

Science 10- Course Review

Unit 2-Biology

Name _____

Date _____

Date due _____

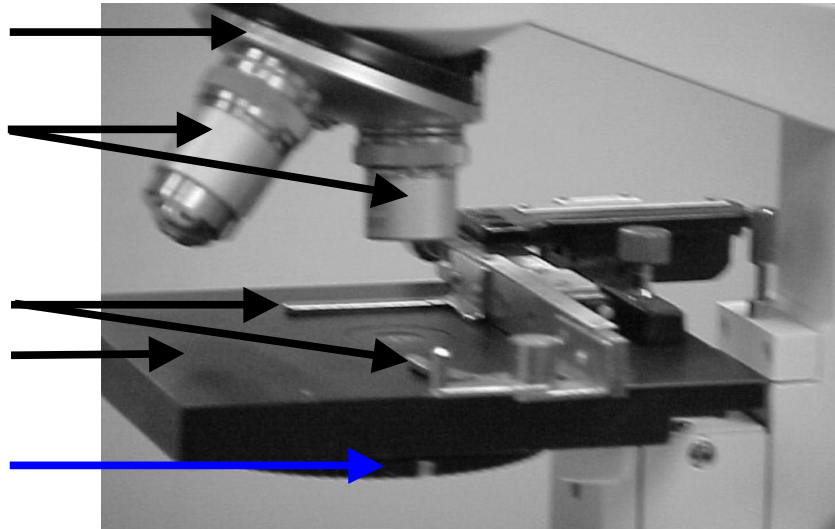
The Science 10 Biology Unit covers:

- Chapter 14-The Microscope
- Chapter 15-The Cell
- Chapter 16-Reproduction
- Chapter 17-Heredit

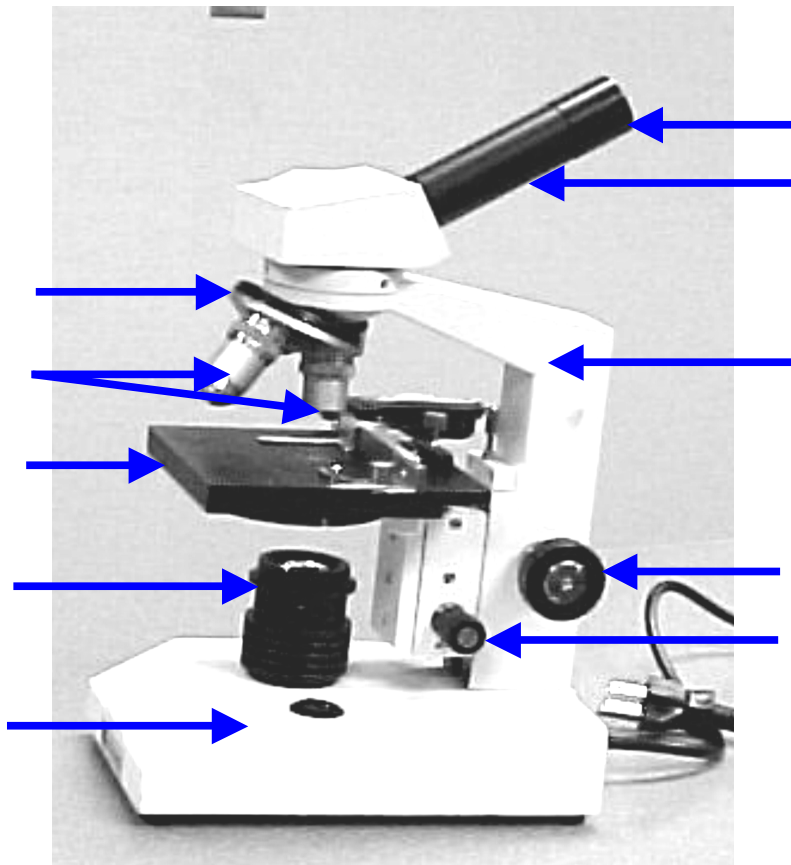
You can also consult the “Biology Outline” which shows all of the activities (Worksheets and Labs) If you don’t have one or if you want to view or print any of the activities, go to the Science 10 Web page at <http://sd67.bc.ca/teachers/dcolgur> and click “Science 10”

1. What happens to light when it passes through a barrier between two substances (eg. air and water)? _____
2. The Dutch microscopist _____ discovered many things using a simple microscope including micro-organisms.
3. What is the main difference between a **simple** microscope and a **compound** microscope?

