

**NAME** ..... **INDEX NO.** .....

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**P530/1**  
**BIOLOGY**  
**PAPER 1**  
**UNNASE Joint Mock Examinations**  
**July/August 2015**  
**2 ½ Hours**

**UNNASE Joint Mock Examinations 2015**  
***Uganda Advanced Certificate of Education***  
**BIOLOGY (THEORY)**  
**PAPER 1**  
**2 Hours 30 Minutes**

**INSTRUCTIONS TO CANDIDATES:**

- ❖ *This paper has two sections A and B.*
- ❖ *Attempt **all** questions in both sections.*
- ❖ *For section A, write the letter corresponding to the correct answer in the box drawn at the right hand side of each question.*
- ❖ *For section B, write the answers in the spaces provided.*

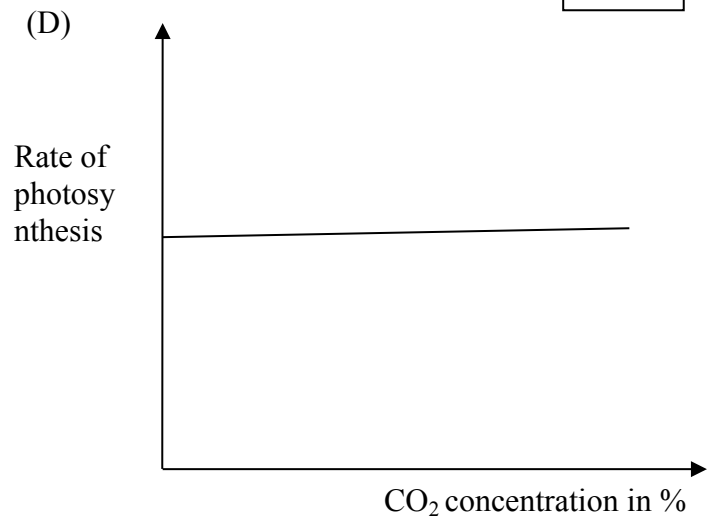
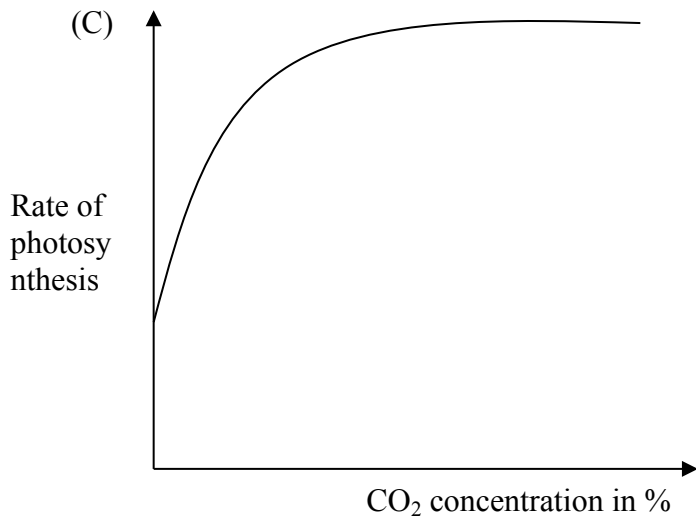
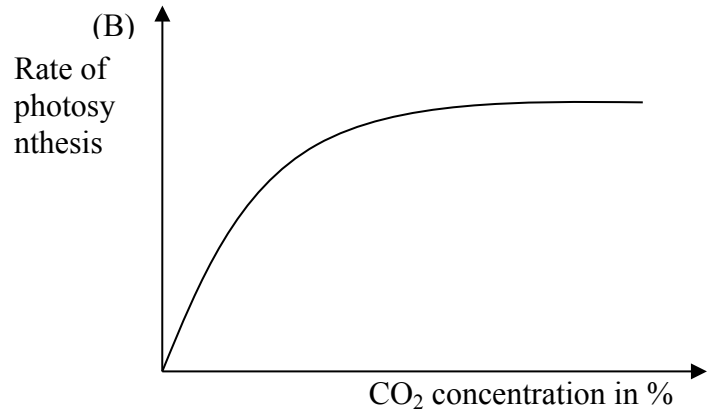
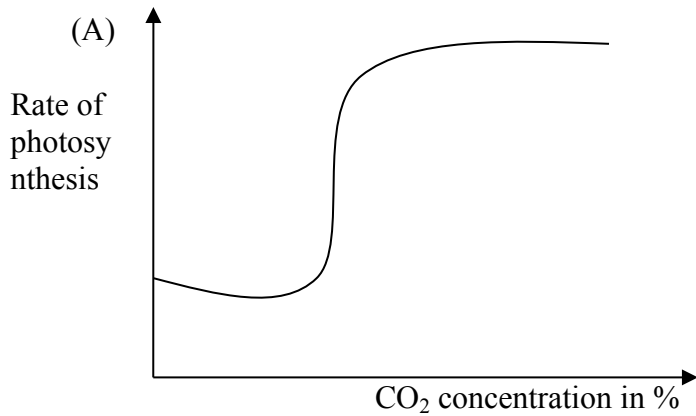
FOR THE EXAMINER'S USE ONLY		
SECTION	MARKS	EXAMINER
A		
B		
TOTAL		

