1. Select the correct term from the following list to match the term DNA: protein, enzyme, uracil, sap, ethanol, mutation, thymine, chlorophyll

**Thymine**

1. Select the correct term from the following list to match the term Ribosome: protein, enzyme, uracil, sap, ethanol, mutation, thymine, chlorophyll

**Protein**

1. Select the correct term from the following list to match the term RNA: protein, enzyme, uracil, sap, ethanol, mutation, thymine, chlorophyll

**Uracil**

1. What is meant by the term DNA profiling?

**(To look at) an organism’s pattern of DNA fragments or genetic fingerprinting or (preparing) a pattern of DNA fragments**

1. State two uses of DNA profiling.

**Forensic / paternity / medical or examples**

1. The genetic code incorporated into the DNA molecule finds its expression in part in the formation of protein. This formation requires the involvement of a number of RNA molecules. List these RNA molecules and briefly describe the role of each of them.

**mRNA: mRNA formed to match DNA (or transcription or explained) / leaves nucleus or into cytoplasm / (carries instructions) to ribosomes or for translation; rRNA: rRNA binds (holds) mRNA in place / for translation (or explained) / structure of ribosome; tRNA: tRNA carries an amino acid / complementary to mRNA / to ribosomes**

1. True or False. RNA is not found in ribosomes.

**FALSE**

1. What is meant by DNA profiling?

**(To look at) an organism’s pattern of DNA fragments or genetic fingerprinting or (preparing) a pattern of DNA fragments**

1. Describe briefly how DNA profiling is carried out.

**Cells are broken down / how cells are broken down / DNA is released / DNA is cut into fragments / by (restriction) enzymes / the fragments are separated / on the basis of their size**

1. Give two uses of DNA profiling.

**Forensic / paternity / medical or examples**

1. Answer the following questions in relation to the extraction of DNA experiment (i) It is usual to chop the tissue and place it in a blender. Suggest a reason for this (ii) For how long should the blender be allowed to run? (iii) Washing-up liquid is normally used in this experiment. What is its function? (iv) Sodium chloride (salt) is also used. Explain why. (v) What is a protease enzyme? (vi) Why is a protease enzyme used in this experiment? (vii) The final separation of the DNA involves the use of alcohol (ethanol). Under what condition is the alcohol used?

**(i) Break up of cell (walls) or release of cytoplasm; (ii) A few seconds only (max 6 secs); (iii) To break down membrane(s) or membrane components; (iv) Clumps (protects) DNA / to remove protein / separates DNA / separates protein; (v) Breaks down (acts on) protein; (vi) Proteins are associated with DNA (histones or chromosomes); (vii) (Ice) cold**

1. What is meant by genetic screening?

**Testing (people) for the presence of a (specific) gene**

1. Parents who are suspected of being carriers of disease-causing alleles may be advised to consider a genetic test. Suggest a role for such a test after in-vitro fertilisation.

**Selection of embryo** or **any valid role**

1. Name the four bases that are found in DNA.

**Adenine, Thymine, Guanine, Cytosine** or **letters A,T,G,C**

1. The bases in DNA form a triplet code. What is meant by a triplet code?

**Three bases / code for one amino acid**

1. The triplet code is transcribed into mRNA. What does this statement mean?

**Information (code) is copied to RNA molecule**

1. To which structures in the cell does mRNA carry the code?

**Ribosome**

1. In the case of the following state: 1. An investigation in which you used it, 2. The precise purpose for its use in the investigation that you have indicated: Cold alcohol (ethanol).

**1. isolation of DNA; 2. to separate DNA**

1. Explain what is meant by the term DNA profiling.

**Examining DNA / for a pattern or band / to compare**

1. Give a brief account of the stages involved in DNA profiling.

**DNA extracted or explained / DNA cut into fragments / using enzymes / fragments separated / on basis of size / pattern analysed**

1. Give two applications of DNA profiling.

**Forensic science or explained / relationships or explained / medical or explained**

1. What is genetic screening?

**To establish presence or absence of gene(s)**

1. “The same amount of DNA is present in nuclei of cells taken from the liver, heart, pancreas and muscle of a rat.” (i) Use your knowledge of DNA and mitosis to explain this statement (ii) Name a cell produced by the rat which will contain a different amount of DNA in its nucleus to those mentioned above.

**(i) chromosome contains DNA / mitosis maintains same chromosome number or cells derived from mitotic division; (ii) gamete or sex cell or named**

1. Briefly outline how you isolated DNA from a plant tissue.

**Chop plant into small pieces / add salt / add detergent / warm to 50 – 60 °C / then cool / blend / any one correct time point / filter / add protease / add cold ethanol**

1. The genetic code is contained within the DNA of chromosomes. Briefly describe the nature of this code.

**Three bases (triplet or codon) / in sequence / (codes for) one amino acid / (base or triplet or codon) sequence / codes for protein**

1. What is meant by non-coding DNA?

**Does not code for a protein or for RNA or explained**

1. Give one structural difference between DNA and RNA.

**(DNA) contains thymine** or **RNA contains uracil**

1. Name the nitrogenous bases whose first letters are A and C.

**Adenine / cytosine**

1. Where in the cell would you expect to find most DNA?

**Nucleus / chromosome / gene**

1. DNA contains the instructions needed to make protein. These instructions are called the … code.

**Gene / genetic**

1. What is meant by DNA profiling?

**Making a pattern / explanation / (Genetic) Fingerprinting**

1. In DNA profiling, what are used to cut DNA strands into fragments?

**Enzymes**

1. In DNA profiling DNA strands are cut into fragments. On what basis are these fragments then separated?

**Size / allow mass / weight / use of gel electrophoresis**

1. Give two applications (uses) of DNA profiling.

**Crime (forensic) / Medicine / Paternity / Archaeology / Evolution**

1. For what precise purpose did you use freezer-cold ethanol (alcohol) in your isolation of DNA?

**To separate the DNA**

1. For which purpose did you use each of the following in the course of your practical studies? 1.Washing-up liquid or other detergent while extracting DNA from plant tissue 2. Freezer-cold ethanol while extracting DNA from plant tissue.

