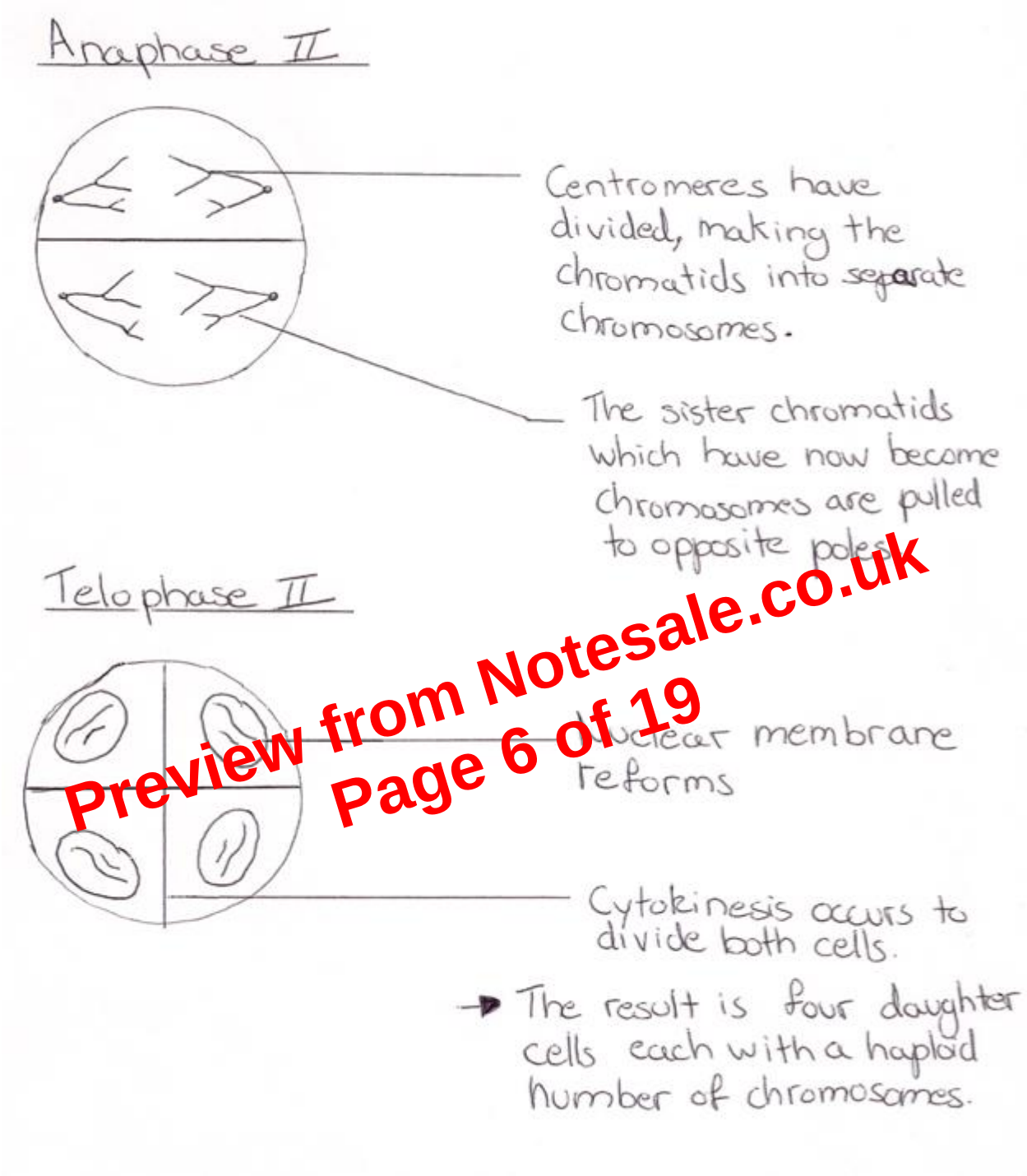

4.2.4 Explain that non-disjunction can lead to changes in chromosome number, illustrated by reference to Down syndrome (trisomy 21).

A number of problems can arise during meiosis. A common problem is non-disjunction. This is when the chromosomes do not separate properly during meiosis, either in meiosis I (in anaphase I) or meiosis II (in anaphase II). This leads the production of gametes that either have a chromosome too

4.3.10 Explain that female carriers are heterozygous for X-linked recessive alleles.

Female carriers for X-linked recessive alleles are always heterozygous since they require a dominant allele and a recessive allele to be carriers. They inherit the recessive allele from one parent and the dominate allele from the other. For example hemophilia is a sex-linked disease. If a carrier mother and an unaffected father have offspring then the unaffected father will always pass on his dominate allele to his female offspring. The carrier mother can either pass on the dominate or recessive allele. If she passes on the recessive allele to her female offspring than the female offspring will be a carrier as well.

4.3.11 Predict the genotypic and phenotypic ratios of offspring of monohybrid crosses involving any of the above patterns of inheritance.

4.4.2 State that, in gel electrophoresis, fragments of DNA move in an electric field and are separated according to their size.

In gel electrophoresis, fragments of DNA move in an electrical field and are separated according to their size.

4.4.3 State that gel electrophoresis of DNA is used in DNA profiling.

Gel electrophoresis of DNA is used in DNA profiling.

4.4.4 Describe the application of DNA profiling to determine paternity and also in forensic investigations.

Organisms have short sequences of bases which are repeated many times. These are called satellite DNA. These repeated sequences vary in length from person to person. The DNA is copied using PCRand then cut up into small fragments using restriction enzymes. Gel electrophoresis separates fragmented pieces of DNA according to their size and charge. This gives a pattern of bands on a gel which is unlikely to be the same for two individuals. This is called DNA profiling. DNA profiling can be used to determine paternity and also in forensic investigations to get evidence to be used in a court case for example.

4.4.5 Analyse DNA profiles to draw conclusions about paternity or forensic investigations.

For a suspect look for similarities between the DNA found at the crime scene and the suspect. For a paternity test, look for similarities between the child and the possible father.

4.4.6 Outline three outcomes of the sequencing of the complete human genome.

- It is now easier to study how genes influence human development.
- It helps identify genetic diseases.
- It allows the production of new drugs based on DNA base sequences of genes or the structure of proteins coded for by these genes.
- It will give us more information on the origins, evolution and migration of humans.

4.4.7 State that, when genes are transferred between species, the amino acid sequence of polypeptides translated from them is unchanged because the genetic code is universal.

When genes are transferred between species, the amino acid sequence of polypeptides translated from them is unchanged because the genetic code is universal.