4. Label the parts on the following close-up of the stage of a compound monocular microscope:



5. Label each of the following parts on this **compound monocular microscope**:



6. Give the function of each of the following microscope parts: (see p. 316-318 in Text)

- a) **Ocular Lens** –
- b) **Body Tube** –
- c) **Objective Lenses**
- d) **Revolving Nose Piece** –
- e) **Arm** –
- f) **Stage** –
- g) **Slide Holder** –
- h) **Disk Diaphragm (or Light Control Disk)** –
- i) **Course Adjustment Knob** –
- j) **Fine Adjustment Knob** –
- k) **Light** –

7. What are two advantages of using a stereoscopic microscope rather than a monocular microscope?

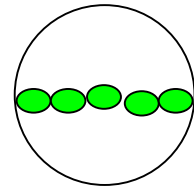
8. Why aren't stereoscopic microscopes used for examining very small specimens?

9. A particular stereo microscope has an **ocular** lens magnification of **15X** and an **objective** lens magnification of **3X**. Calculate the total magnification.
10. Explain what is meant by “**field of view**” in a microscope.
11. When you move an object to the **right** on the stage, the image in the field of view moves to the _____. When you move an object **up** on the stage, the image in the field of view moves _____.
12. What is meant by the **depth of field**? (See p. 323 or 523 of the Text)
13. Which gives you a greater (better) **depth of field**, a **lower** power magnification or a **higher** power magnification?
14. Give **two** advantages to viewing an object in a **lower** power magnification.
1. _____
2. _____
15. Write the correct formula for finding the **Actual Size** of an object under the microscope if you know the **Field Diameter** and the **number of times the object fits** in the field.
16. The Low Power Field Diameter in a certain microscope is 4000 μm . An organism stretches $\frac{1}{4}$ of the way across the field. (ie. four organisms would fit across the field)
Calculate the **actual size** of the organism. Show the formula in your solution.

Answer _____ μm

17. Write the formula for finding “**Drawing Magnification**” if you know the **Drawing Size** in μm and the **Actual size** in μm

18. The picture shows five organisms stretched across the High Power Field of a microscope.



The High Power Field Diameter of this microscope is $400\ \mu\text{m}$.

- a) Calculate the **actual size** of one of these organisms. Show the formula in your work!

Answer _____ μm

- b) Measure the length of one object in the drawing here and calculate the **drawing magnification** of this diagram.

Answer: Drawing Magnification is _____ X

19. Given the main **function** of each of the following cell **organelles**:

- a. cell wall -
- b. cell membrane -
- c. cytoplasm -
- d. nucleus -
- e. nuclear membrane -
- f. chromosomes -
- g. mitochondrion -
- h. endoplasmic reticulum -
- i. chloroplast -

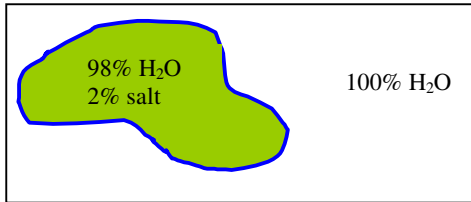
j. vacuole -

k. ribosome -

20. What is meant by **diffusion** as it applies to cells?

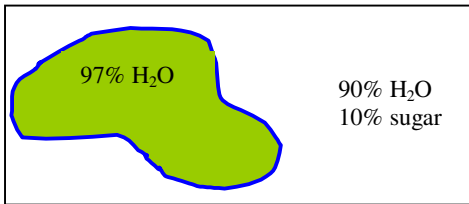
21. What is meant by **osmosis**?

22. Inside a cell membrane there is 98% water and 2% salt, while outside the cell membrane there is pure water. Which direction will the water flow, into the cell or out of the cell?



What will happen to the size of this cell as this happens?

23. A cell, which has 97% water inside the cell membrane is placed in a sugar solution which is 10% sugar and 90% water. Which way will water flow, into the cell or out



of the cell? _____
What will happen to the size of the cell as this happens?

24. *Photosynthesis* occurs in the _____ of the cell.