**SECTION A: (40 Marks)**

1. Which of these organelles has a transport function?

- (A) Ribosome and Golgi apparatus
- (B) Golgi apparatus and endoplasmic reticulum.
- (C) Mitochondrion and endoplasmic reticulum.
- (D) Mitochondrion and ribosome.

2. Which of these graphs shows the effect of increasing carbon dioxide concentration on the rate of photosynthesis?



3. Which of these are components of an eukaryotic chromosome?

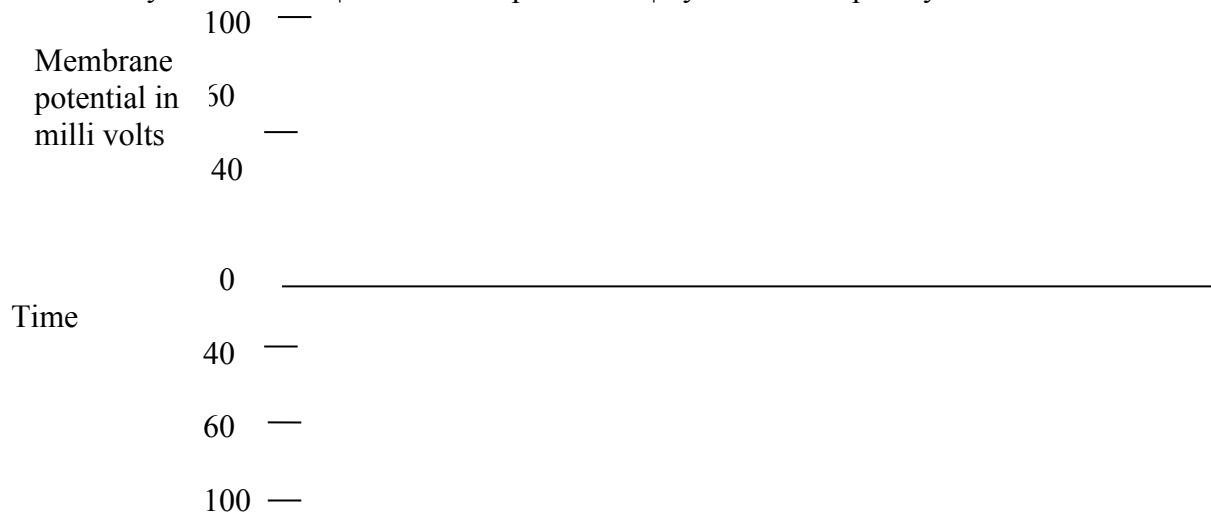
- (A) one DNA molecule and one large protein.
- (B) Many DNA molecules and many proteins.
- (C) One DNA molecule and many proteins
- (D) Many DNA molecules and one large protein.

