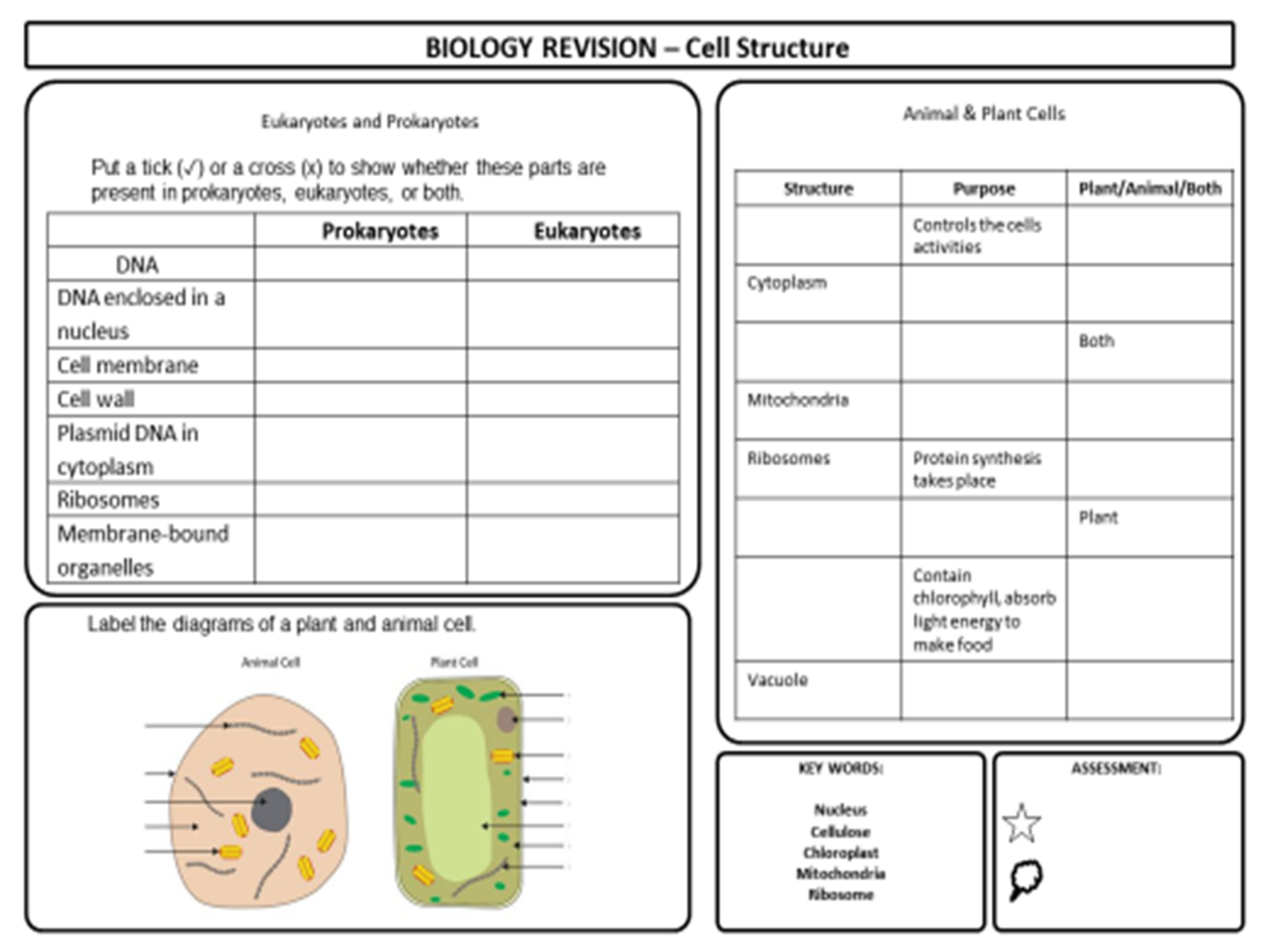
A Level Biology Transition Work



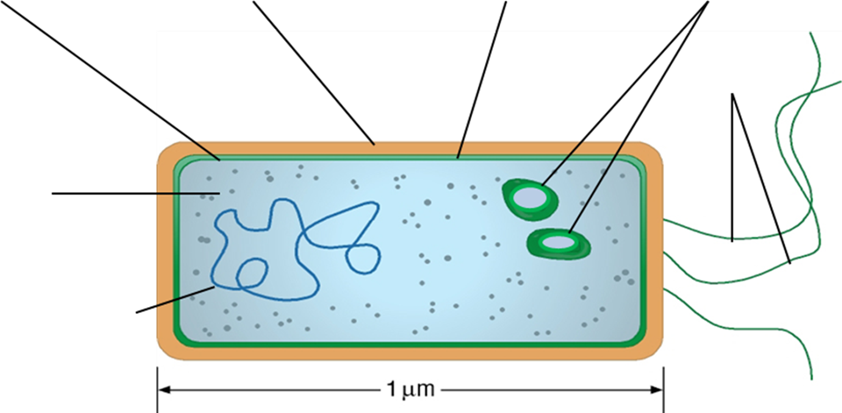
To be a successful student of A level Biology takes an independent, proactive and thinking approach to your study. This transition work will help you to connect what you have learned at GCSE to the extended ideas at A level and start to develop your study methods and thinking skills. Your A level Biology study will start with some fundamental ideas which you need to understand really well as they form the foundations that all other biological concepts depend on.

* **Cells**

[**https://www.youtube.com/watch?v=gFuEo2ccTPA**](https://www.youtube.com/watch?v=gFuEo2ccTPA)

**Review** – use the revision mat to review what you already know about cells 

Label this Prokaryote and describe what is meant by a prokaryote:



* **Research** – view the animation below. Note any processes and reactions that must happen to allow a cell to stay alive:

[**https://www.youtube.com/watch?v=Aa0cvmsD\_2Q**](https://www.youtube.com/watch?v=Aa0cvmsD_2Q)

**Ideas**

What are the meanings of the following terms used in the clip:

Pseudopods

Food vacuole

Membrane-bound

Cilia

Cytoplasm

DNA and mRNA

Mitosis

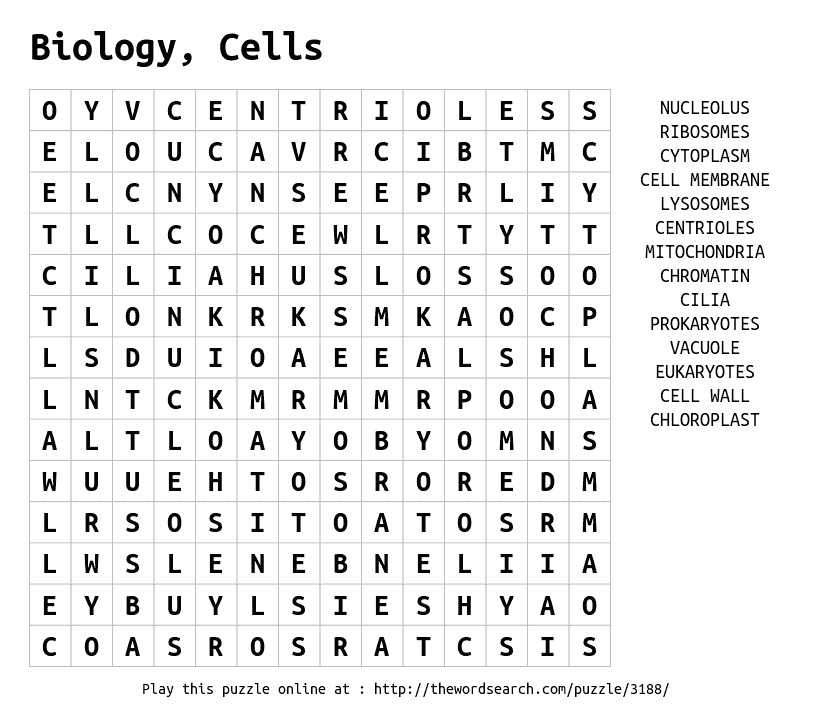
Mitochondria

View the following animation and fill in the table (3) with the functions of the organelles:

[**https://www.youtube.com/watch?v=URUJD5NEXC8**](https://www.youtube.com/watch?v=URUJD5NEXC8)

|  |  |  |
| --- | --- | --- |
| **Organelle** | **Description** | **Function** |
| **Nucleus** |  |  |
| **Mitochondria** |  |  |
| **Chloroplast** |  |  |
| **Golgi Apparatus** |  |  |
| **Ribosome** |  |  |
| **Cytoskeleton** |  |  |

Complete the word search and find definitions for the words:



View the animations on microscopy:

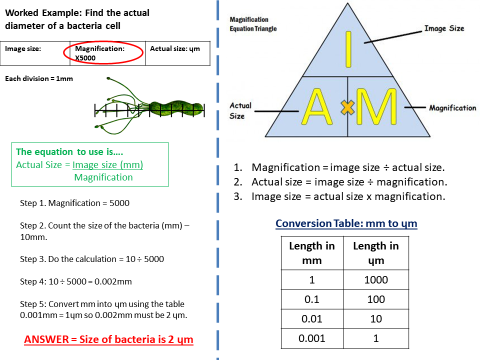
[**https://www.youtube.com/watch?v=znSQ9A7OPVc**](https://www.youtube.com/watch?v=znSQ9A7OPVc)

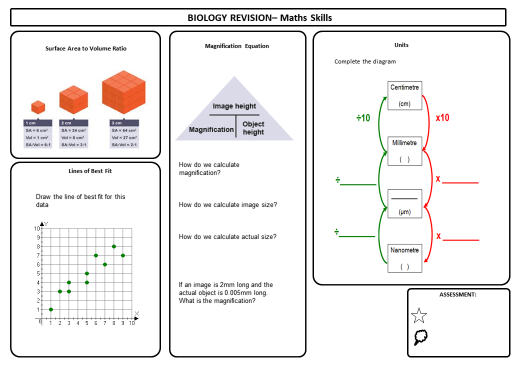
[**https://www.youtube.com/watch?v=ZqgKrd4Lp24**](https://www.youtube.com/watch?v=ZqgKrd4Lp24)

Create a mind map for your ideas

Microscopes

**Calculating Magnification**





* **Practice**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **1.** | Fig. 23 shows a microscope image of a cross section taken from the stem of a sunflower, Helianthus annuus.  C:\core\files\questions\1554782429\H020H420-BioA-H020-01\img\pg16_Q_01_150.png **Fig. 23**  Calculate the magnification of this image.   |  |  |  | | --- | --- | --- | |  |  | **[2]** | | | |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **2.** | Fig. 1 shows two blood smears, **A** and **B**.   |  |  |  | | --- | --- | --- | | C:\core\files\questions\1497110316\H020-BiologyAH420-03Practice2\img\p2-01a_150.png |  | C:\core\files\questions\1497110316\H020-BiologyAH420-03Practice2\img\p2-01b_150.png |   **Fig. 1**   1. Which of the two images, **A** or **B**, shows a non-specific immune response?  Explain your answer.     **[1]**   1. The actual width of **X** in Fig. 1 image **B** is 15 µm.  Calculate the magnification used to produce image **B** in Fig. 1.  Give your answer to **two** significant figures.   Answer = ................................................................... **[2]** | | |

**END OF QUESTION paper**

* **Think**

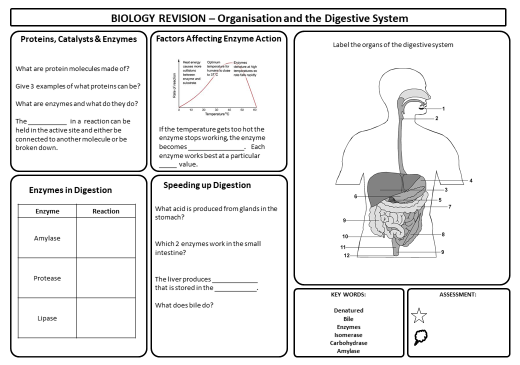
Can you answer the questions on cell structure? If you can you have become an A level thinker!

