

Name: _____

Teacher: _____

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YOU ARE TOLD BY THE SUPERVISOR TO BEGIN**



Biology 2201

FINAL EXAMINATION

June 2010

Value: 100%

General Instructions

This examination consists of two parts. Both parts are contained in this booklet and further general instructions are provided on appropriate pages.

Part I – Multiple Choice (75%)

Select the letter of the correct response from those provided. EITHER shade the letter on your computer scorable card OR place the letter in the blank provided on your Multiple Choice Answer Sheet, whichever format is being used by your school for this exam. **Do ALL questions in this section.**

Part II – Constructed Response (25%)

Answer ALL questions fully and concisely in the space provided.

Student Checklist

The items below are your responsibility. Please ensure that they are completed.

- Write your name and teacher's name on the top of this page.
- Write your name, teacher's name, course name and number on the Part I answer sheet.
- Check the exam to see that there are no missing pages.

ALL MATERIALS MUST BE PASSED IN WITH THIS EXAM. Use your time wisely. Good luck!

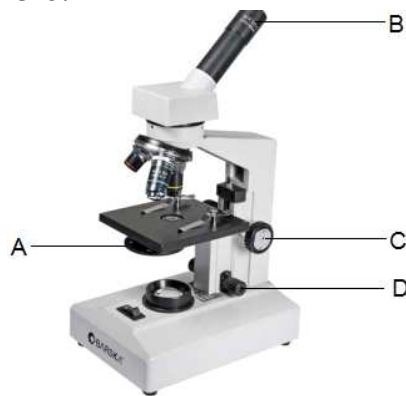
Part I
Total Value 75%

Instructions: Place the letter of the correct answer on the answer sheet provided.

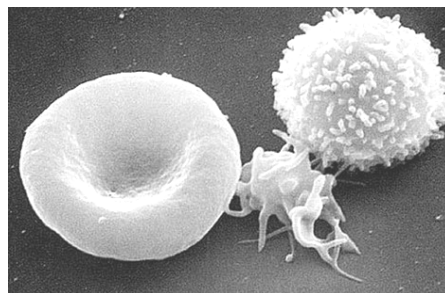
1. Which scientist stated that all cells come from other cells?
(A) Hooke
(B) Leeuwenhoek
(C) Schwann
(D) Virchow
2. Which scientist's experiments supported the theory of abiogenesis?
(A) Francesco Redi
(B) John Needham
(C) Lazzaro Spallanzani
(D) Louis Pasteur

3. Which structure is the ocular lens?

- (A) A
- (B) B
- (C) C
- (D) D



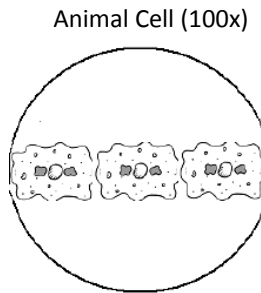
4. Which microscope will produce the image below?



- (A) compound light
 - (B) scanning electron
 - (C) simple light
 - (D) transmission electron
5. The low power (4x) field of view of a microscope is 540 μm . What is the field of view under the high power (40x) objective lens?
(A) 54 μm
(B) 135 μm
(C) 2160 μm
(D) 5400 μm