4. Which of these would lead to sickle cell anaemia?
- (A) Errors in the translation of mRNA
  - (B) A base substitution in DNA.
  - (C) A transcription error that replaces A with U
  - (D) A mutation that leads to glutamic acid instead of valine.
5. Recombination of unlinked genes would normally occur
- (A) Crossing over in prophase 1
  - (B) Random chromosome assortment.
  - (C) Failure of spindle formation.
  - (D) Random gene mutations.
6. Which of these would trigger the uptake of  $\text{Ca}^{2+}$  in synaptic transmission?
- (A) The influx of sodium ions only.
  - (B) Release of neurotransmitter
  - (C) Depolarisation of post-synaptic membrane.
  - (D) Arrival of nerve impulse in the pre-synaptic neurone.
7. The part of the kidney where most glucose is re-absorbed from glomerular filtrate is;
- (A) loop of Henle
  - (B) Glomerulus
  - (C) Proximal convoluted tubule.
  - (D) distal convoluted tubule
8. Prokaryote cells divide by;
- (A) Mitosis
  - (B) Meiosis
  - (C) Budding
  - (D) Binary fission
9. The extra-cellular matrix of cells is made up of;
- (A) Polysaccharide
  - (B) Polysaccharide and glycoprotein
  - (C) Glycoprotein and phospholipid
  - (D) Phospholipid, glycoprotein and polysaccharide
10. Oxides of nitrogen are looked at as green house gases because they;
- (A) trap long wave radiation emitted by the earth's surface.
  - (B) prevent short wave radiation from reaching the earth's surface.
  - (C) Dissolve in water to produce acid rain.
  - (D) are not naturally produced like carbondioxide methane.
11. Antibiotics are ineffective against bacteria and not viruses because
- (A) Viruses can hide inside the host cells.
  - (B) Bacteria are recognised as pathogens but viruses are not.
  - (C) Enzymes of bacteria can be inhibited by antibiotics.
  - (D) Viruses are resistant to antibiotics.
12. The tertiary structure of a protein would best be described by;

- (A) interactions of polypeptide subunits and prothetic groups.  
(B) Interactions forming hydrogen bonds between the amino acids.  
(C) The sequence of amino acids in the polypeptide chain.  
(D) The structure formed from interactions between the amino acids side groups.
13. The chloroplast, complex carbohydrates are made in;
- (A) The inter-membrane space (C) the inner membrane  
(B) The stroma (D) The thylakoid space
14. Human Chorionic Gonadotrophic (HCG) in early pregnancy stimulates
- (A) Follicle stimulating hormone secretion.  
(B) Degeneration of corpus luteum.  
(C) Ovarian oestrogen and progesterone secretion.  
(D) Uterine contraction.
15. Which of the following is true about a polar amino acid and cellulose? Both;
- (A) are polysaccharide (C) contain nitrogen  
(B) are hydrophobic (D) contain hydrogen atoms.
16. If 15% of a sample of DNA is thymine, what percentage of DNA is guanine?
- (A) 15% (B) 30% (C) 35% (D) 70%
17. When a pathogen is ingested by a phagocyte, the first event that occurs is;
- (A) T – cell activation. (C) Antigen presentation by the phagocyte.  
(B) Memory cell proliferation (D) B – cell activation
18. Which of the following is not a function of a membrane protein?
- (A) Hormone binding site (C) Cell cohesion  
(B) Cell adhesion (D) Acts as a pump in active transport
19. Which of the following takes place during either interphase or mitosis in animal cells?
- (A) Reformation of nuclear membrane.  
(B) Reformation of nuclear membrane and pairing of homologous chromosomes.  
(C) Pairing of homologous chromosomes and DNA replication.  
(D) Reformation of nuclear membrane and DNA replication.
20. An animal has radial symmetry, a sac-like body with only one opening and tentacles. This animal is a member of;
- (A) Annelid (C) Mollusca  
(B) Cnidaria (D) Porifera
21. The figure below shows membrane potential during an action potential. What occurs at stages 1 and 2 ?