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **1.** | Which of the following structures, **A** to **D**, are found in prokaryotes **and** in eukaryotes?   1. a cell wall made of peptidoglycan 2. circular genomic DNA 3. a nucleus surrounded by a nuclear membrane 4. ribosomes   Your answer   C:\core\files\questions\1493222983\H020BiologyAH020-012016Jun\img\p3_03a_150.png  **[1]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **2.** | State the correct term for of the following definition:  The detailed structure of cells visible only with an electron microscope.  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **3.** | Cyanobacteria are photoautotrophs and fossil records confirm their existence 3.5 billion years ago.  Which row describes the structure of cyanobacteria?   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | **Feature** | | | | | | |  | **Nucleus** | **Circular DNA** | **Mitochondria** | **Ribosomes** | **Chloroplast** | **Cell wall** | | **A** | ✓ |  | ✓ |  | ✓ |  | | **B** |  |  | ✓ |  | ✓ | ✓ | | **C** | ✓ | ✓ |  | ✓ |  |  | | **D** |  | ✓ |  | ✓ |  | ✓ |   Your answer C:\core\files\questions_migrate\1481388552\H020BiologyAH020-01NewSAM\img\p2_01_150.png  **[1]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **4.** | Plant and animal cells have different structural features.   1. Name **two** features of plant cells that are not features of animal cells.  1     2    **[2]**   1. Name **one** structure present in animal cells that is not present in plant cells.   **[1]**   1. The cytoskeleton in cells consists of microtubules and microfilaments.  Describe the roles of the cytoskeleton.                 **[3]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **5.** | One theory about the evolution of organelles is the endosymbiotic theory. This theory suggests that the mitochondria and chloroplasts found in eukaryotic cells represent formerly free-living bacteria that were absorbed into a larger cell. The following list describes a number of features of mitochondria and chloroplasts.  Place a tick (✓) next to the **three** statements that could be used as evidence for the endosymbiotic theory.   |  |  | | --- | --- | | mitochondria contain ribosomes that are smaller than those found in the cell cytoplasm | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png | | chloroplasts contain chlorophyll and other photosynthetic pigments | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png | | mitochondria are a similar size to bacteria | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png | | the inner membrane of a mitochondrion is folded to form cristae | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png | | chloroplasts contain many disc-shaped membranes called thylakoids | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png | | chloroplasts have their own circular DNA | C:\core\files\questions\1494950615\H021BiologyAF211-01Jun15\img\squ_150.png |   **[3]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **6.** | A cytoskeleton is present in all eukaryotic cells. One of its functions is to control the movement of organelles.  Epithelial cells in the airways of mammals play an essential role in defences against pathogens.  Explain the function of epithelial cells in the airways of mammals in the defence against pathogens and suggest the importance of the cytoskeleton in carrying out this function.            **[4]** | | |
| |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **7.** | Haemoglobin is found in erythrocytes. Unlike other vertebrates, the mature erythrocytes of mammals lack nuclei and other membrane-bound organelles.   1. Explain **one** advantage and **one** disadvantage of the lack of nuclei and other membranebound organelles to mammalian erythrocytes.  |  |  | | --- | --- | | Advantage |  |    |  |  | | --- | --- | | Disadvantage |  |  1. **[2]** 2. Viruses do not use erythrocytes as host cells, whereas the malarial pathogen Plasmodium spends part of its life cycle inside erythrocytes.  Suggest why.           **[2]**   1. Explain why erythrocytes do **not** make use of any of the oxygen that they are transporting.           **[2]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **8.** | Fig. 3.1(a) and Fig. 3.1(b) below show root hairs on the surface of roots. The two images were taken using different types of microscope.  C:\core\files\questions\1493223382\H021BiologyAF211-012016Jun\img\p6_01a_150.png  **Fig. 3.1(a)**  C:\core\files\questions\1493223382\H021BiologyAF211-012016Jun\img\p6_02a_150.png  **Fig. 3.1(b)**  One of the images was taken using a scanning electron microscope.  Identify which image, **Fig. 3.1(a)** or **Fig. 3.1(b)**, was taken using a scanning electron microscope.  Justify your choice.  **[2]** | | |

**END OF QUESTIONS**

* Review

1. **Biomolecules and Enzymes**

****

* **Research**
* **Biomolecules**

[**https://www.youtube.com/watch?v=H8WJ2KENlK0**](https://www.youtube.com/watch?v=H8WJ2KENlK0)

* **Carbohydrates**

**Watch the following animation and answer the questions. Fill in the table if you can**

[**https://www.youtube.com/watch?v=\_zm\_DyD6FJ0**](https://www.youtube.com/watch?v=_zm_DyD6FJ0)

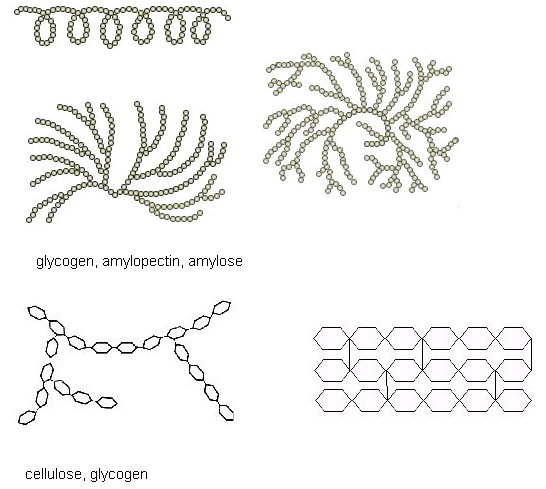
[**https://www.youtube.com/watch?v=LeOUIXbFyqk**](https://www.youtube.com/watch?v=LeOUIXbFyqk)

1. Draw a glucose molecule:
2. What is meant by a hexose?
3. Name 3 monosaccarides:
4. What is a disaccharide?
5. Name 3 disaccarides and what they are made of:
6. Name the bond formed between the hexoses:

Try to complete the table with ticks and crosses:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Starch | Glycogen | Cellulose |
| Found in animals |  |  |  |
| Found in plants |  |  |  |
| Made up of alpha glucose |  |  |  |
| Made up of beta glucose |  |  |  |
| Polysaccharide |  |  |  |
| Structural molecule |  |  |  |
| Storage molecule |  |  |  |
| Stains deep blue/black with iodine |  |  |  |
| Found in plant cell walls |  |  |  |
| Branched chain |  |  |  |
| Unbranched chain |  |  |  |
| Tightly coiled |  |  |  |
| Insoluble |  |  |  |
| Hydrolysed to form alpha glucose for respiration |  |  |  |