25. Write the **word equation** for **photosynthesis**.

26. Write the **balanced chemical equation** for **photosynthesis**.

27. Why can't *starch* molecules get through the cell membrane? _____

28. Write the simple *word equation* for **cellular respiration**.

29. Write the *balanced chemical equation* for **cellular respiration**.

30. Cellular respiration requires a *gas* called _____.

How does this gas get to every cell in the human body? _____

31. Cellular respiration takes place in _____ cell of the body.

32. Most of the processes of cellular respiration take place in the

_____ inside the cells.

33. Catalysts to speed up chemical reactions in the cells are called _____.

34. The nucleus controls the cells activities by controlling the production of _____.

35. Molecules of _____ within the nucleus control the production of enzymes.

36. Human cells normally contain _____ chromosomes.

37. A strand of DNA is a huge chain made up of smaller molecules called _____.

38. Each nucleotide in a DNA molecule has a *base* as part of it. The four types of bases found on these nucleotides are shown by the letters ____, ____, ____, and ____.

39. What is meant by a *gene*?

40. The actual DNA structure is not really like a ladder, but like two coils wrapped around each other. This structure is called a *double* _____.

41. The number and order (sequence) of bases on each *gene* determine the exact structure of the _____ “coded” by that gene. Each chromosome contains thousands of genes, each one controlling the structure of one protein or enzyme made by the cell.

42. In the following, rather complex looking diagram showing the structure of a small piece of DNA, *circle* and clearly *label* **one** example of each of the following:

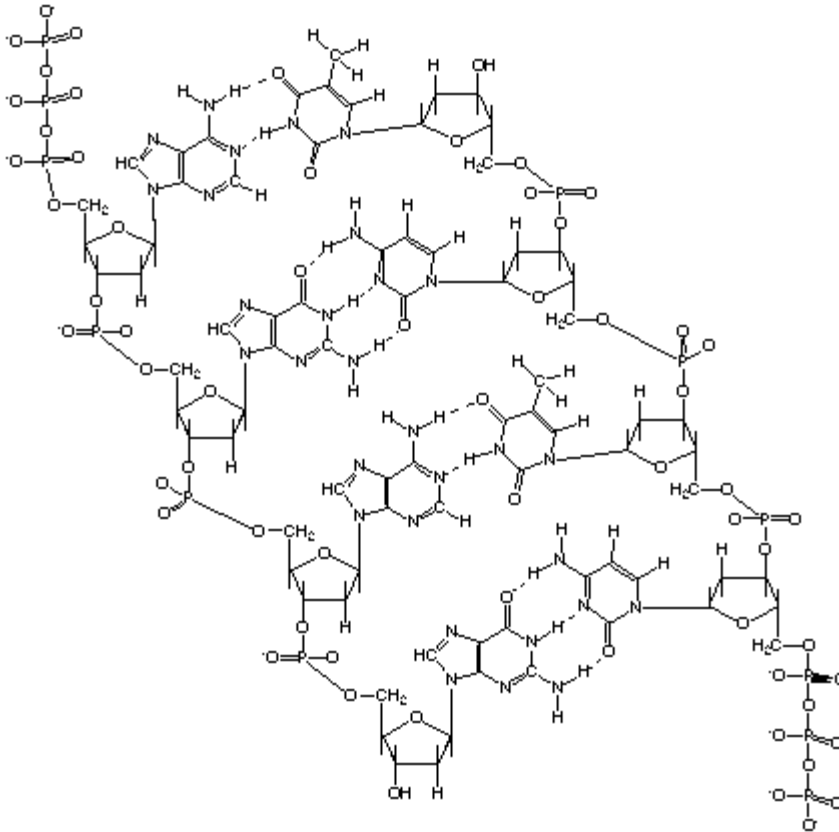
A phosphate group

A deoxyribose (sugar)

