MARKER CODE			

STUDENT EDUCATION NUMBER									

Samoa Secondary Leaving Certificate

BIOLOGY

2015

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS:

1. You have 10 minutes to read **before** you start writing.
2. Write your **Student Enrolment Number (SEN)** in the space provided on the top right hand corner of this page.
3. Answer **ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more space, ask the Supervisor for extra paper. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets at the appropriate places in this booklet.

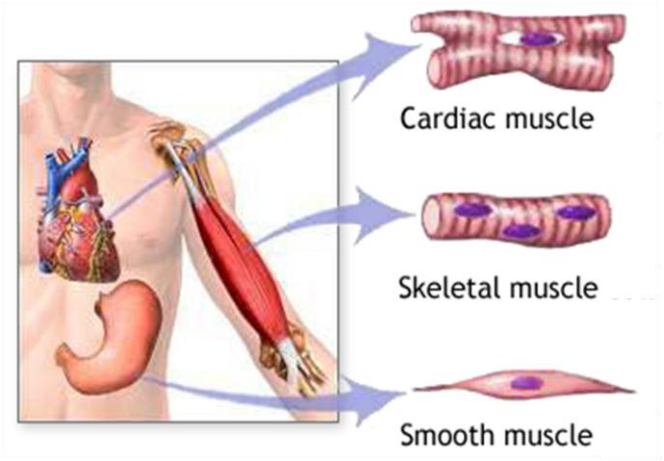
STRANDS	Page Number	Time (minutes)	Weighting
1. Variety of Life	2	25	15
2. Cell Biology	5	40	20
3. Genetics	9	25	15
4. Plants	13	25	15
5. Animals	17	40	20
6. Environment	22	25	15
TOTAL		**180**	**100**

Check that this booklet contains pages 2 - 26 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

STRAND 1: VARIETY OF LIFE WEIGHTING 15

1. Use the diagram below and your knowledge to answer the questions that follow.



(a) Identify the level of organisation of the organism shown above.

Skill Level 1	
1	
0	
NR	

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(b) List TWO functions of the smooth muscle.

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Skill Level 2	
2	
1	
0	
NR	

2. *Mose was looking at some pond water under a microscope and noticed a single-celled organism in the field of view. He observed that the organism had a nucleus as well as chloroplasts in its cytoplasm, and it was also enclosed by a cell wall. After looking at the dichotomous key, Mose determined this organism was green algae.*

   (a) Identify the kingdom to which this organism belongs to**.**

   _____

Skill Level 1	
1	
0	
NR	

   (b) State TWO reasons for your answer in (a) above.

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Skill Level 2	
2	
1	
0	
NR	

   (c) Name a phylum within the Animalia kingdom .

   _____

   _____

   _____

   _____

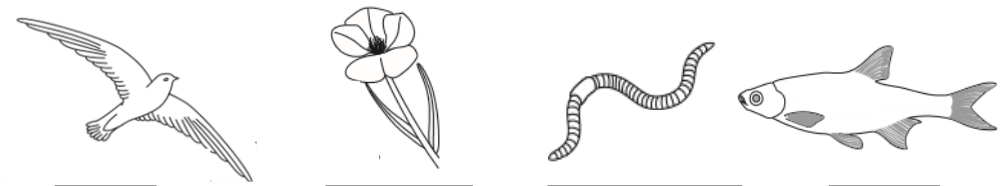
Skill Level 1	
1	
0	
NR	

3. Give ONE local example of Class Echinodermata within Phylum Mollusca.

   _____

Skill Level 1	
1	
0	
NR	

4. *You have learned in class that all living things can be classified according to their anatomical and physiological characteristics.* Use the diagrams and your knowledge of the four organisms shown below to **CREATE** a <u>dichotomous key</u> to identify these organisms.