**Can you spot which polysaccharide is which?**



* **Research**
* **Proteins**

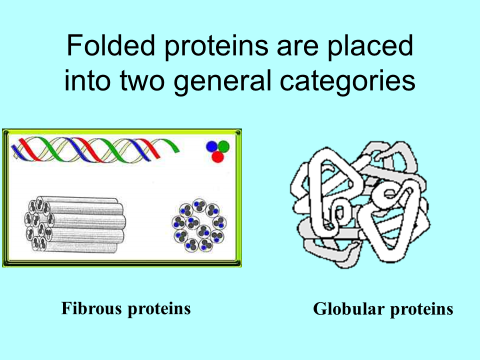
**What is a protein? Your ideas here:**

**Watch the animations below and try the questions:**

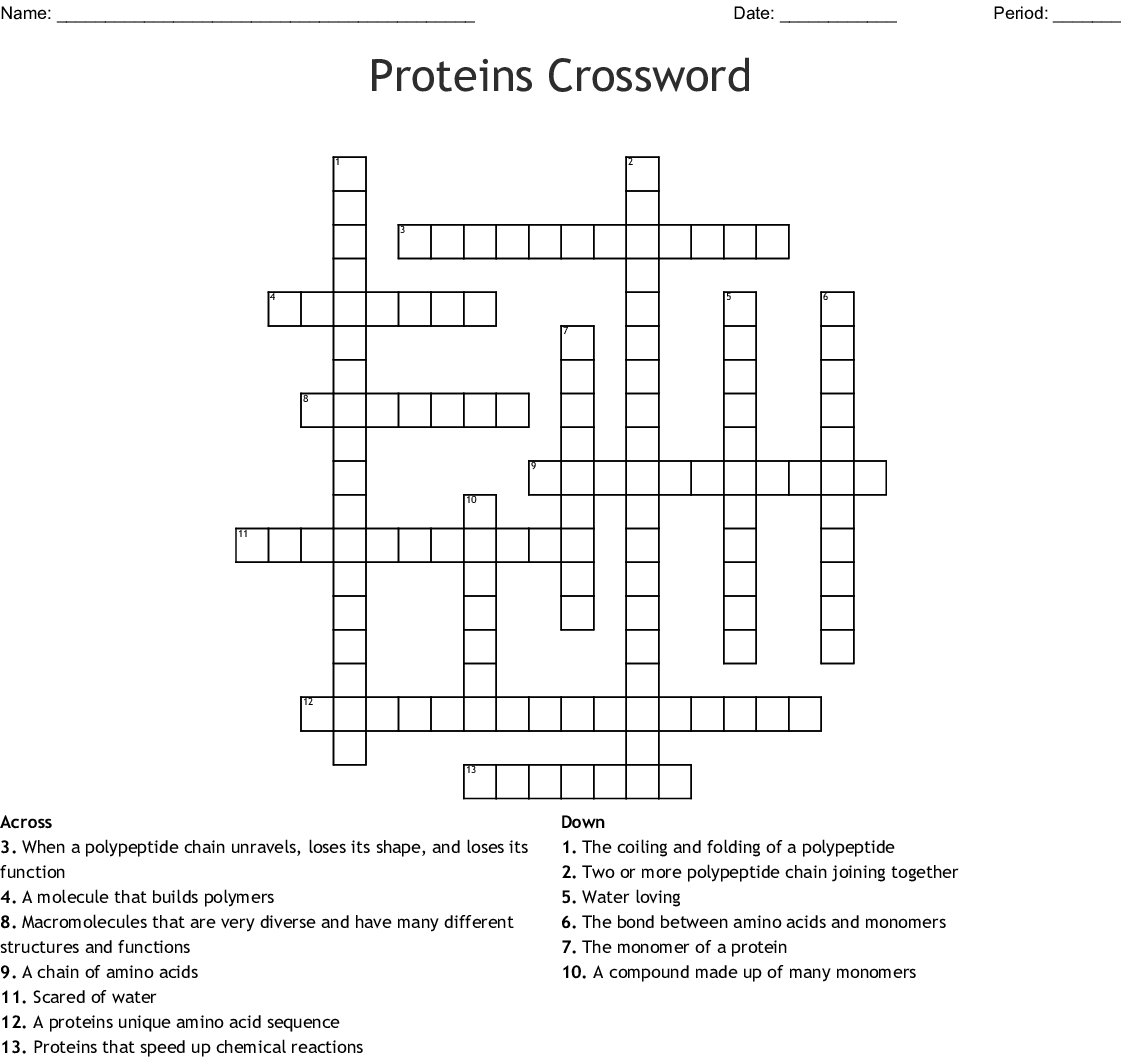
<https://www.youtube.com/watch?v=Gi9A56nu01E>

<https://www.youtube.com/watch?v=qBRFIMcxZNM>

1. Draw an amino acid:
2. How many types of amino acids are there?
3. How are amino acids different from each other?
4. What is the name of the bond between amino acids?
5. What is the Primary structure of a protein?
6. What then happens to the primary structure of a protein?



