

# INTRODUCTION

## OVERVIEW OF THIS BOOKLET

Welcome to the iPrep Plus review booklet for Biology. This resource is not meant to replace the learning that takes place in the classroom and/or your biology labs, but to help you with some of the more consistently confused topics as you move through your school year. You may use it as a review booklet at the end of the year, but it is more powerful as a resource you refer to throughout the school year. As the Alberta Biology 30 Diploma exam is now worth 30% of your mark, your in-class mark (70%) becomes that much more important: do not leave your learning until the end of the course – use this booklet all year long.

One thing that makes this resource different than some others is the ability to access connected video support, engage in at home activities, or consider the practical applications of what you are learning. These additional tools will be indicated by the iPrep Plus symbol:



You will also notice certain shaded call-out boxes throughout the book, explained below:

**Remember** – something you should take a moment and remind yourself of to help make connections to previous learning.

**Hint** – a tip to help you learn, understand, or more easily remember the material

**Important** – something you must always be conscious of in this topic when dealing with questions

We hope you find the resource useful as you work through your Biology class this year. Remember: while this booklet will NOT replace the learning that takes place in your classroom, it may help you deal with some concepts when you are at home and cannot ask for the support of your teacher.

Think of this booklet as your own personal tutor you can access any time you need it. We hope this resource helps you earn the best possible grades this year. Have a great year and enjoy biology to its fullest!

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and the rest of the iPrep Plus Team

# CELL DIVISION AND INHERITANCE

The basic unit of life is the cell. As a living unit, the cell itself is formed, lives its life, and divides. In multicellular creatures, cells work together to perform all of the functions needed for that organism's survival. In all cases, however, cells divide and pass on the information to perform these functions. How they divide and why is the main point of this topic.

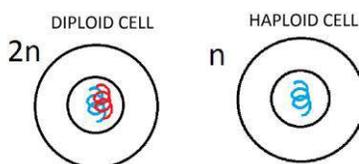
In both unicellular and multicellular organisms, cells are able to carry out functions due to the passing on of deoxyribonucleic acid (DNA), often in set sequences called genes. Genes are units biologists use to indicate a specific section of DNA used for a specific function. In most organisms you will study in this course, genes are found within chromosomes.

**Remember** – DNA is a molecule. It is wrapped around proteins called histones. This combination of the DNA molecule and proteins is what we call a chromosome.

## ON CHROMOSOMES AND PLOIDY

Because every organism has a different number of chromosomes overall, there is no set number used to describe “one full set”. Biologists instead use the variable letter “n” to represent “one full set of chromosomes”. In humans,  $n=23$  chromosomes, BUT this is not true for all organisms. The vocabulary word used for “one full set of chromosomes” is **haploid**.

In organisms that use sexual reproduction to produce offspring, both parents provide “one full set” to the offspring, giving the offspring “two full sets”, or 2 times  $n$  ( $2n$ ). In humans,  $2n=46$  chromosomes, BUT this is not true for all organisms. The vocabulary word used for “two full sets of chromosomes” is **diploid**.



Each full set of chromosomes will have some chromosomes that do not affect the sex of the organism. These are **autosomes**, because we all, males and females, automatically get them. However, each set will also contain **sex chromosomes**. These chromosomes affect primary sex hormones and primary sex characteristics, making us biologically male or female. In humans, 22 of our 23 chromosomes are autosomes, the other chromosome is either an X or a Y chromosome. When we combine two sets of human chromosomes to create an offspring, we get 44 autosomes ( $2 \times 22$ ), and 2 sex chromosomes (either XX or XY).

**Important** – haploid =  $n$  = one full set of chromosomes; diploid =  $2n$  = two full sets of chromosomes

*Autosomes* do not determine sex of an organism; *sex chromosomes* do.

If organisms have MORE than two full sets of chromosomes (e.g.  $3n$  = triploid,  $4n$  = tetraploid, etc.), we call this **polyploidy**. Polyploidy is very rare (and often lethal) in animals, but far more common in plants.

**Hint** – If you are asked to determine the “ploidy” of a cell or of an organism, you are being asked to say whether it is “haploid” or “diploid”. Polyploidy is rarely asked for, but if it is, there will be additional information in the question to help you solve it.