bird | flower | earthworm | fish

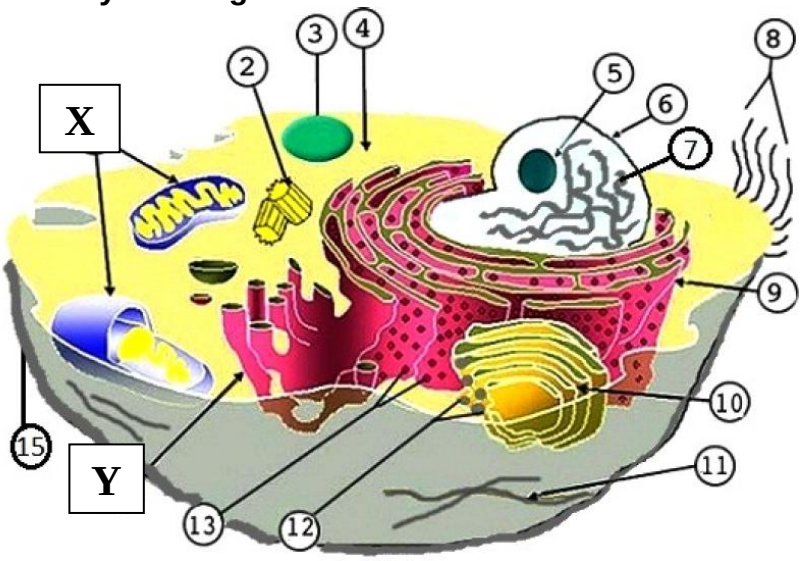
Skill Level 3	
3	
2	
1	
0	
NR	

5. Discuss the importance of the diversity of organisms for survival of plants and animals. Give specific examples.

Skill Level 4	
4	
3	
2	
1	
0	
NR	

STRAND 2: CELL BIOLOGY WEIGHTING 20

6. Study the diagram of the cell below.



Label the structures X and Y

X: _____

Y: _____

Skill Level 2	
2	
1	
0	
NR	

7. *Your teacher has asked you to prepare a wet mount of an onion cell for viewing under the light microscope*.
List or outline the steps that you would take to prepare the wet mount.

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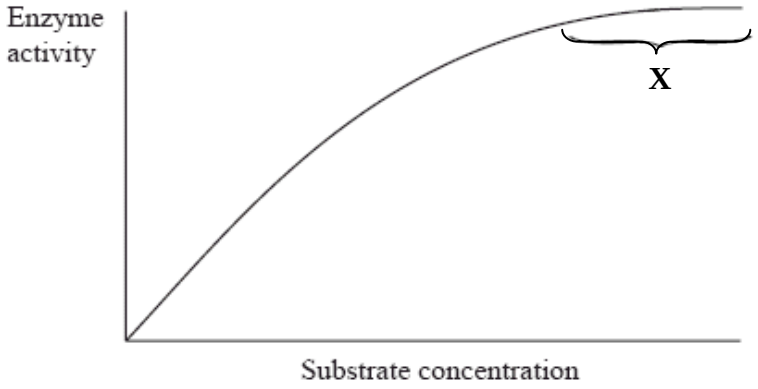
Skill Level 2	
2	
1	
0	
NR	

8. You have learned in class that enzymes play a vital role in biological and biochemical processes. The graph below shows the effect of substrate concentration on enzyme activity. Use the graph below and your knowledge to answer the *a – c.*



(a) Define *enzymes*.

_____

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Skill Level1	
1	
0	
NR	

(b) Describe how enzymes catalyze biological reactions.

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Skill Level 2	
2	
1	
0	
NR	

(c) Explain the effect of substrate concentration on section **X** of the graph.

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Skill Level 3	
3	
2	
1	
0	
NR	

9. Glucose is a high-energy molecule, and as it is broken down, energy is released. This process is called <u>cellular respiration</u>.

(a) Define *aerobic respiration*.

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Skill Level1	
1	
0	
NR	

(b) Explain how pyruvic acid is broken down during the Krebs cycle.

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Skill Level 3	
3	
2	
1	
0	
NR	

10. There are several mechanisms by which molecules of substances pass through membranes of a cell. Two common processes are diffusion and osmosis.

(a) Define the term *diffusion*.

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Skill Level 1	
1	
0	
NR	

(b) Define the term *osmosis*.

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Skill Level 1	
1	
0	
NR	

11. Compare the processes of active transport and passive transport in terms of energy requirements and where they are used in the body. You are to use relevant examples.