1. Can you name any fibrous or globular proteins?
2. Can you complete the proteins crossword?



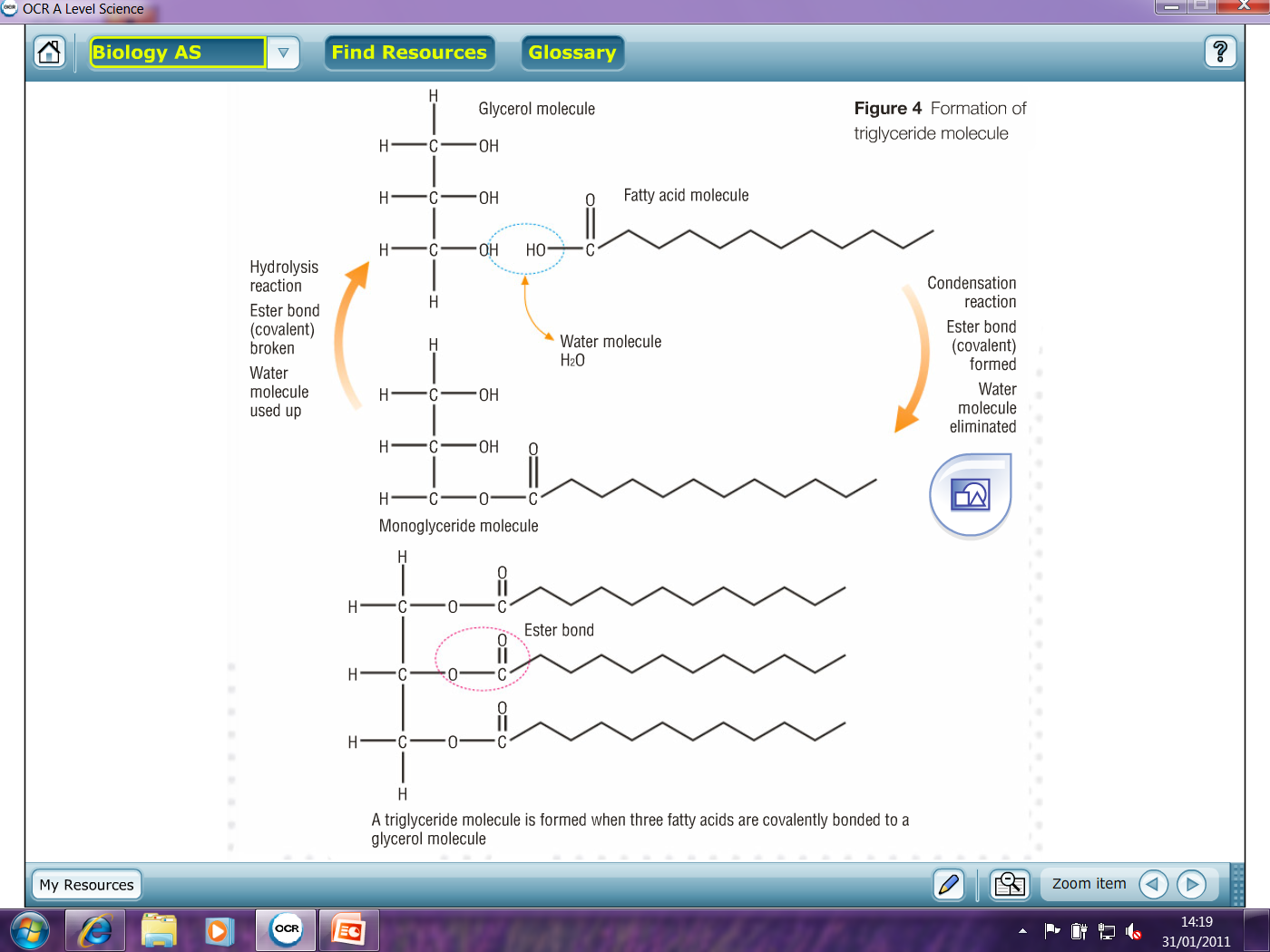
* **Research**
* **Lipids**

[**https://www.youtube.com/watch?v=VGHD9e3yRIU**](https://www.youtube.com/watch?v=VGHD9e3yRIU)

[**https://www.youtube.com/watch?v=5BBYBRWzsLA**](https://www.youtube.com/watch?v=5BBYBRWzsLA)

[**https://www.youtube.com/watch?v=brs2nMubr84**](https://www.youtube.com/watch?v=brs2nMubr84)

1. Label a triglyceride:



1. What components are triglycerides made of?
2. What is the difference between a saturated and an unsaturated fat?
3. What is a phospholipid?
4. Where is this molecule found?

Try the wordsearch and define the terms:

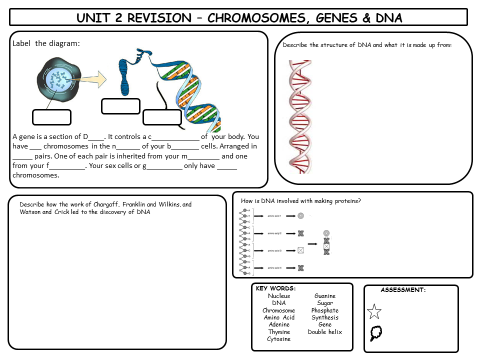
LIPIDS

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| H | U | E | I | W | N | E | G | J | U | F | I | E | L | A | R | S |
| F | M | N | E | G | Y | X | O | F | A | T | F | Q | P | H | V | E |
| O | T | R | I | G | L | Y | C | E | R | I | D | E | Y | L | C | L |
| W | P | L | N | K | J | C | A | R | B | O | N | G | C | B | O | U |
| S | D | N | Z | E | F | Y | J | P | M | S | G | O | H | Y | A | C |
| H | O | T | R | D | Y | Q | L | V | P | R | Y | X | O | H | U | E |
| N | I | L | D | P | I | P | A | J | O | G | H | C | T | B | V | L |
| E | L | K | I | T | R | M | J | L | T | M | X | G | U | L | W | O |
| G | S | S | P | J | N | O | I | T | A | L | U | S | N | I | B | M |
| O | P | U | I | F | E | A | Q | W | X | T | V | J | O | A | L | O |
| R | K | N | L | D | Y | W | S | J | M | Y | W | W | W | J | O | I |
| D | K | P | I | N | U | P | K | H | O | R | M | O | N | E | S | B |
| Y | L | O | R | K | A | V | Q | L | H | K | H | L | G | D | Z | A |
| H | S | D | I | O | R | E | T | S | B | S | H | O | A | W | B | X |
| I | B | E | G | A | R | O | T | S | Q | R | W | F | B | Y | V | I |
| Q | U | X | T | V | X | R | F | Q | J | Y | L | P | A | V | S | V |
| K | S | I | I | S | E | X | A | W | E | Z | D | D | Y | Z | K | V |

   STEROIDS       WAXES       HORMONES       OILS          INSULATION       TRIGLYCERIDE   FAT STORAGE

      CARBON       OXYGEN       HYDROGEN       LIPID       BIOMOLECULES

* **Review**
* **DNA**



* **Research**

Use these animations to review and extend your ideas about DNA structure and function:

<https://www.youtube.com/watch?v=zwibgNGe4aY>

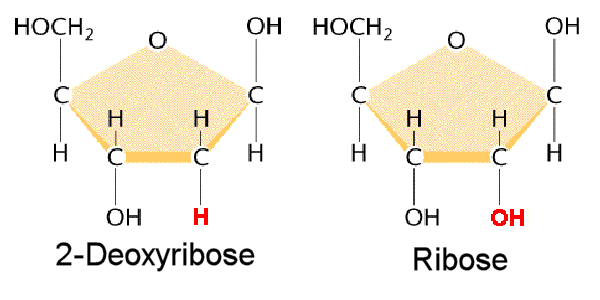
<https://www.youtube.com/watch?v=5MQdXjRPHmQ&t=207s>