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- (A)  $\text{Na}^+$  ions diffuse in and  $\text{K}^+$  ions diffuse out.
- (B)  $\text{K}^+$  ions diffuse out and  $\text{Na}^+$  ions diffuse in
- (C)  $\text{Na}^+$  ions diffuse out and  $\text{K}^+$  ions diffuse out
- (D)  $\text{Na}^+$  ions diffuse in and  $\text{K}^+$  ions diffuse in

22. In males, testosterone'

- (A) stimulates FSH production and growth in puberty.
- (B) pre-natal development of genitalia and development of secondary sexual characteristics.
- (C) development of pre-natal genitalia and development of pre-natal secondary sexual characteristics.
- (D) stimulates FSH production and prenatal development of secondary sexual characteristics.

23. Cells in a multicellular organism differentiate because'

- (A) They express some of their genes but not others.
- (B) They all have a different genetic composition.
- (C) Different cells contain a different set of chromosome.
- (D) Different cells do not have some of the genes.

24. If mRNA has a codon CAU, what is the corresponding anti-codon on the tRNA ?

- (A) CAT
- (B) GUA
- (C) CAU
- (D) GTA

25. Skin colour is an example of inheritance through

- (A) Sex linkage
- (B) Multiple alleles
- (C) Systemic genes
- (D) Polygenes.

26. In what sequence do the hormones reach their maximum level in the human menstrual cycle?

- (A) LH, progesterone, FSH, Oestrogen (C) LH, oestrogen, FSH, progesterone  
(B) FSH, progesterone, LH, Oestrogen. (D) FSH, oestrogen, LH, progesterone

27. What prevents a long day plant from flowering during winter?

- (A) Too much phytochrome for red (Pfr) is converted to phytochrome red (Pr) during night.  
(B) Too much Pfr is converted to Pr during the day.  
(C) Too much Pr is converted to Pfr at night.  
(D) Too much Pr is converted to Pfr during day.

28. Which process has the greatest effect in determining which members of a population are most likely to survive until reproductive age?

- (A) Evolution (C) Meiosis  
(B) Natural selection (D) Hybridisation

29. Colchicine disrupts microtubule assembly, what activity would be most affected by colchicines?

- (A) Photosynthesis (C) Movement of chromosomes to the pole during mitosis  
(B) Replication (D) Active transport by membrane protein

30. In the opening and closing of stomata, the osmotic theory is associated with;

- (A) conversion of starch into sugar in the guard cells.  
(B) accumulation of salts in the guard cells  
(C) synthesis of abscisic acid.  
(D) production of starch during photosynthesis

31. Birds reared by a foster mother of another species, later attempts to mate with birds of the foster mother species as a result of

- (A) Simple reflex (C) Imprinting  
(B) Conditioned reflex (D) Trial and error learning

32. Which part of an amoeba is concerned with active intake of water?

- (A) Ectoplasm (C) Pseudopodia  
(B) Contractile vacuole (D) Cell membrane

33. Which of the following cell types are unlikely to be found in the mammalian intestines?

- (A) Columnar (C) Stratified  
(B) Ciliated (D) Squamous

34. Crossing over exchanges alleles between

- (A) non-homologous chromosomes (C) Non-sister chromatids  
(B) non-homologous chromatids (D) Sister chromatids

35. A stable community of organisms in equilibrium with the natural environmental conditions is

- (A) Pioneer community
- (B) Seral community
- (C) Biotic community
- (D) Climax community

36. An accidental discharge of a very acidic waste occurred near a small lake. Which of the following is most likely to happen?