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Skill Level 4	
4	
3	
2	
1	
0	
NR	

STRAND 3: GENETICS WEIGHTING 15

12. DNA is found in the nucleus and plays a vital role in the genetic make-up of living organisms.

(a) State the function of DNA.

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Skill Level 1	
1	
0	
NR	

(b) State the function of chromosomes.

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Skill Level 1	
1	
0	
NR	

(c) Describe the role of DNA in protein synthesis.

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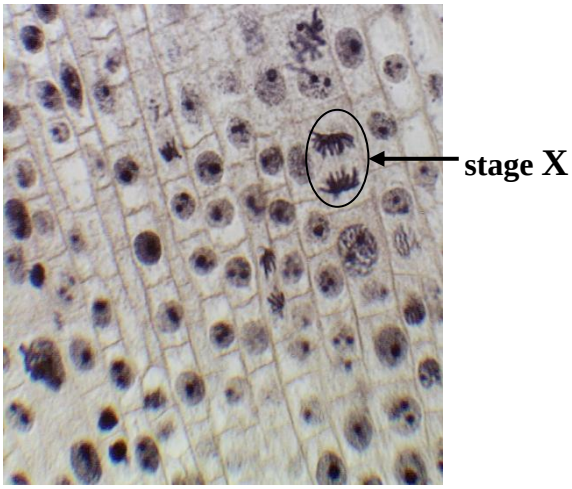
Skill Level 2	
2	
1	
0	
NR	

13. *Sina was investigating the process of cell division using a prepared wet mount from the onion root tip and viewed the specimen under the light microscope. She made the observation as shown in the diagram below*.

Use this diagram and your knowledge to answer (a) and (b).



(a) Is the cell division in the diagram mitosis or meiosis?

_____

Skill Level 1	
1	
0	
NR	

(b) Name the stage X of cell division that is occurring in the cell indicated with the arrowhead.

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Skill Level 1	
1	
0	
NR	

14. Define the term *phenotype*.

Skill Level1	
1	
0	
NR	

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15. Define the term *homozygous*.

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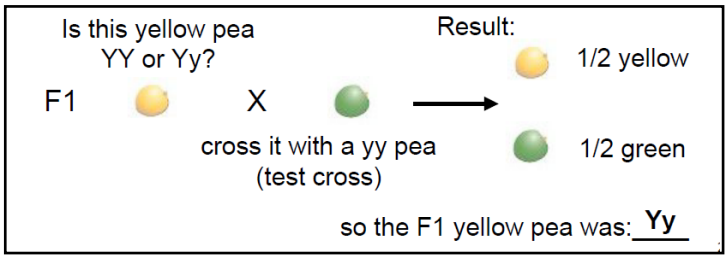
Skill Level1	
1	
0	
NR	

16. A common way to determine whether an individual with the dominant phenotype is homozygous or heterozygous is to perform a test cross like the one given below.



Explain how the offspring from the test cross may indicate the genotype of an individual parent.

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Skill Level 3	
3	
2	
1	
0	
NR	

17. Discuss **TWO** ethical issues associated with the genetic manipulation of organisms.

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Skill Level4	
4	
3	
2	
1	
0	
NR	

STRAND 4: **PLANTS** **WEIGHTING 15**

18. Draw and label the internal structure of a leaf. Make sure to include in your labels the *cuticle, epidermis, mesophyll (palisade and spongy), vascular bundle, stoma* and *air spaces*.