Make a mind map to summarize and link your ideas

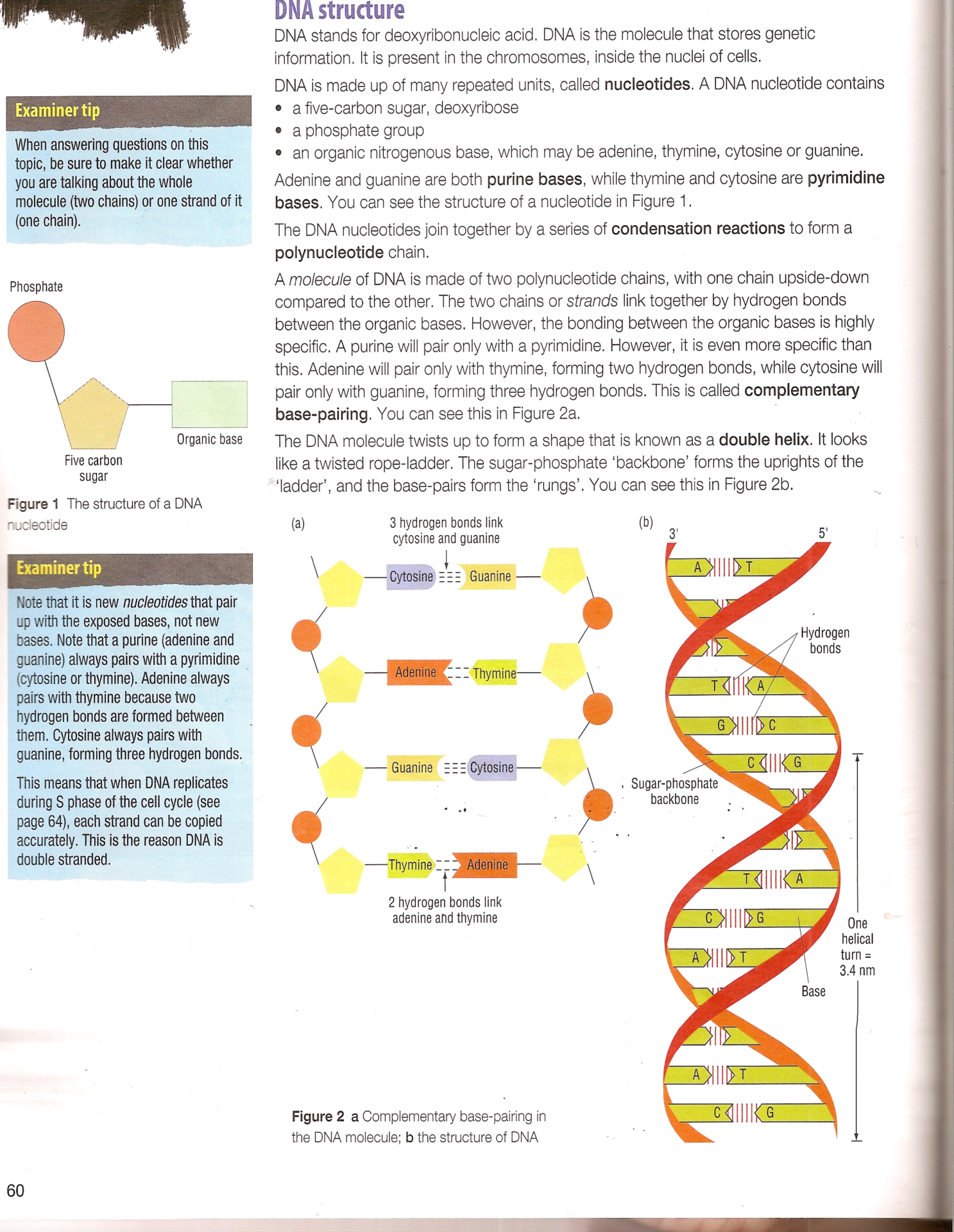
**DNA**

**DNA – quick test**

1. Draw the basic structure of a nucleotide
2. Name each 5 carbon sugar below



1. Name the different nitrogenous bases in DNA
2. DNA is often described as a DOUBLE HELIX. What can you remember about the way in which the double helix is formed?



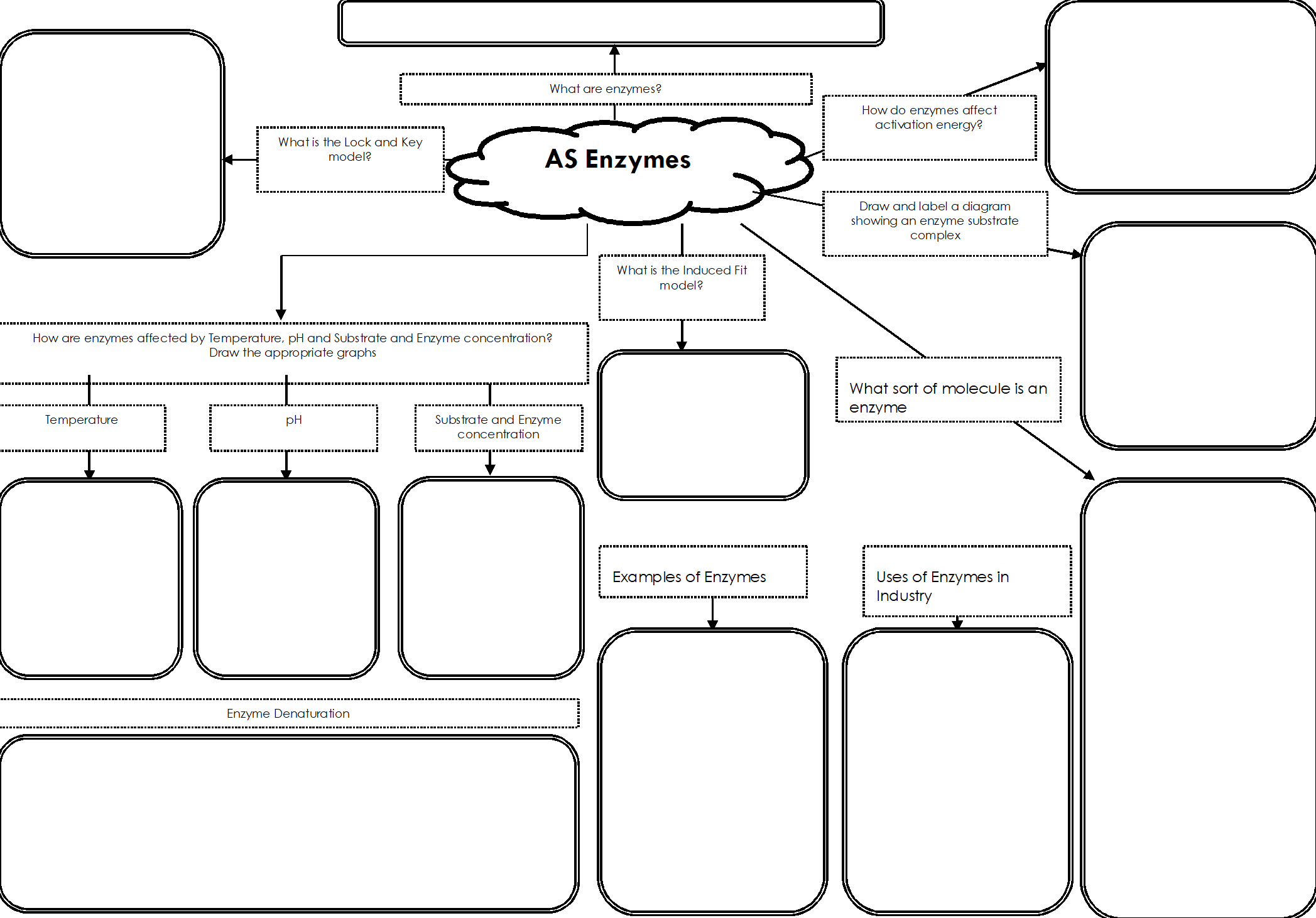
1. What is the BASE PAIR RULE in DNA?
2. In one sample of DNA , the % of each nitrogenous base is analysed. 22% is found to be thymine. Can you work out what the % of each other base is?