- (A) Eutrophication
- (B) Increased water turbidity
- (C) Gill damage in fish
- (D) An algal bloom

37. Enzymes that catalyse the removal of water molecules from a substrate are known as

- (A) Reductases
- (B) Dehydrogenases
- (C) Dehydrases
- (D) Hydrases

38. Which of the following is considered to be a passive process in the body?

- (A) Water loss from stomata
- (B) DNA transcription
- (C) Uptake of mineral salts
- (D) Muscular contraction

39. Facilitated diffusion and active transport both require;

- (A) Adenosine triphosphate
- (B) Protein carriers
- (C) Unidirectional movement of solutes
- (D) That the solute be soluble in lipids

40. If two species with similar niches and share limited resources are forced to co-exist indefinitely

- (A) Both species would be expected to co-exist.
- (B) Both species would become extinct.
- (C) The species that use the resource more efficiently would drive the other to extinction.
- (D) Both species would become similar to one another.

**SECTION B: (60 Marks)**

41. (a) Describe the structural changes of a flower's ovary that result in the development of a fruit. (3mks)

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(b) Why are plantations of banana plants in different parts of the world grown from cuttings all susceptible to fungal attack? (3mks)

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(c) Edible banana plants have three sets of chromosomes. Why does this condition result into sterility? (4mks)

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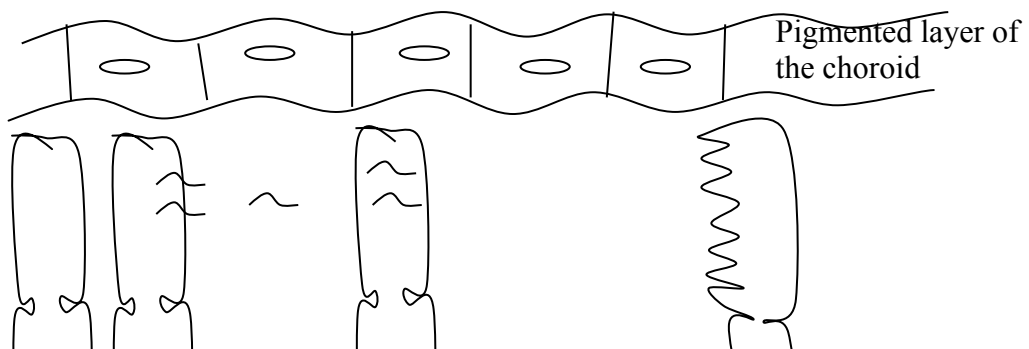
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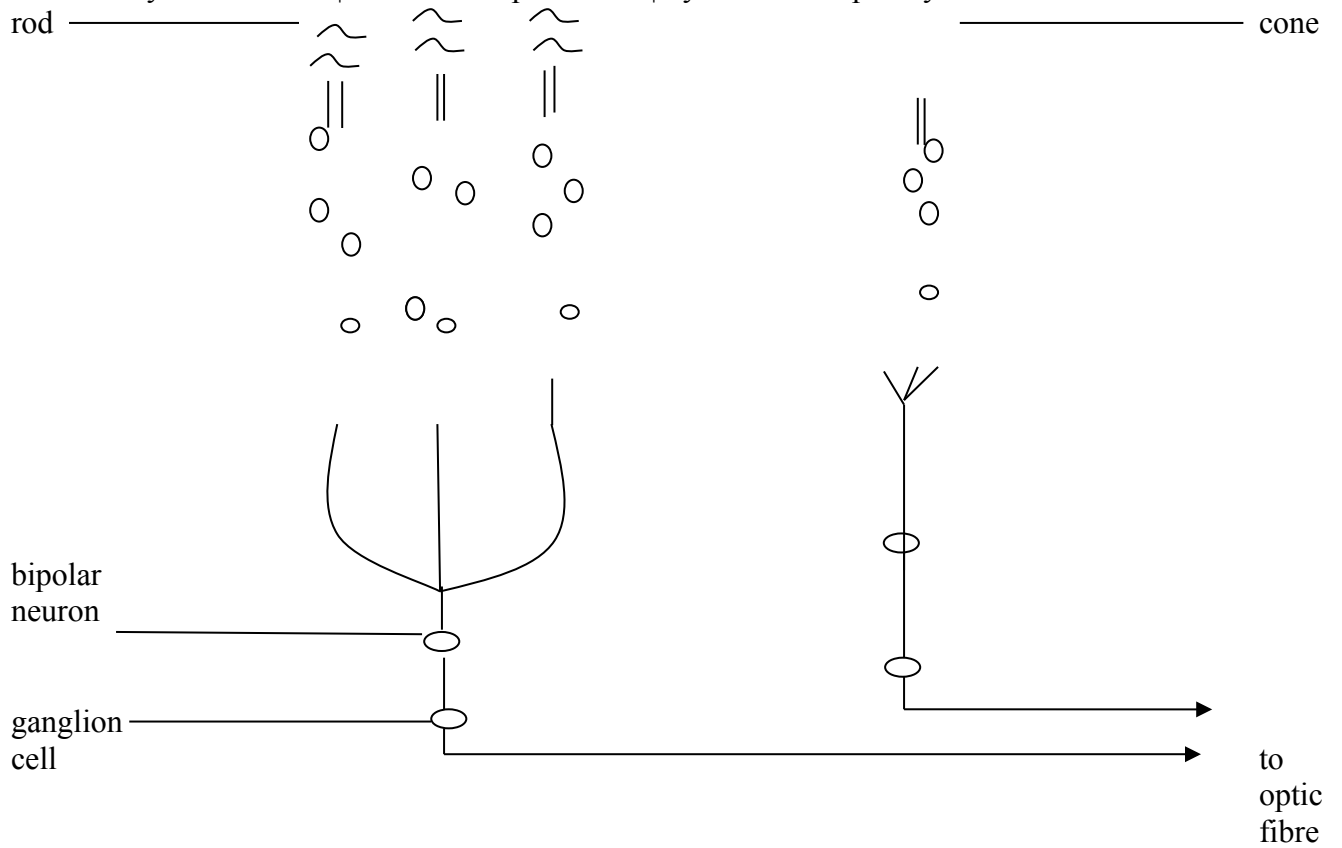
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42. The diagram below represents an enlarged section of part of the retina and choroids of a human eye.