Skill Level 3	
3	
2	
1	
0	
NR	

19. Describe the function of the *palisade mesophyll* in photosynthesis.

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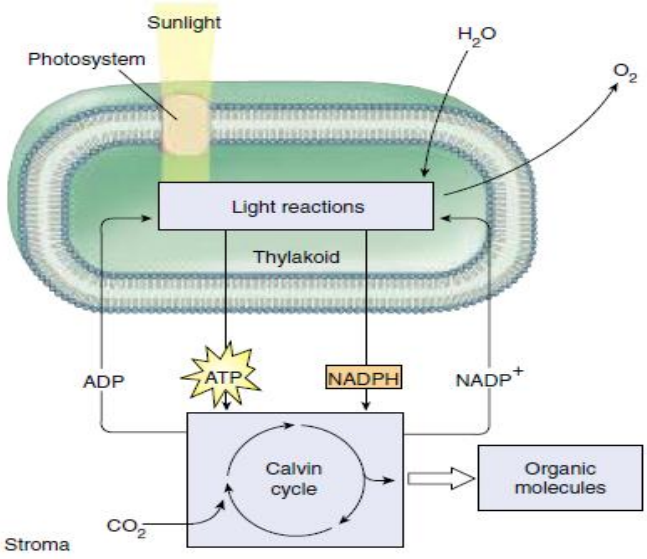
Skill Level 2	
2	
1	
0	
NR	

The diagram below shows the thylakoid membrane of the thylakoids in the chloroplasts, where the light reactions of photosynthesis occur. The Calvin cycle, which is another stage in photosynthesis, may occur in the absence of light.
Use this diagram and your knowledge to answer Number 20 & 21.



20. Define the light reactions of photosynthesis.

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Skill Level 1	
1	
0	
NR	

21. Explain the link between the light and dark phase reactions.

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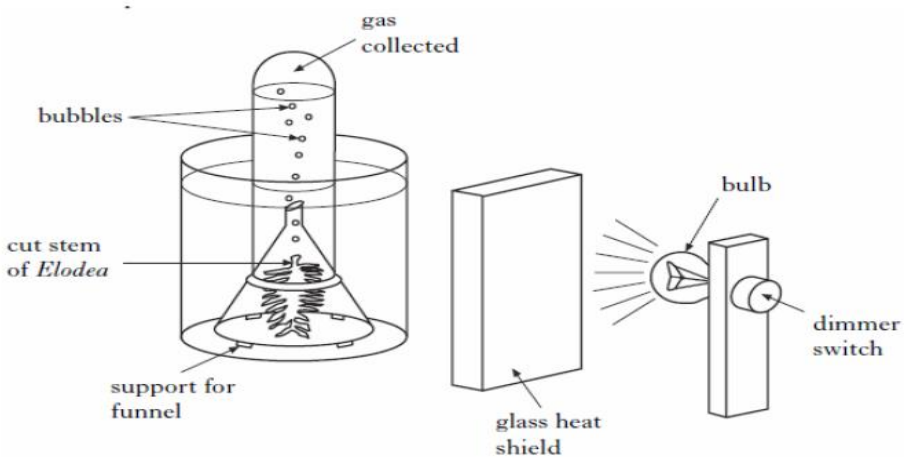
Skill Level 3	
3	
2	
1	
0	
NR	

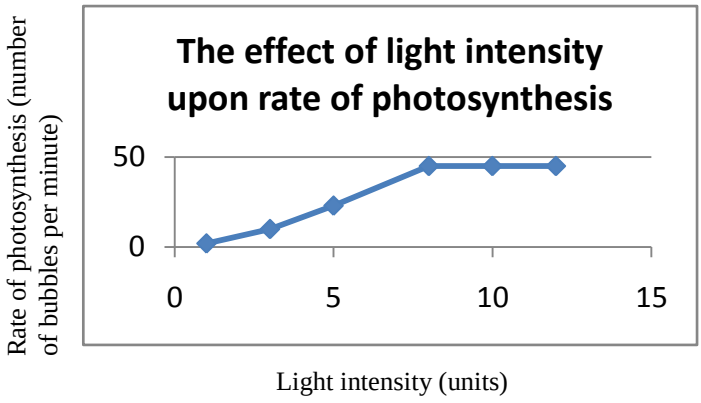
Study the experiment given to answer Number 22.

An experiment was set up to measure the effect of light intensity on the rate of photosynthesis in the water plant, *Elodea.* The light intensity was varied using a dimmer switch on the bulb. The rate of photosynthesis was measured by counting the number of bubbles released per minute.



The table and graph below show the results.