6. The field of view shown below is 1600 μm . What is the size of a single cell?

- (A) 160 μm
 (B) 533 μm
 (C) 1600 μm
 (D) 4800 μm

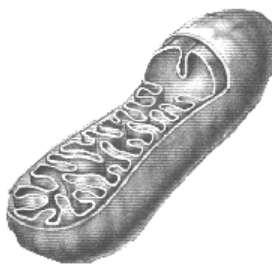


7. Which cellular structure produces proteins?

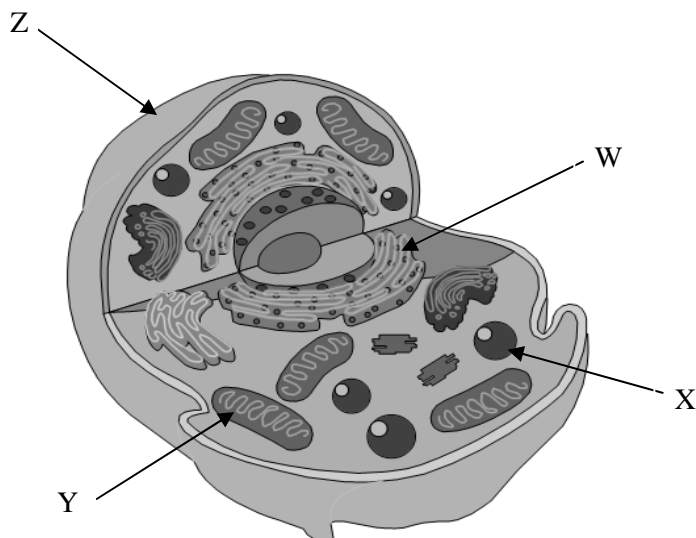
- (A) cytoplasm
 (B) lysosome
 (C) mitochondria
 (D) ribosome

8. Which organelle is represented in the diagram?

- (A) cell membrane
 (B) chloroplast
 (C) lysosome
 (D) mitochondria



9. Which structure is responsible for recycling worn out organelles and large waste molecules?



- (A) W
 (B) X
 (C) Y
 (D) Z

10. Which statement about the diffusion of oxygen is correct?

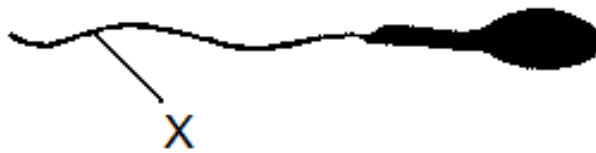
- (A) Particles move into the cell by phagocytosis.
 (B) Particles move with the concentration gradient.
 (C) Requires carrier or channel proteins.
 (D) Requires energy to move through the cell membrane.

11. Which substance would be transported by carrier proteins?
- (A) carbon dioxide
 (B) chloride ions
 (C) glucose
 (D) water
12. Which transport process requires energy to carry solid particles like bacteria into a cell?
- (A) exocytosis
 (B) facilitated diffusion
 (C) phagocytosis
 (D) pinocytosis
13. What type of environment would cause the amount of water entering a cell to equal the amount of water leaving a cell?
- (A) hypertonic
 (B) hypotonic
 (C) isotonic
 (D) pure water
14. Which equation represents the process that occurs in mitochondria?
- (A) $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + \text{ATP}$
 (B) $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
 (C) $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$
 (D) $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{CO}_2 + \text{ATP} \rightarrow 6\text{H}_2\text{O} + 6\text{O}_2$

15. Which cell would most efficiently diffuse materials if the cell's volume is 1000 mm^3 ?

	Surface Area (mm^2)
(A)	0.15
(B)	0.62
(C)	1.3
(D)	2.4

16. What is the structure labelled X?



- (A) cilium
 (B) flagellum
 (C) microfilament
 (D) microtubule
17. Which structure identifies a cell as prokaryotic or eukaryotic?
- (A) cell wall
 (B) DNA
 (C) nucleus
 (D) ribosomes

18. A multicellular organism is placed in a hypotonic environment. If the organism is capable of photosynthesizing, what would happen to its cells?
- (A) Cell vacuoles will dry out.
 - (B) Cells will shrink.
 - (C) Cells will swell and burst.
 - (D) Cells will swell but not burst.

19. A malfunction in a cell causes glucose to leave the cell. What would be true for this cell?

	Cellular Respiration	ATP Production
(A)	Decrease	Decrease
(B)	Decrease	Increase
(C)	Increase	Decrease
(D)	Increase	Increase

20. What is the correct sequence in the classification system?

- (A) kingdom, class, order, family, genus, family, species
- (B) kingdom, class, phylum, order, family, genus, species
- (C) kingdom, phylum, class, order, genus, family, species
- (D) kingdom, phylum, class, order, family, genus, species

21. What type of evidence classifies organisms based on the different proteins in insulin?

- (A) anatomy
- (B) biochemistry
- (C) embryology
- (D) radioactive dating

22. Why do systems of classification change?

- (A) Important features in groups suddenly appear.
- (B) New organisms are discovered.
- (C) Scientists are trying to simplify classification.
- (D) Species become extinct.