* **Think**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **1.** | The following table describes the approximate percentage mass of different chemical elements in organic polymers.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  | **Polymer** | **N (%)** | **C (%)** | **O (%)** | **H (%)** | **P (%)** |  | | **A** | nucleic acid | 20.0 | 30.0 | 20.0 | 10.0 | 20.0 |  | | **B** | carbohydrate | 0.0 | 33.3 | 33.3 | 33.3 | 33.3 |  | | **C** | protein | 30.0 | 10.0 | 10.0 | 0.0 | 50.0 |  | | **D** | lipid | 0.0 | 50.0 | 49.0 | 1.0 | 0.0 |  |   Which of the rows, **A** to **D**, is correct?   |  |  |  | | --- | --- | --- | | Your answer | C:\core\files\questions\1555699347\H020H420-BioA-H420-01\img\square_150.png | **[1]** | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **2.** | Energy can be stored in living organisms in the form of carbohydrates or lipids.  Name the carbohydrate molecules used to store energy in plants and animals.  plants ................................................................................................................................................  animals ...............................................................................................................................................  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **3.** | Which of the processes, **A** to **D**, describes the formation of cellulose?   |  |  | | --- | --- | | **A** | condensation polymerisation of amino acid molecules | | **B** | condensation polymerisation of β-glucose molecules | | **C** | hydrolysis polymerisation of α-glucose molecules | | **D** | hydrolysis polymerisation of deoxyribose molecules |   Your answer  C:\core\files\questions\1497109076\H020-BiologyAH420-01Practice2\img\p3-01b_150.png  **[1]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **4.** | Cellulose is another polysaccharide that is present in some living organisms.   1. Complete the following table to show **three** other differences in the **structures** of starch (amylose) and cellulose molecules.  |  |  | | --- | --- | | **Amylose** | **Cellulose** | | coiled | no coiling | |  |  | |  |  | |  |  |  1. **[3]** 2. Which properties of cellulose make it suitable for forming cell walls?         **[2]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **5.** | Polymers are important molecules that have structural and functional roles in organisms.  Chitin is a polymer that is found in insects, where it forms a major part of the structure of the exoskeleton.   * Chitin is a macromolecule that is similar to a polysaccharide. * Chitin is composed of molecules of N-acetylglucosamine, the structure of which is shown in the figure below. * The monomers of N-acetylglucosamine join by 1–4 glycosidic bonds to form the chitin molecule.   C:\core\files\questions\1493223196\H020BiologyAH020-022016Jun\img\p12_01a_150.png   1. How does the composition of N-acetylglucosamine differ from the composition of a monosaccharide sugar?     **[1]**   1. Which monosaccharide sugar does N-acetylglucosamine most closely resemble?   **[2]**   1. Using your knowledge of the formation of structural polysaccharides, describe the formation of the chitin molecule from its monomer and predict its structure.                 **[4]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **6.** | Biological molecules, such as lipids and carbohydrates, are found in dairy products.  Lipids differ depending on the type of fatty acid they contain.  Stearic acid is a fatty acid commonly found in animal fats. It contains 18 carbon atoms.  The structure of stearic acid is shown in Fig. 1.1.  C:\core\files\questions\1495122158\H023BiologyBF221-01Jun15\img\p3-01a_150.png  **Fig. 1.1**   1. State the chemical groups labelled **A** and **B** in Fig. 1.1.   **A...................................................................................................................................................**  **B...................................................................................................................................................**  **[2]**   1. Fig. 1.2 shows another type of molecule also found in lipids.   C:\core\files\questions\1495122158\H023BiologyBF221-01Jun15\img\p3-01b_150.png  **Fig. 1.2**  Name the molecule shown in Fig. 1.2.  **[1]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **7.** | Pepsin is an enzyme that digests protein foods in the mammalian stomach.  Protein molecules are made from chains of amino acids.   1. Name the covalent bond between two adjacent amino acids in a chain of amino acids.   **[1]**   1. Name the type of reaction involved in breaking this bond **and** describe what happens in this reaction.           **[2]** | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **8.** | A vet is concerned that a llama is unwell. The vet suspects there may be haemoglobin in the urine of the llama.  Explain how the vet could confirm this suspicion.        **[2]** | | |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **9.** | The chromosomes carried by sperm are made of DNA.  The following passage about nucleic acids has four words missing. Choose the correct missing words from the list below and complete the passage by writing them in the gaps.  C:\core\files\questions\adminupload\126615\pg25_001_150.png  Nucleic acids are made from ................................... monomers.  Phosphodiester bonds form between the monomers. They consist of a ................................... group between the ................................... molecules, forming the ‘backbone’ of the molecule.  In DNA, hydrogen bonding between the two antiparallel ................................... causes the characteristic double helix shape.   |  |  | | --- | --- | |  | **[4]** | | | |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **10.** | A DNA molecule contains polynucleotide strands.   1. Individual nucleotides are joined together to make a polynucleotide strand.  What type of chemical reaction takes place when two nucleotides in a single polynucleotide strand are joined together?   **[1]**   1. Name the chemical released when the bond is formed between the two nucleotides.   **[1]**   1. A DNA molecule contains two polynucleotide chains.  Describe how these two chains are held together.           **[3]** | | |

**END OF QUESTION paper**

* Review
* Enzymes



* **Research**

[**https://www.youtube.com/watch?v=1BoZfsARSjk**](https://www.youtube.com/watch?v=1BoZfsARSjk)

[**https://www.youtube.com/watch?v=Wm\_hW4ATROo**](https://www.youtube.com/watch?v=Wm_hW4ATROo)

[**https://www.youtube.com/watch?v=C2gYhT9BrmQ**](https://www.youtube.com/watch?v=C2gYhT9BrmQ)

Match the parts or processes in the list below with the descriptions in the table:

* **Active site**
* **Globular protein**
* **Lock and key**
* **Optimum pH**
* **Optimum temperature**
* **Substrate**
* **Biological catalyst**
* **Product**
* **Denature**
* **Enzyme-substrate complex**

|  |  |
| --- | --- |
| **Description** | **Part/Process** |
| The tertiary structure of an enzyme |  |
| The pH at which an enzyme’s maximum rate of reaction is achieved |  |
| An association of enzyme and substrate |  |
| Chemical which is made and is present at the end of a reaction |  |
| Definition of an enzyme |  |
| A theory suggesting that enzyme and substrate fit precisely together |  |
| Chemical present at the start of a reaction |  |
| The region of the enzyme into which the substrate fits |  |
| A change in the structure of the enzyme and its active site |  |
| Temperature at which a particular enzyme works best |  |