Light intensity (units)	Rate of photosynthesis (number of bubbles per minute)
1	2
3	10
5	23
8	45
10	45
12	45



22. Discuss the nature of the relationship between light intensity and the rate of photosynthesis through the experiment above.

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Skill Level 4	
4	
3	
2	
1	
0	
NR	

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23. Define *sexual reproduction* in plants.

Skill Level 1	
1	
0	
NR	

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24. State ONE local example of ‘angiosperm’.

Skill Level 1	
1	
0	
NR	

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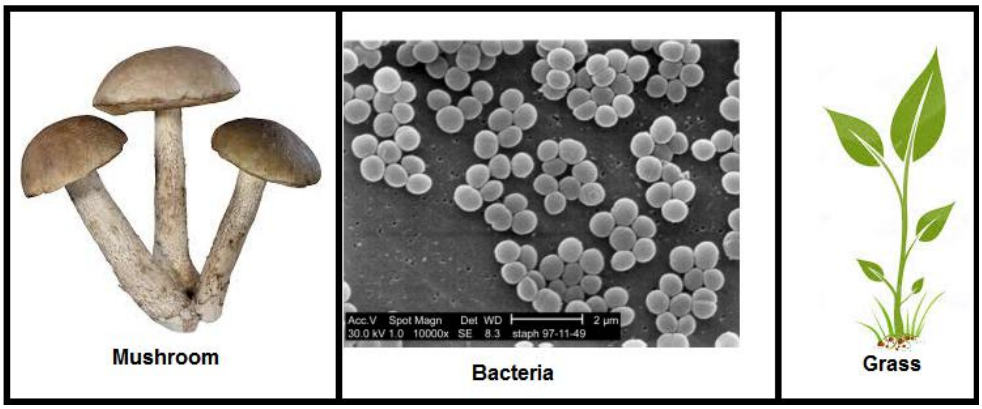
STRAND 5: ANIMALS WEIGHTING 20

Use the diagrams and your knowledge of the three types of organisms given below to answer Number 25 & 26.



25. Identify the organism that is multicellular, has a cell wall made of cellulose and is autotrophic.

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_____

Skill Level 1	
1	
0	
NR	

26. List TWO differences between autotrophic and heterotrophic nutrition.

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Skill Level 2	
2	
1	
0	
NR	

A man was on a diet that was deprived of fresh fruits and vegetables for a long period of time. He was later admitted to hospital due to the appearance of tiny red blood-blisters to purplish blotches (blotch means scratch or mark) on the skin, chronic weakness, extensive gum swelling and bleeding, and joint and muscle aches. The Doctor examined and diagnosed him with a condition called scurvy, which is caused by the lack of a certain group of vitamins in the diet.

Skill Level 1	
1	
0	
NR	

27. Identify the group of vitamins that is lacking in the man's diet.

_____

28. Explain the importance of the presence of glucose in food.

Skill Level 3	
3	
2	
1	
0	
NR	

_____

_____

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_____

29. Define *ingestion*.

Skill Level 1	
1	
0	
NR	

_____

_____

_____

30. Define *digestion*.

Skill Level 1	
1	
0	
NR	

_____

_____

_____

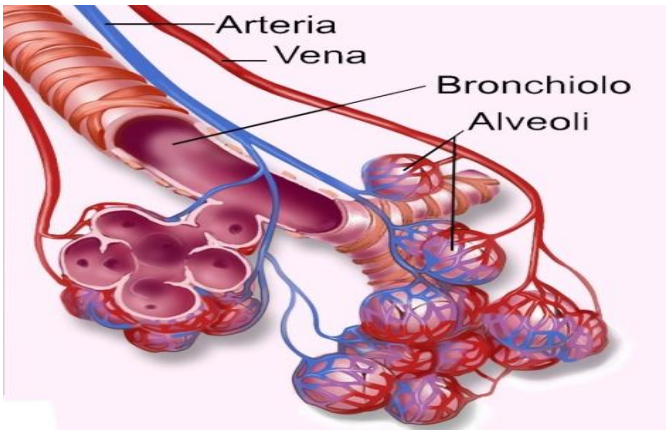
31. Describe the gut structure of herbivores.

