replaced it with a nucleus taken from another adult. This egg was then placed in the uterus of a surrogate mother, where is developed normally.

25. Human proteins produced through **genetic engineering** can be produced relatively inexpensively in large quantities. They are the actual human protein, and are pure.

31. The blood proteins that people need could be produced by bacteria that have been transformed with the human gene that encodes the needed protein.