**1. (Detergent) breaks down membranes; 2. (Freezer-cold ethanol) to separate (or see) the DNA**

1. What are the two main events in the replication of DNA?

**(DNA) opens (or unzips) / new strands (made)**

1. What is meant by DNA profiling?

**Analysing or examining a person’s DNA (to compare patterns with others) or getting or providing, patterns or bands**

1. Laboratory activity isolation of DNA from a plant tissue. (i) Give one reason why you first chopped the plant material into very small pieces (ii) Detergent and salt were added to the chopped plant material, which was then heated. Explain why the detergent was used (iii) How was this mixture heated? (iv) Why was this mixture heated? (v) Later in the activity the mixture was blended for a maximum of 3 seconds. What would happen to the DNA if the mixture was blended for longer than 3 seconds? (vi) Protease was then added to the mixture. Why was protease added? (vii) The mixture was then filtered. After filtration, where was the DNA of your plant tissue to be found? (viii) What should you do next to make the DNA visible?

**(i) To increase surface area or to burst cells or to break cell walls (ii) To break down cell membranes or to burst cells (iii) In a water bath (iv) To inactivate enzymes (v) It would be shredded (vi) To digest the protein (in the chromosomes) (vii) In the filtrate or liquid or solution or test tube (viii) Add freezer-cold ethanol or alcohol**

1. For what purpose did you use Freezer-cold alcohol in the course of your practical activities?

**To bring DNA out of solution / to isolate DNA**

1. Some people choose to be screened to determine their risk of getting a particular type of cancer. What is meant by genetic screening?

**Checking / for presence of specific gene**

1. Blood samples taken from a crime scene were put through a process called DNA profiling. During the process cells were broken down to release the DNA, which was then cut into fragments. The fragments were then separated. 1. What was used to cut the DNA? 2. On what basis were the DNA fragments separated? 3. Give an application of DNA profiling other than solving crime.

**1. Enzyme, 2. Size, 3. Paternity or maternity / taxonomy / evolution**

1. True or False. DNA is a double helical shape.

**True**

1. True or False. The base Uracil is found in DNA.

**False**

1. In DNA, nitrogenous bases occur in complementary pairs. Explain the term complementary as used here.

**Each base has a (different) corresponding (or matching) (base)**

1. In each case, name the complementary base in RNA for: 1. Adenine, 2. Cytosine.

**1. Uracil or U; 2. Guanine or G**

1. Name a carbohydrate that is a component of nucleotides.

**Ribose or deoxyribose**

1. Name a component of a nucleotide that is neither a carbohydrate nor a nitrogenous base.

**Phosphate (group) or P**

1. What does the ‘m’ stand for in mRNA?

**Messenger**

1. Give one difference between RNA and DNA, other than the nitrogenous bases.

**RNA has ribose or RNA is single stranded or DNA has deoxyribose or DNA is double stranded**

1. Where in a human cell would you expect to find most DNA?

**Nucleus only - (allow chromosomes)**

1. What is meant by DNA profiling?

**Treating a DNA sample / revealing a pattern / unique to species or individual or compare with other pattern**

1. In DNA profiling, what is used to cut the DNA strands into fragments?

**Enzymes**

1. Give two applications of DNA profiling.

**e.g. Forensics / paternity or maternity testing**

1. Name and outline the procedure used for analysing the DNA samples that revealed the presence of horse meat in products labelled as beef. Would the result be the same if the beef were contaminated with pig meat? Explain your answer.

**DNA profiling. Cut DNA into fragments with restriction enzymes, separate fragments on basis of size analyse results**

1. True or False. Replication is the copying of DNA.

**TRUE**

1. True or False. RNA contains the base thymine.

**FALSE**

1. What is meant by genetic screening?

**Checking or testing (DNA) / for a gene**

1. What is meant by the term junk DNA?

**Non-coding (DNA)**

1. In relation to the isolation of DNA from a plant tissue, explain why you used each of the following: 1. Washing-up or similar liquid. 2. Sodium chloride. 3. Protease. 4. Freezer-cold ethanol.

**1.** **To breakdown the (cell) membrane(s), 2. To cause the DNA to clump, 3. To breakdown (or remove or digest) the protein in the chromosomes, 4. To bring the DNA out of solution or to make the DNA visible or to separate the DNA**

1. Give any one base pair found in DNA.

**A - T or G - C**

1. Answer the following in relation to practical work you carried out to isolate DNA from plant tissue. (i) Name a suitable plant for this activity. (ii) Below is a list of some of the steps carried out during the practical work but they are not in the correct order. A. Pour freezer-cold ethanol down the inside of the test tube containing the filtered plant extract. B. Add the mixture of the plant tissue, salt and washing up liquid to a blender. C. Chop the plant tissue into small pieces. D. Add 2 – 3 drops of protease to the filtered plant extract. Place A, B, C and D in the correct order. (iii) Why was the protease added to the filtered plant extract? (iv) What was the purpose of adding washing up liquid to the mixture? (v) What was the purpose of the freezer-cold ethanol?

**(i) e.g. Onion / Kiwi; (ii) C, B, D, A; (iii) To breakdown protein (in the chromosomes); (iv) To breakdown (cell) membranes; (v) DNA comes out of solution OR it allows it to be seen**