A base

A nucleotide

A hydrogen bond linking two nucleotides



43. About how many genes are there in human DNA? _____.

44. What is meant by the **human genome project**?

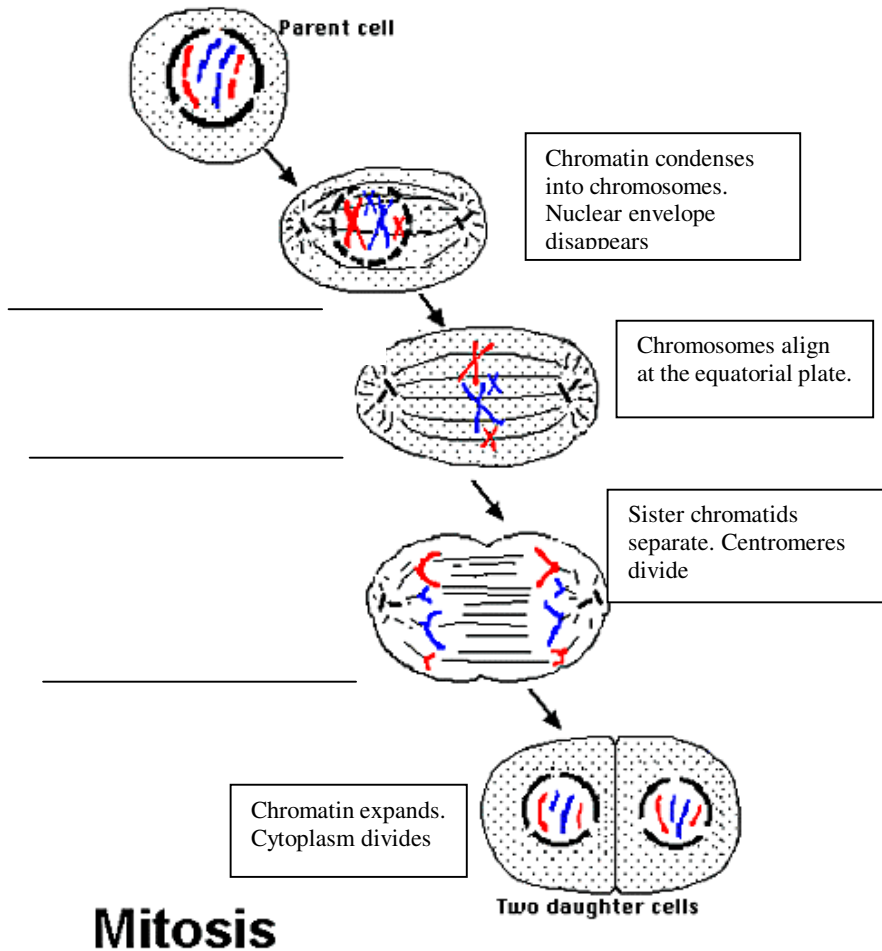
45. Name two diseases that are known to be hereditary:

46. Little bristle-like structures in microbes are called _____.
What are they used for? _____
47. Describe *flagella* _____
What are flagella used for? _____
48. *Plasmodium* spends part of its life cycle in _____ and the other part in human hosts where it ultimately infects and ruptures blood cells in large numbers. The disease it causes is called _____.
49. Do *bacteria* have a defined nucleus, or just DNA inside the cell?
50. *Escherichia coli* (a.k.a. *E. coli*) lives in the human _____, where it helps _____ and produces Vitamin _____.
51. What **can't** *viruses* do, that other organisms can?
52. What are three human diseases that can be caused by viruses?
1. _____
2. _____
3. _____
53. What are viruses like when they are outside of a cell? _____
54. What do viruses do once they get inside of a host cell?
55. A virus that can be fatal to humans and is carried by mosquitoes has recently been in the news. It seems to be making it's way into Western Canada. This virus is called the _____ virus.

56. **Prions** are blamed for _____ in cattle, and its human variant Creutzfeldt-Jakob disease. In which country have several people died from Creutzfeldt-Jakob disease? _____ How could it be transmitted from one animal to another or from animals to humans?
57. The disease called *hepatitis B* is caused by a _____ and affects which organ of the body? _____.
58. Viral diseases *encephalitis* and *rabies* both affect which organ? _____
59. *A.I.D.S.* stands for _____ and affects the T cells in the human _____ system.
60. If the length of one side of a cube is “s”, the formula for the total **surface area** of that cube would be :
- Surface Area =**
61. If the length of one side of a cube is “s”, the formula for the total **volume** of that cube would be :
- Volume =**
62. One side of a cube has a length of 1.5 cm.
- Calculate the **Surface Area** in cm^2
 - Calculate the **Volume** in cm^3
 - Calculate the **Ratio** of **Surface Area/Volume**
63. If a cell was very large, its **Surface Area/Volume** Ratio would be quite (*high/low*) _____ When this is true, it means that the cell (does/doesn't) _____ have enough ability to absorb the nutrients it needs and to get rid of waste materials.

64. When an organism grows in size, do the number of cells increase or do the existing cells just get bigger? _____
65. The phases which make up the life of a cell is called the _____
66. Most of the cell's growth takes place during a stage called _____
67. "Interphase" means between _____
68. Draw a pair of chromosomes showing and labeling the *chromatids* and the *centromere*.

69. Label the stages of **mitosis** in the following diagram:



70. The process by which organelles in the cytoplasm divide in two is called

71. Cell division produces two new cells out of one. The new cells are called

_____ cells.

72. Explain why chromosomes become more visible during prophase.

73. What happens to cells during *interphase*?

74. What happens to the rate of cell production when an organism gets older?

75. What happens to cells when they form *tumors*?

76. Tumors that stop growing *before* causing damage are said to be

77. What happens to a *malignant tumor*?

This is a disease called

78. What is meant by *carcinogenic*?

79. Name some substances or sources of substances which are *carcinogenic*.

80. Name and describe the three main types of *treatment* for cancer.

1. _____

2. _____

3. _____

81. What is meant by **asexual reproduction**?

82. Briefly describe what happens in each of the following methods of asexual reproduction:

- a) Binary Fission
- b) Budding
- c) Spore Formation
- d) Fragmentation
- e) Vegetative Reproduction

83. In general, what can be said about the offspring of asexual reproduction in relation to the parent.

84. In evolutionary terms, what is a disadvantage of asexual reproduction?

85. *Sexual reproduction* requires _____ parents. Are the offspring identical to the parents? _____.
86. Specialized cells used ONLY for sexual reproduction are called _____
87. What is meant by a *karotype*? _____

88. Most human cells contain _____ chromosomes or _____ pairs.
89. What is meant by a **homologous pair** of chromosomes?
90. What is meant by **diploid** cells?
91. What is meant by **haploid** cells?
92. Cells other than gametes are (*diploid/haploid*) _____
93. Gametes are (*diploid/haploid*) _____
94. The process that divides the nucleus and reduces the number of chromosomes by half is called _____
95. During meiosis, one normal cell creates (*1,2,3 or 4*) _____ daughter cells. These daughter cells are (*diploid/haploid*) _____ and are called _____
96. The mature *male* gamete is called the _____
(plural _____) or (*shorter word*) _____.
97. The mature *female* gamete is called the _____
(plural _____)
98. Which is usually larger, the male gamete or the female gamete? _____

99. Which one is able to move around more? _____
100. The process of the two gametes meeting successfully is called _____
101. The sperm and the ovum both contain _____ the chromosomes of a normal cell. When they meet, their nuclei fuse together so that the new cell contains _____ number of chromosomes as a normal cell.
102. The new cell that forms when a sperm and ovum unite is called a _____.
103. What are *hermaphrodites*? _____

- Give an example of a species which is a hermaphrodite. _____
104. In what type of animals does fertilization occur *externally*? _____
105. Where does the embryo develop in birds? _____
106. Where does the embryo develop in mammals? _____
107. *Sexual reproduction* is more complicated than *asexual*. What do you think the main *advantage* of sexual reproduction is to the survival of a species. _____

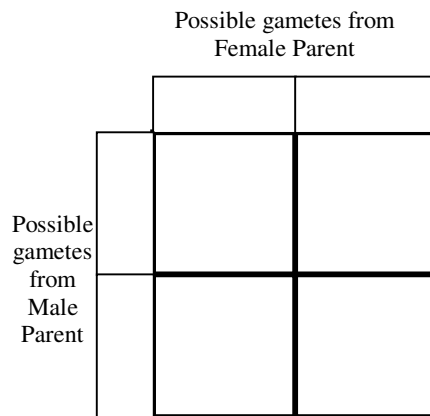
108. On each of the homologous chromosomes, there is a gene for a certain trait. These genes are called _____
109. Alleles can either be *dominant* or _____
110. A trait from a recessive allele which is present but does not show itself is said to be _____.
111. If the dominant and recessive allele for a trait are both present, the _____ allele will always express itself and its trait will be shown.

112. An individual who has a pair of alleles that are the same type (both dominant or both recessive) is said to be _____ for that gene.
113. An individual who has a pair of alleles that are different types (one dominant and one recessive) is said to be _____ for that gene.
114. When two different gametes (*one from each parent*) combine during fertilization, they each carry one allele for a particular gene (or trait). The new individual will now have _____ alleles. (One from each _____)
115. What is meant by the **genotype** of an individual? _____

116. What is meant by the **phenotype** of an individual? _____

117. In humans, long eyelashes (L) are dominant and short eyelashes (l) are recessive.

a) Draw a Punnett Square showing the cross between two **heterozygous long-eyelash** parents.



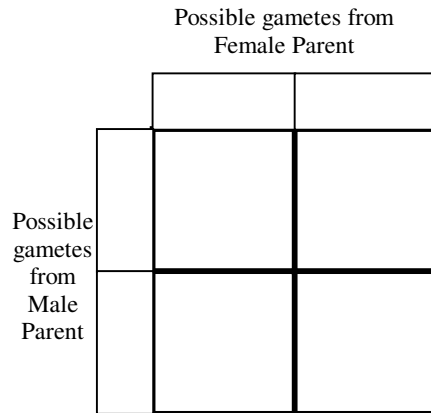
- b) What fraction of the offspring should have long eyelashes? _____
- c) What fraction of the offspring should have short eyelashes? _____
- d) What fraction of the offspring will be **homozygous long eyelash**? _____
- e) What fraction of the offspring will be **homozygous short eyelash**? _____

- f) What fraction of the offspring will be **heterozygous long eyelash**? _____
- g) A cross is made between two *different* parents and **all** the offspring have the genotype Ll (*They are all heterozygous long eyelash.*). Determine the genotypes of both parents. (*Don't worry about which one is male and which one is female.*)

Answer _____ and _____

118. In humans, long eyelashes (L) are dominant and short eyelashes (l) are recessive.

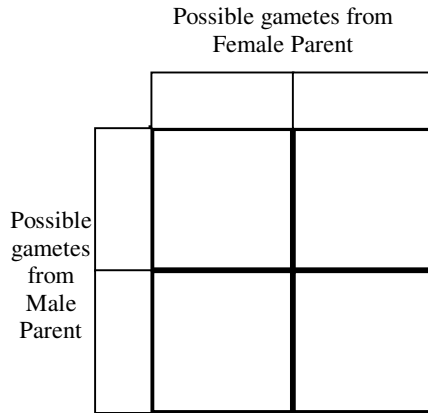
- a) Draw a Punnett Square showing the cross between a male that is **heterozygous long eyelash** and a female who is **homozygous short eyelash**.



- b) What fraction of the offspring should have long eyelashes? _____
- c) What fraction of the offspring should have short eyelashes? _____
- d) What fraction of the offspring will be **homozygous long eyelash**? _____
- e) What fraction of the offspring will be **homozygous short eyelash**? _____
- f) What fraction of the offspring will be **heterozygous long eyelash**? _____
119. In mice, gray colour (G) is dominant over white (g). A mouse from a population that **always** produces **gray** mice is mated with a **white** mouse.
- a) What is the genotype of the gray mouse? _____
- b) What is the genotype of the white mouse? _____

(This question is continued on the next page....)

c) Fill in the following Punnett Square showing this cross:

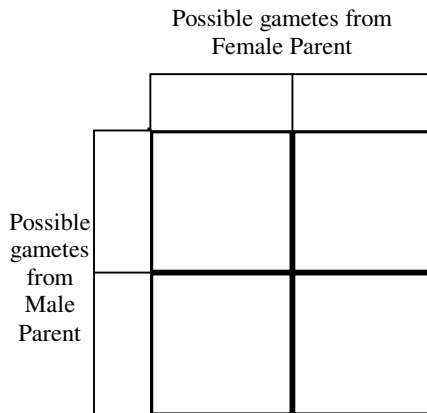


d) Describe the **phenotype** of all the first generation of mice from this cross?

e) What is the **genotype** of each one of the offspring? _____

f) These mice are all _____zygous.

120. A **heterozygous gray** mouse is mated with a **white** mouse. Use the following Punnett Square to predict the possible offspring as asked below:



a) _____ of the offspring are gray and _____ of the offspring are white.

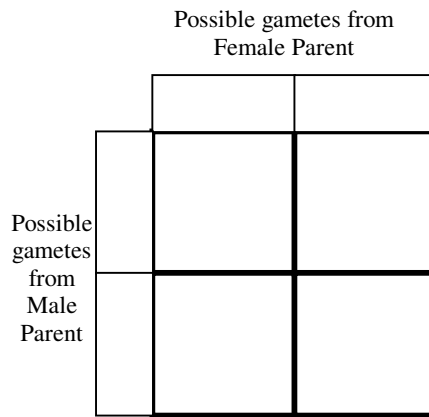
b) Are any of the offspring **homozygous gray**? _____

c) _____ of the offspring are **homozygous white**.

e) Is it possible to have a **heterozygous white** mouse? _____

121. In **incomplete dominance**, individuals that are **heterozygous** are _____ than each homozygous parent, instead of being like one of them.
122. In incomplete dominance, neither allele is completely _____.
123. In carnations, neither the allele for red flower colour nor the allele for white flower colour are dominant. If a purebred red carnation is crossed with a purebred white carnation, what are the offspring like? _____

124. A homozygous red carnation is crossed with a pink carnation. Use the following Punnett Square to predict the possible offspring as asked below:



- a) _____ of the offspring are red and _____ of the offspring are pink.
- b) Are any of the offspring **white**? _____
125. Two carnations are crossed and it is found that half of the offspring are pink and half are white. What are the two possible genotypes of the parents of this cross?
_____ and _____
126. A gene with more than two alleles is said to have _____ alleles. Even if a gene has more than two possible alleles, an individual can only possess _____ of these alleles -- one on each chromosome of a homologous pair.
127. There are 3 alleles that determine human blood type: I^A , I^B and i .
- a) Give two possible genotypes which would result in the person having blood type “A”
_____ and _____

- b) Give two possible genotypes which would result in the person having blood type “B”
_____ and _____
- c) Give the genotype which would result in a person having type “AB” blood. _____
- d) Blood type “O” contains neither the “A” nor the “B” antigen. Give the genotype of
blood type “O” _____

128. What is meant by an **antigen**?

129. Should a person with blood type “A” receive a blood transfusion from a person with blood type “B”? _____ Why or why not?

Could a person with blood type “A” safely receive a blood transfusion from a person with blood type “O”? _____ Why or why not?

Could a person with blood type “AB” safely receive a blood transfusion from a person with blood type “B”? _____ Why or why not?

People with which blood type are “universal recipients”? _____

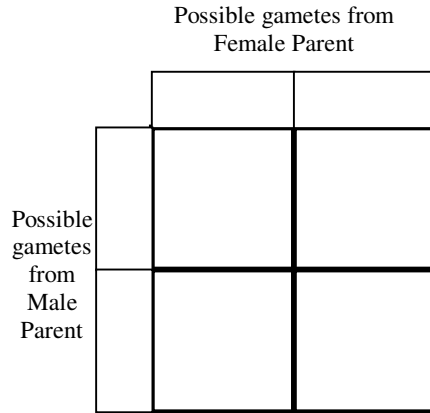
People with which blood type are “universal donors”? _____

130. Do genes usually act on their own, or do they usually interact with other genes?

131. Is human height controlled by a simple gene, or many genes? _____

As well as genetics, human height is also affected by the _____

132. Draw a Punnett square showing the X and Y chromosomes of a cross between a female and male human.



- What fraction of the offspring will be female? _____. What fraction are male? _____
133. Which contains more genes, the X chromosome or the Y chromosome? _____
134. The gene for colour-blindness is carried on the _____ chromosome. There is no matching allele on the _____ chromosome. People with the **dominant** allele for colour vision will have _____ colour vision, while people with only the recessive allele will be _____
135. In order to be colour-blind, a female (with two X chromosomes) must have the _____ allele on both chromosomes. If she have the dominant allele on just one chromosome, she will _____ be colour-blind.
136. Males only have one X chromosome, so if they inherit the recessive allele, they _____ be colour-blind. (They do not have another X chromosome which could carry the dominant (normal colour vision) allele.

137. Characteristics which are controlled by genes on the sex (X & Y) chromosomes are called _____ traits. Since most of these traits are found on the X chromosome, they are usually exhibited by _____, who **do not** have another X chromosome which could carry a **dominant** allele to cancel the effects of a **recessive** one. Females are usually _____ of these traits because they have the recessive allele (which they could pass on to an offspring) on one X chromosome, but also the dominant allele on the other _____ chromosome, which cancels the effects of the recessive one. If the recessive allele is passed onto a male offspring, the male will exhibit the recessive trait.

138. What is the major symptom of *hemophilia*? _____

139. Why did the Royal Family have such a high incidence of hemophilia? _____

THE END OF SCIENCE 10 BIOLOGY COURSE REVIEW!