23. Why is a virus difficult to control and destroy?

- (A) Antibiotics are effective against it.
- (B) It is considered living.
- (C) It mutates rapidly.
- (D) Vaccines are easy to produce for it.

24. Which life process does a virus exhibit?

- (A) cell division
- (B) photosynthesis
- (C) replication
- (D) respiration

25. Which refers to organisms that are capable of producing food by photosynthesis?

- (A) autotroph
- (B) eukaryotic
- (C) heterotroph
- (D) prokaryotic

26. Why are *E. coli* bacteria classified into kingdom Eubacteria?
- (A) harmful to humans
 - (B) lack of cell walls
 - (C) multicellular
 - (D) nucleus is absent
27. Which organism reproduces using binary fission?
- (A) bacteria
 - (B) fern
 - (C) frog
 - (D) rhizopus
28. A prokaryotic, single cell organism is discovered in a volcanic vent. What classification would provide the best fit for the new species?
- (A) Archaea
 - (B) Bacteria
 - (C) Fungi
 - (D) Protista
29. Which group would have the most difficulty reproducing if global warming has caused an abnormally dry year?
- (A) apple trees
 - (B) black spruce
 - (C) rose bush
 - (D) sphagnum moss
30. A biotechnology company created a drug that slows the spread of malaria. What is one way this new drug could work?
- (A) blocking the assembly of viral particles inside the host cell
 - (B) preventing the DNA of the plasmodium from taking over the host DNA
 - (C) preventing the reproduction of the bacterial cells
 - (D) stopping the sporozoite spores from invading the red blood cells
31. Which method would best identify a cod fish that has been filleted and salted?
- (A) dichotomous key
 - (B) DNA analysis
 - (C) microscope
 - (D) visual examination
32. Which kingdom contains algae and slime molds?
- (A) Archaea
 - (B) Bacteria
 - (C) Fungi
 - (D) Protista
33. Which group contains the cone bearing trees?
- (A) Angiosperms
 - (B) Bryophytes
 - (C) Fungi
 - (D) Gymnosperms

34. Which organism best represents a fern based on the dichotomous key below?

1. i. Nonvascular..... Go to 2
ii. Vascular Go to 3
2. i. Require water for reproduction A
ii. Do not require water for reproduction B
3. i. Spore producer C
ii. Seed producer D

- (A) A
(B) B
(C) C
(D) D

35. Which group of invertebrates contain an exoskeleton and jointed appendages?

- (A) Annelida
(B) Arthropoda
(C) Echinodermata
(D) Mollusca

36. Which type of symmetry do jellyfish exhibit?

- (A) asymmetrical
(B) bilateral
(C) radial
(D) transverse

37. Which two animals are most closely related?

1	2	3	4
Animalia	Animalia	Animalia	Animalia
Chordata	Chordata	Chordata	Arthropoda
Mammalia	Mammalia	Mammalia	Insecta
Carnivora	Carnivora	Chiroptera	Mantodea
Felidae	Mustelidae	Vesperfilinonidae	Mantidae
Felix	Mephitis	Myotis	Stagmonantic
<i>F. domesticus</i>	<i>M. mephitis</i>	<i>M. lucifugus</i>	<i>S. carolina</i>

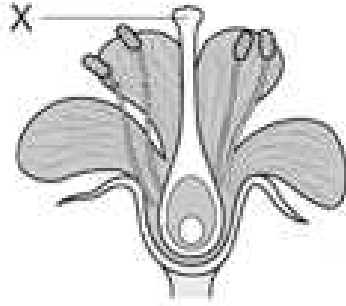
- (A) 1 and 2
(B) 1 and 3
(C) 2 and 3
(D) 2 and 4

38. Which identifies the characteristics of the organism below?



	Heterotrophic	Cell Wall Present	Nucleus Present
(A)	Yes	Yes	Yes
(B)	No	Yes	Yes
(C)	No	Yes	No
(D)	Yes	No	Yes

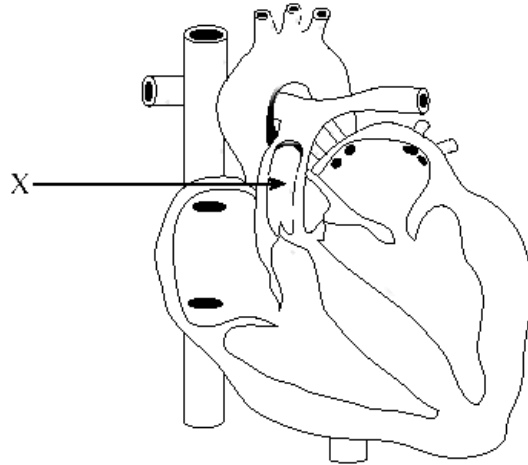
39. What the function of structure X?



- (A) attract insects
 - (B) catch and hold pollen
 - (C) protect the egg
 - (D) transport sperm
40. Which characteristic is present in the group Aves?
- (A) air sacs in lungs
 - (B) internal development
 - (C) external fertilization
 - (D) three- chambered heart
41. Which animal has lungs with the highest surface area?
- (A) cheetah
 - (B) frog
 - (C) lizard
 - (D) shark
42. In which kingdom would you find plus and minus strands of hyphae uniting to form a zygospore?
- (A) Animalia
 - (B) Bacteria
 - (C) Fungi
 - (D) Protista
43. Which refers to how systems of the body are maintained in dynamic equilibrium?
- (A) circulation
 - (B) excretion
 - (C) homeostasis
 - (D) respiration
44. Which physiological response would you observe in a healthy individual as they are exercising?

	Systolic Pressure	Diastolic Pressure	Respiratory Rate	Heart Rate
(A)	Decrease	Decrease	Increase	Decrease
(B)	Decrease	Increase	Decrease	Increase
(C)	Increase	Decrease	Decrease	Decrease
(D)	Increase	Increase	Increase	Increase

45. What does structure X transport?



- (A) blood rich in carbon dioxide away from the heart
 - (B) blood rich in carbon dioxide toward the heart
 - (C) blood rich in oxygen away from the heart
 - (D) blood rich in oxygen toward the heart
46. Which part of human blood transports oxygen?
- (A) erythrocyte
 - (B) leukocyte
 - (C) plasma
 - (D) platelet
47. Which refers to the build-up of plaque on the innermost lining of the arteries?
- (A) arteriosclerosis
 - (B) atherosclerosis
 - (C) hypertension
 - (D) hypotension
48. Which structure of the human respiratory system is responsible for increasing absorptive surface area?
- (A) alveoli
 - (B) bronchi
 - (C) nasal cavity
 - (D) trachea
49. What is the correct pathway of an oxygen molecule as it enters the nasal passageway during inhalation?
- (A) Alveoli → Trachea → Bronchiole
 - (B) Bronchi → Alveoli → Diaphragm
 - (C) Bronchiole → Bronchi → Alveoli
 - (D) Trachea → Bronchiole → Alveoli
50. Which change in the human respiratory system is due to asthma?
- (A) buildup of fluid in the lungs
 - (B) constriction of the bronchial tubes
 - (C) deterioration of alveoli
 - (D) increase in lung capacity

51. The chart shows the concentration of gases in humans. Why is there a difference in gas concentration of inhaled and exhaled air during cellular respiration?

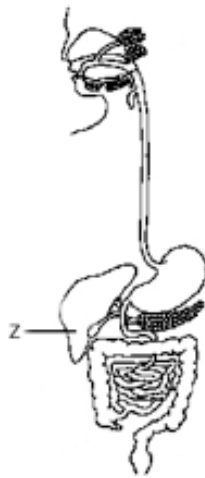
	% O ₂	% CO ₂	% N ₂
Inhaled Air	20.9	0.04	79.0
Exhaled Air	14.0	5.60	79.0

- (A) CO₂ is used and O₂ is produced
 (B) CO₂ is used and N₂ is produced
 (C) O₂ is used and CO₂ is produced
 (D) O₂ is used and N₂ is produced
52. In humans what does the diaphragm do during exhalation?

- (A) contracts and moves downward
 (B) contracts and moves upward
 (C) relaxes and moves downward
 (D) relaxes and moves upward

53. What is structure Z?

- (A) duodenum
 (B) liver
 (C) pancreas
 (D) stomach



54. Inflammation of the inner lining of this structure would result in which disorder?

- (A) colitis
 (B) gall stones
 (C) ileitis
 (D) ulcers



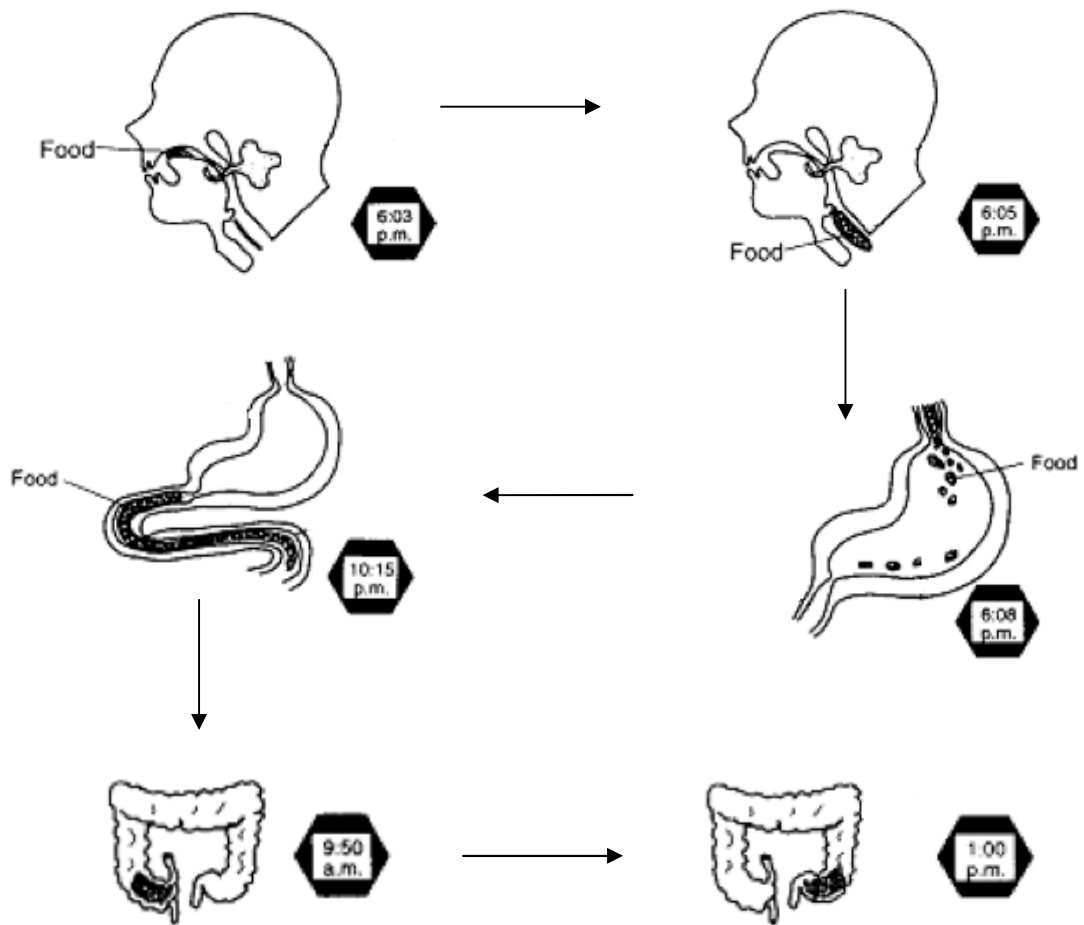
55. Your body has run through its energy reserves. What situation would be likely to occur?

- (A) drop in lipase levels
 (B) drop in pepsin levels
 (C) rise in lipase levels
 (D) rise in pepsin levels

56. What are finger-like projections in the small intestine that increase surface area for greater nutrient absorption?

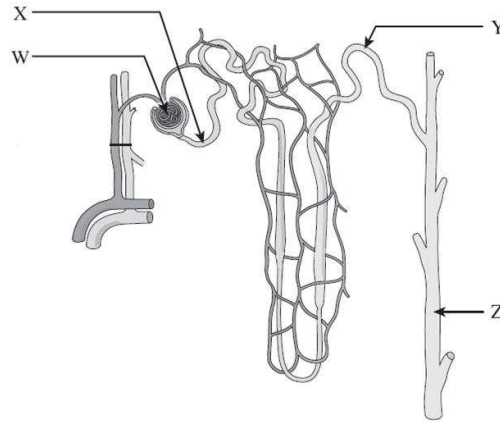
- (A) cilia
 (B) cristae
 (C) ileum
 (D) villi

57. The diagrams illustrate the pathway and time frame for the digestion of a hamburger. During which time period does most of the digestive action of bile and pancreatic juice occur?



- (A) 6:03 pm → 6:05 pm
 (B) 6:05 pm → 6:08 pm
 (C) 10:15 pm → 9:50 am
 (D) 9:50 am → 1:00 pm
58. What is missing from a person's diet if they have very little energy and low levels of fatty acids in their blood?
- (A) carbohydrates and lipids
 (B) carbohydrates and proteins
 (C) proteins and lipids
 (D) proteins and minerals
59. Which structure is the primary filter for removing water, salts and urea from blood?
- (A) kidney
 (B) lung
 (C) pancreas
 (D) skin
60. Which treatment would be prescribed to a patient with kidney failure?
- (A) angioplasty
 (B) chemotherapy
 (C) electrocardiograph
 (D) hemodialysis

61. In which structure would tubular secretion occur?



- (A) W
- (B) X
- (C) Y
- (D) Z

62. Which substances enter the nephron tubule and are then reabsorbed back into the blood as they pass through the tubule?

Substance	Number of Molecules		
	Blood Entering Glomerulus	Beginning of Tubule	End of Tubule
Protein	100	0	0
Glucose	100	20	0
Sodium	100	30	1
Urea	100	50	90

- (A) glucose and sodium
- (B) protein and glucose
- (C) sodium and urea
- (D) urea and protein

63. Which is a characteristic of the inflammatory response?

- (A) Blood vessels constrict making the area cool to the touch.
- (B) Blood vessels constrict making the area warm to the touch.
- (C) Blood vessels dilate making the area cool to the touch.
- (D) Blood vessels dilate making the area warm to the touch.

64. Which results when a person's antibodies attack their own tissues?

- (A) Acquired Immunodeficiency Syndrome
- (B) Atherosclerosis
- (C) Hodgkin's Lymphoma
- (D) Rheumatoid Arthritis

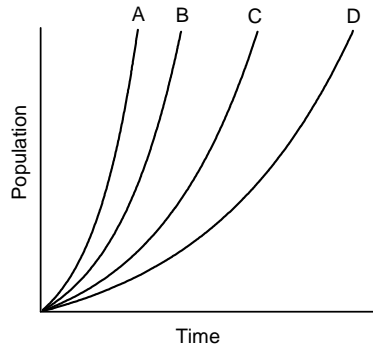
65. Which disorder is characterized by rapid, uncontrolled cell division?

- (A) anemia
- (B) cancer
- (C) hypertension
- (D) ileitis

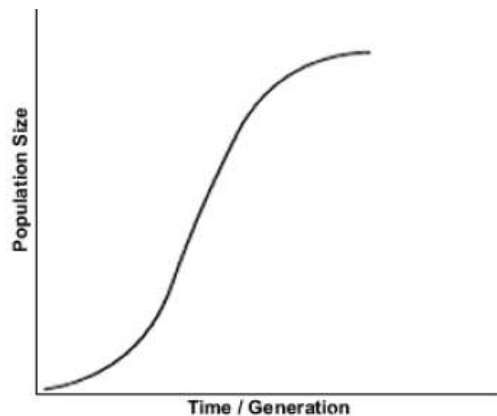
66. Which is the correct sequence of events when a mammalian immune system encounters a pathogen?
1. Antigen from pathogen binds to protein markers on the lymphocytes.
 2. Lymphocytes secrete antibodies.
 3. Lymphocytes specific to antigen from pathogen become numerous.
 4. Pathogen is destroyed by antibodies.
- (A) 4, 1, 2, 3
(B) 2, 4, 3, 1
(C) 1, 3, 2, 4
(D) 3, 1, 2, 4
67. Jack and Diane are exposed to *Streptococcus*, the bacteria that causes strep throat. Diane has mild symptoms and recovers in a day. Jack suffers for a week and has to take medication. Which explains the difference in their responses?
- (A) A person cannot contract the same disease twice.
(B) Histamines prevent second infections.
(C) Memory cells from previous exposure make second responses faster.
(D) Dead bacteria remain in the system to prevent a second infection.
68. During the last 20 years the provincial and federal governments have actively encouraged breast-feeding by new mothers. What effect would this have on healthcare costs and children's health during the first 5 years of the child's life?
- (A) There will be a decrease in healthcare costs and the level of children's health will decrease.
(B) There will be a decrease in healthcare costs and the level of children's health will increase.
(C) There will be an increase in healthcare costs and the level of children's health will decrease.
(D) There will be no impact on healthcare costs and the level of children's health will remain the same.
69. Which is a density-independent factor?
- (A) availability of space
(B) competition for food
(C) destruction by fire
(D) spread of disease
70. Which population would experience exponential population growth?
- (A) a virus entering a new host
(B) bacteria in an overcrowded petri dish
(C) humans in the third stage of demographic transition
(D) trees in the tropical rainforest
71. Which equation would be used to calculate the population growth of a country?
- (A) Population growth = (births + deaths) – (immigration + emigration)
(B) Population growth = (births + emigration) – (deaths + immigration)
(C) Population growth = (births + immigration) – (deaths + emigration)
(D) Population growth = (immigration + emigration) – (births + deaths)

72. Which species has the highest biotic potential?

- (A) A
- (B) B
- (C) C
- (D) D



73. The graph shown represents logistic growth of a human population. Which factor could be responsible for the equilibrium phase?



- (A) advances in technology
 - (B) improved medical care
 - (C) increased access to birth control
 - (D) increased food supply
74. Which statement describes the lag phase of a logistic growth curve?
- (A) Population growth decreases because the carrying capacity has been exceeded.
 - (B) Resources are not yet limited so there is rapid population growth.
 - (C) The population is just starting to build so few individuals producing offspring.
 - (D) There is no growth because the population has reached its carrying capacity.
75. What is the maximum number of individuals an area can support indefinitely due to a limited supply of resources?
- (A) biotic potential
 - (B) carrying capacity
 - (C) logistic growth
 - (D) natality

End of Part I

Part II -Total Value 25%

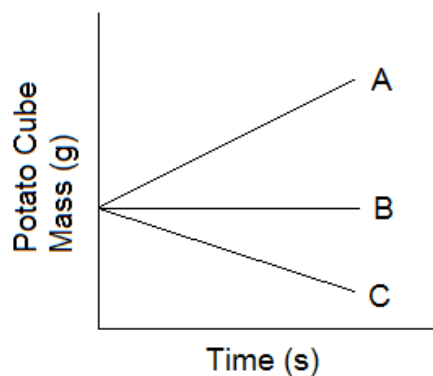
Instructions: Complete all items in this section. Your responses should be clearly presented in a well-organized manner.

76a) Describe Louis Pasteur's experiment and how it ended the debate of biogenesis versus abiogenesis. You may use a diagram to support your answer. (2 marks)

b) An experiment is conducted by placing potato cubes with the same surface area and mass into equal amounts of one of three salt solutions. The potato cubes are only permeable to water. The salt solutions have the concentrations listed in the table below.

Solution	Salt Concentration
A	0.2 %
B	0.9 %
C	1.8 %

The graph shows what happens to the mass of the potato cube in each solution as time passes.



i. What type of transport would cause the mass of the potato cube in solution A to increase? Explain. (2 marks)

ii. What is the initial salt concentration of the potato cubes? Explain. (2 marks)

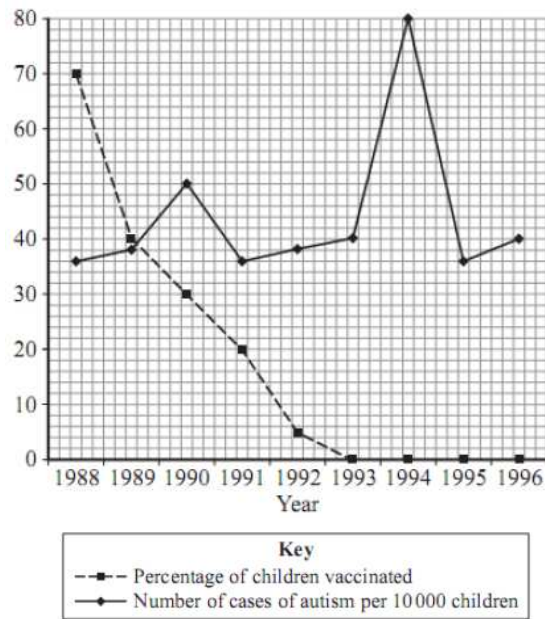
77a) Describe two reasons why flowering plants are the most diverse and widespread in the kingdom Plantae. (2 marks)

b) There are many reasons why arthropods are the most successful phylum of animals. Choose any **three** reasons and **explain** why each is an advantage. (3 marks)

c) Using **TWO** examples from either Fungi, Bacteria, or Invertebrates, describe how knowledge of certain organisms can be useful in the study of medicine. (2 marks)

78a) "Gas exchange occurs both in the lungs and the tissues." Discuss the importance of the structure and distribution of the blood capillaries with reference to this statement. (2 marks)

- b) The measles, mumps and rubella (MMR) vaccination began in Japan in 1988. Due to a concern about a possible link between MMR and autism, the MMR vaccination ended in 1993. The graph shows the percentage of children who were vaccinated with MMR and the number of children who developed autism.



- i) Is there a link between the vaccination for MMR and development of autism in children? Explain using the graph above. (2 marks)

- ii) Would you recommend that the Japanese reinstate mandatory vaccination for its citizens? Why or why not? (1 mark)

- c) A school teacher sends home a letter advising that a young girl in your little brother's class had a kidney transplant when she was very young. The letter asks parents to keep their children home if they become sick, even if the illness is mild. Explain why this would be necessary. (2 marks)

- d) A new drug blocks the secretion of stomach acid from stomach cells and can be used to treat a specific type of digestive tract disorder. What digestive tract disorder would this new drug be used to treat and why would it be helpful? (2 marks)

- 79a) A new species of wild cat has been introduced into an area causing the population of the native cats to decrease. Give two reasons why the population of native cats decreases. (2 marks)

- b) Some countries in stage 2 of demographic transition have implemented controls on human population growth such as rewards for females who undergo sterilization procedures. Do you agree or disagree with such measures to control population growth? Explain why or why not. (1 mark)

End of Part II