

# Science 30 - Lesson 15 - Chapter 2 - Review

Name: \_\_\_\_\_

1) Describe the differences among the terms chromosome, DNA, and gene.

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2) How many chromosomes are found in a human autosomal cell?

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3) Compare the processes of mitosis and meiosis.

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4) What are the differences between acquired and inherited characteristics?

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5) A pea plant with green pea pods is crossed with a pea plant with yellow pea pods. Both plants come from lines of pea plants that have only produced one colour of pod. All offspring from this cross develop green pea pods.

a) Determine whether the green colour for pea pods is dominant or recessive.

b) Using letters to represent alleles, write the most likely genotypes for the two parent plants and the genotype of the offspring.

6) Distinguish between the terms genotype and phenotype.

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7) For each of the following DNA nucleotide sequences, write the sequence for the complementary strand and for the chain of amino acids that code for this strand.

a) ATATACCAGCCGATA

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b) GCATGGTTCATAAGG

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c) CGTATGCCAGTTTAT

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d) GGTTTATGCATTTCT

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8) For each of the following amino acid chains, write all the corresponding DNA sequences that could code for that chain.

a) Methionine-Threonine-Glutamine

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b) Arginine-Lysine-Tryptophan

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c) Serine-Proline-Aspartate

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d) Leucine-Cysteine-Valine

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9) Describe the importance of proteins.

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10) Compare and contrast a point mutation and a frameshift mutation.

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11) List the steps used to create recombinant DNA. Applying Concepts

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12) Draw a series of diagrams to compare and contrast mitosis and meiosis. For each step, use one pair of chromosomes and include labels to describe the process.

13) A rare recessive allele causes a lack of fur pigment in tigers to produce the distinctive “white tiger” phenotype. These animals have sometimes been incorporated into the extravagant stage shows of Las Vegas magicians.

a) Explain why entertainers who use the white tigers in their shows only want their white tigers to breed with other white tigers or the offspring of white tigers.

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b) State possible problems with the selective inbreeding of closely related white tigers.

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14) A dog breeder owns a dog that has just given birth to a litter of puppies. Both the father and the mother were selected from long lines of well-known and recorded pedigrees. One of the puppies has a red fur colouring that the breeder has never seen in any of the puppy’s ancestors.

a) Explain the likely cause of this new trait.

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b) Describe how you can determine if the new colour trait is dominant or recessive. Use Punnett squares to illustrate your answer.

c) Explain the steps you would take to develop a breed of dogs with this particular trait.

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15) The use of antibacterial soaps has become popular. Describe how bacteria can develop a resistance to antibacterial soaps. Include the role of bacterial plasmids in your answer.

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16) Draw a series of images that illustrate the process of gene therapy on a patient who has the autosomal recessive disease of cystic fibrosis.

17) A breeder of Labrador retrievers is told that black fur is dominant over yellow fur. The breeder crosses a black Lab with a yellow Lab. When the puppies are born, some are black, some are yellow, and some are chocolate in colour. Evaluate the following statements regarding this Labrador cross. State whether you agree or disagree with each one. For those statements you disagree with, explain why.

- a) The gene for coat colour in Labrador retrievers must be controlled by more than one gene or have more than two possible alleles.

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- b) All the puppies have homozygous genotypes for their coat colour. \_\_\_\_\_  
c) The female must have bred with both a black Labrador male and a chocolate Labrador male to produce three kinds of coats in her puppies.

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- d) A pedigree of coat colours is helpful to determine the genotype of the parents and offspring.

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18) The allele that produces hairy ears in humans is found on the Y chromosome.

- a) State which gender is affected by the presence of a gene on the Y chromosome.

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- b) Explain why a Y-linked gene cannot be recessive or dominant.

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- c) State the probability of a male with hairy ears passing this trait onto his son.

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- d) State the probability of a male with hairy ears passing this trait onto his daughter.

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- e) Can a person be a carrier for this trait? Explain your answer.

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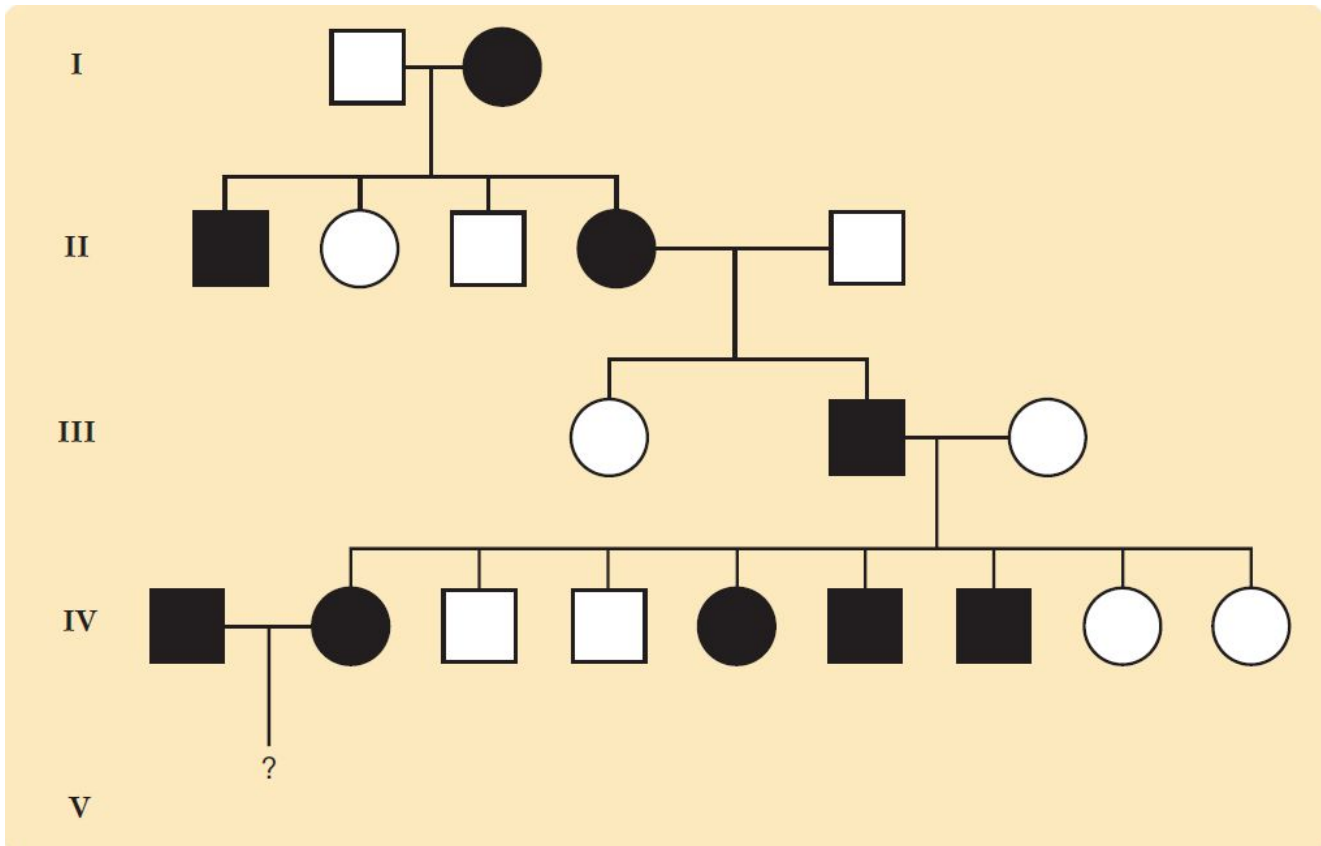
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19) Elliptocytosis is a genetic disorder affecting a protein that influences the cell membrane structure in red blood cells. Red blood cells with the altered protein have an elliptical, or oval, shape when compared to red blood cells containing the unaltered protein.

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20) The pedigree below shows how elliptocytosis is inherited within one family.



a) Based on the evidence shown in this pedigree, determine which pattern of inheritance—sex-linked, autosomal recessive, or autosomal dominant—is exhibited by elliptocytosis. Explain how evidence in the pedigree supports your answer.

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b) Predict the possible genotypes and phenotypes of offspring in generation V.

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