- (a) (i) Draw an arrow on the sketch of the diagram above to show the direction in which light passes through the retina. (1mk)
- (ii) Suggest three functions of the black pigment which is found in the choroid layer of the eye. (3mks)

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- (b) Use the information on the diagram above to explain how a person is able to:
- (i) See light of low intensity (3mks)

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(ii) See in great detail in bright light (3mks)

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43. A pure breeding fruit fly with a tan body and long wings was crossed with a mutant having a black body and short wings. The  $F_1$  all had tan bodies and long wings. The  $F_2$  was 75% tan with long wings and 25% black with short wings.

(a) Suggest an explanation for these results. (2mks)

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(b) Using genetic diagrams, show how these results were obtained. (8mks)

44. (a) State **five** differences that exist between nerves and muscle fibres. (5mks)

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(iii) .....

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(iv) .....

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(v) .....

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(b) What would you expect to observe in the structure of a contracting muscle filament if the sliding filament hypothesis holds during contraction?(4mks)

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(c) What is reciprocal innervations as applied to muscles? (1mk)

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45. (a) Distinguish between growth and differentiation. (1mk)

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(b) Describe how insects larval are adapted to successful life (1mk)

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(c) Give the hormones that control metamorphosis in insects and for each of them state where in the body of the insect it is secreted. *(3mks)*

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(d) Both insects and amphibians undergo metamorphosis. Outline three characteristics of this process. *(3mks)*

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46. (a) Define the following terms.

(i) Coenzymes *(2mks)*

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(ii) Prothetic group (2mks)

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(b) Describe enzyme action based on the induced fit hypothesis. (3mks)

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(c) Outline any **three** differences between lock and key and induced fit hypothesis of enzyme action. (3mks)

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\*\*\*\* **END** \*\*\*\*