**Enzyme Wordsearch**

D O E K S M R R V I S C E L H S A Z U K

P E N R D E A E N Y O T T D Z U C K N O

S X A O U L M H V M U W I B B B T R K C

H T Z T U T I Y P E Q B S Q Q S I Q J W

P K A B H B A E Z R R P E V R T V E J T

A U O T I C T R U N V S V A I R A U H V

X L I T I I A D E X E Q I I V A T D Q U

G K O V T N F P C P R O T B Q T I G V C

Y R B I M C S C M E M S C W L E O P S Q

S X V Q L V G V G U K E A V I E N H R B

Z E P R O D U C T S S Y T P Y Y E G O A

I N D U C E D F I T T H M K E O N W T M

S T S Y L A T A C G Z P R K L L E B C Y

L T V F E I I P V D E R D O J H R R A L

Y T I C I F I C E P S N H W O U G M F A

M Y D X U G Q J S A A C S L B M Y I O S

G R H L W E Y I F K P Y Z I U Z C H C E

F B Y Q N J N T C M T S W B K T A W K T

L S P D M G K O V G P Q L S L Q X Y C V

G R A B S Y L N V A H Q E D W M E V A O

1. Enzymes lower the ................... of a reaction.
2. The place where the substrate binds to the enzyme.
3. An enzyme that breaks down starch.
4. Enzymes are biological ................
5. Two types of molecule that may be required for an enzyme to catalyse a reaction.
6. A type of inhibitor that has a similar shape to the substrate.
7. A fungus that may be fatal.
8. Enzymes are .............. proteins.
9. Two hypotheses that explain how enzymes function.

10) A molecule that prevents an enzyme working.

11) An enzyme that is found in the stomach.

12) The molecules that are produced at the end of a reaction.

13) A term that describes the fact that enzymes are particular to one type of substrate.

14) Drugs that inhibit the production of cholesterol.

15) A factor that affects the rate of enzyme controlled reactions and may cause the enzyme to denature if too high.

* **Think**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **1.** | The concept of molecules with complementary shapes can be used to explain many processes in living things.  Complete the following passage about the mechanism of enzyme action.  Enzymes are proteins which speed up the rate of biological reactions. They form an  ......................................................................... by binding to their substrate at a site known as the ................................................................... . This site has a specific shape created by the ………..................................................... structure of the protein molecule. This means that each enzyme can bind to only one type of substrate molecule.  This is explained by the lock and key hypothesis. In an alternative hypothesis, the binding site changes shape to fit more closely around the substrate molecule. This is called the  ......................................................................... hypothesis. This hypothesis can help to explain how enzymes enable reactions to occur at lower temperatures by reducing the ............................................... required for the reaction to occur.  **[5]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **2.** | Lipase is an enzyme that catalyses the breakdown of lipids.  An investigation was carried out to see the effect of temperature on the activity of a lipase.   |  | | --- | | * 5 cm3 of an alkaline solution of lipid was poured into a test tube. * The test tube was placed into a water bath maintained at 20 °C and left to equilibrate. * A few drops of an indicator were added to the wells of a white spotting tile. The indicator is pink above pH values of 8.3 and turns colourless at pH values below 8.3. * Once the lipid solution had equilibrated, 1 cm3 of 0.5% lipase solution at the same temperature was then added to the test tube. * For five minutes, at 30 second intervals, the solution was stirred and a few drops were removed from the test tube and placed in a well on the white spotting tile. * The time was recorded when the solution and indicator did not remain pink. * The procedure was repeated four more times at 20 °C and then again at a further six temperatures. |   The results are shown in the table below.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Temperature (°C)** | **Time when solution did not remain pink** | | | | | | **Replicate 1** | **Replicate 2** | **Replicate 3** | **Replicate 4** | **Replicate 5** | | **20** | 210 | 270 | 240 | 300 | 270 | | **25** | 90 | 120 | 210 | 180 | 120 | | **30** | 60 | 60 | 90 | 90 | 60 | | **35** | 60 | 60 | 60 | 90 | 60 | | **40** | 210 | 120 | 210 | 180 | 210 | | **45** | 240 | 300 | 300 | – | 270 | | **50** | – | – | – | – | – |  1. Why is pH **not** a controlled variable in this investigation?       **[1]**   1. Identify **one** variable that has been controlled in this procedure.   **[1]**   1. Identify **one** variable, other than pH, that has **not** been controlled in this procedure.     **[1]**   1. The procedure required the solution to be stirred and then drops of solution to be placed on a white spotting tile.  Suggest why this procedure was followed rather than simply adding indicator to the test tube, stirring the solution and looking for the colour change in the test tube.       **[1]**   1. What can be concluded from the results in the table about the optimum temperature for lipase activity?       **[1]**   1. Describe **two different** ways in which the procedure could be modified to obtain a more accurate value for the optimum temperature for lipase activity.  1             2    **[4]** | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  |  | | **3.** | A student investigated how changing the pH affected the activity of pepsin.   * He used a blender to make a suspension of egg white (protein) in water. * At the start of the investigation the suspension was cloudy. * He prepared fixed concentrations of egg white suspension, acid and pepsin to add to each of six test-tubes. * He removed 0.1 cm3 of the mixture from each test-tube and used universal indicator to measure the pH of each mixture. * He incubated each test-tube in a water bath at 35 °C and timed how long it took for the egg white suspension in each tube to clear. * He prepared a table in which he recorded his results (Table 1.1).  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Tube** | **Volume of egg white suspension** | **Volume of acid added (cm3)** | **Amount of pepsin added (cm3)** | **Measured pH** | **Time for suspension to clear (m)** | | **1** | 5 | 2.0 | 3.0 | 1 |  | | **2** | 5 | 1.5 | 3.0 | 2 |  | | **3** | 5 | 1.0 | 3.0 | 3 |  | | **4** | 5 | 0.5 | 3.0 | 4 |  | | **5** | 5 | 0.0 | 3.0 | 5 |  | | **6** | 5 | 2.0 | 0.0 | 1 |  |     **Table 1.1**   1. Identify **three** errors the student made in the preparation of his **table** before he recorded his results.  1       2      3    **[3]**   1. Identify a change the student could make to his procedure that would increase the **validity** of the investigation.     **[1]**   1. State the term that best describes the purpose of **tube 6**.   **[1]**   1. Another student suggested that he should repeat the investigation at least twice.  How would this have improved the investigation?         **[2]** | | |

**END OF QUESTION paper**

Well done!! Completing this preparation work will really help you to start you’re a level Biology Studies.

You may also want to try this workbook: Or the Text book:

