Weekly intervention key facts:

B3 Key Biological Concepts

1. Most animals and plants reproduce by sexual reproduction, involving fertilisation of a female sex cell by a male sex cell. Some organisms can reproduce without fertilisation, which is known as asexual reproduction. The offspring from this type of reproduction are called clones. Clones are genetically identical to one another.

2. Sexual reproduction combines characteristics from both parents. This gives offspring genetic variation. This means that the offspring may be better suited to a change in conditions and therefore, more likely to survive.

3. Humans start life as a single fertilised egg known as a zygote. This is formed when two gametes (sex cells) fuse during fertilisation. The zygote then forms a ball of cells using a type of cell division known as mitosis.

4. The instructions for an organisms are found as a code in a molecule called DNA. The DNA of an organisms is its genome. The human genome on found on 46 molecules of DNA and each molecule is inside a chromosome. Along the length of DNA are sections that code for making proteins. These sections are called genes.

5. A human body cell contains two sets of 23 chromosomes making 46 in total. A cell like this is called diploid (2n). If two diploid cells join in fertilisation, the zygote would have four sets of chromosomes, so gametes need to have just one set. They have to be haploid (1n).

6. Mitosis produces diploid cells. A different process called meiosis is used to produce gametes. Please see a diagram of mitosis in your online text book to further explain the process of meiosis.

7. The end result of meiosis is 4 genetically different daughter cells which are haploid (1n).

8. There are 4 bases in a DNA molecule (adenine, thymine, guanine and cytosine). We refer to them as A, T, G and C. A always pairs with T and G always pairs with C. Angled letters with angled letters and curves letters with curves letters. The DNA molecule is arranges in a double helix with hydrogen bonds attaching the base pairs

to each other. See online text book for a visual if this. There are 2 hydrogen bonds between A and T and there are 3 hydrogen bonds between C and G.

9. Each base is attached to a sugar and each sugar is attached to a phosphate group. This is called a nucleotide. The sugar and phosphate groups form the backbone of the DNA molecule.

10. A monk called Gregor Mendel (1822-1884) started the development of modern ideas about genes. He used pea plants has his lead example. He concluded by proving that inherited factors control the variation of characteristics. These factors exists in different versions called alleles. His work was largely rejected until the discovery of chromosomes in the 1880s.

11. Genes for the same characteristic (e.g. eye colour) can contain different instructions that create variations. The different forms of the same gene are called alleles.

12. Since there are two copies of every chromosomes in a body cell, a body cell therefore contains two copies of every gene. Each copy of a gene may be a different allele. It's the different combination of alleles that gives organism's genetic variability.

13. If both alleles for one gene are the same they are termed homozygous. If they are different they are termed heterozygous. The alleles are said to be either dominant or recessive. If they are dominant they are represented with a capital letter (e.g. T). If they are recessive they are represented with a lower case letter (e.g. t). The alleles in an organisms are its genotype and what the organism looks like is called its phenotype.

14. Have a go at some of the Punnett squares and inheritance questions in your text book to text yourself on real life exam questions.

15. A change in a gene that creates a new allele is called a mutation. Mutations often occur after cell division. They happen when there is a mistake in copying DNA. Sometimes this can bring about a big change in the protein that is produced. This will affect how the body works. However, many mutations have small affects and some have no real affect at all.