Skill Level 2	
2	
1	
0	
NR	

32. Discuss the significance of the adaptive structures for gas exchange that maximises their functions in mammals and fish

Skill Level 4	
4	
3	
2	
1	
0	
NR	

The diagram below shows the clusters of alveoli in the lungs. Use this diagram and your knowledge to answer Number 33.



33. Explain how alveoli facilitate gas exchange.

Skill Level 3	
3	
2	
1	
0	
NR	

34. Define *homeostasis*.

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_____
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Skill Level 1	
1	
0	
NR	

35. Define *excretion*.

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_____
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Skill Level 1	
1	
0	
NR	

STRAND 6: ENVIRONMENT WEIGHTING 15

Define the following terms.

36. Environment

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_____

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Skill Level 1	
1	
0	
NR	

37. Ecological niche

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Skill Level 1	
1	
0	
NR	

38. Intra-specific competition

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_____

_____

Skill Level 1	
1	
0	
NR	

39. Predation

_____

_____

_____

Skill Level 1	
1	
0	
NR	

40. Biotic factor

_____

_____

_____

Skill Level 1	
1	
0	
NR	

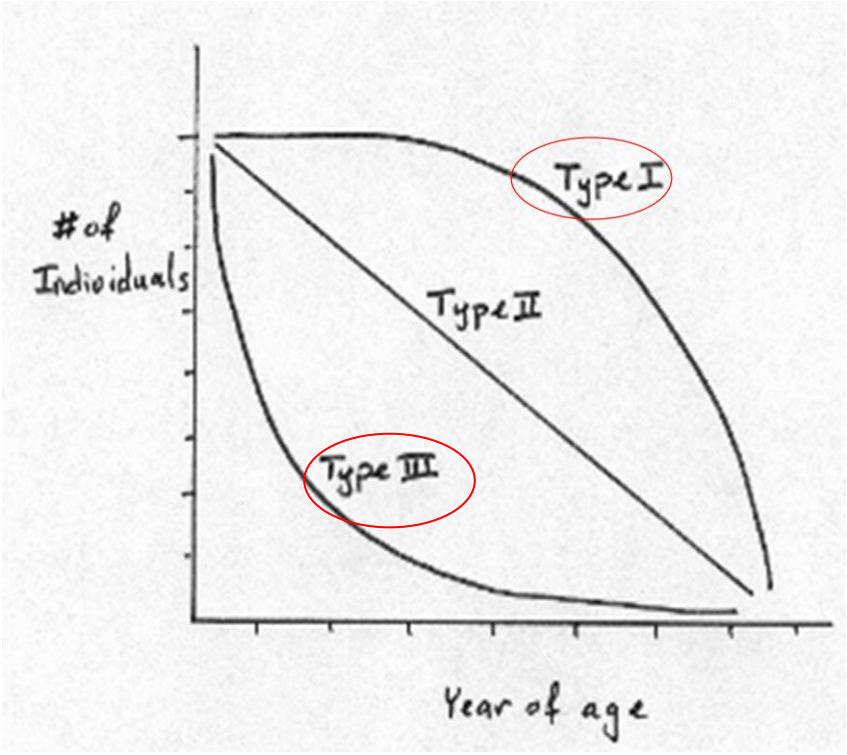
41. Explain how Liebig's Law helps species survive. Use local examples.

Skill Level 3	
3	
2	
1	
0	
NR	

42. Describe how to determine the density of a population using the *quadrats method*.

Skill Level 2	
2	
1	
0	
NR	

43. Use the survivorship curves below and your knowledge to answer (a) and (b).



(a) Describe the characteristics of the growth of Type I population shown above.

Skill Level 2	
2	
1	
0	
NR	

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(b) Explain how mortality can affect the survivorship curve of Type III population.

Skill Level 3	
3	
2	
1	
0	
NR	

Student Education Number									

BIOLOGY

2015

(For Markers only)

STRANDS	Weighting	Marks	Check Marker	Final Weighting
1. Variety of Life	15			
2. Cell Biology	20			
3. Genetics	15			
4. Plants	15			
5. Animals	20			
6. Environment	15			
TOTAL	**100**			