



Candidate Name	
School Name	

BIOLOGY

Saturday 27 February 2016

1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- You are not permitted access to any calculator for this paper.
- Section A: choose the answer you consider to be the best and cross your choice on the answer sheet provided.
- Section B: answer all questions in the boxes provided. Unless otherwise stated in the question, all numerical numbers should be given exactly or correct to three significant figures.
- The maximum mark for this examination paper is [70 marks].

SECTION A

Answer all questions in the answer sheet provided. (Total: 40 marks)

1. The overall shape of a bacterial cell is determined by which of the following?
 - a. cell wall
 - b. nucleoid
 - c. cell surface membrane
 - d. None of the above

2. Which of the following statements is correct?
 - a. animal and fungal cells contain chloroplasts
 - b. animal and plant cells do not contain mitochondria
 - c. plant, animal and fungal cells possess mitochondria
 - d. all plant cells contain chloroplasts

3. Which of the following are not found in plant cells?
 - a. mitochondria
 - b. glyoxysomes
 - c. centrosomes
 - d. golgi apparatus

4. The term “nuclear envelope” is more correct than the term “nuclear membrane” because
 - a. the enclosure has pores which membranes do not
 - b. the enclosure is made up of two membranes
 - c. the chemical composition is inconsistent with cellular membranes
 - d. No answer. The two terms are interchangeable

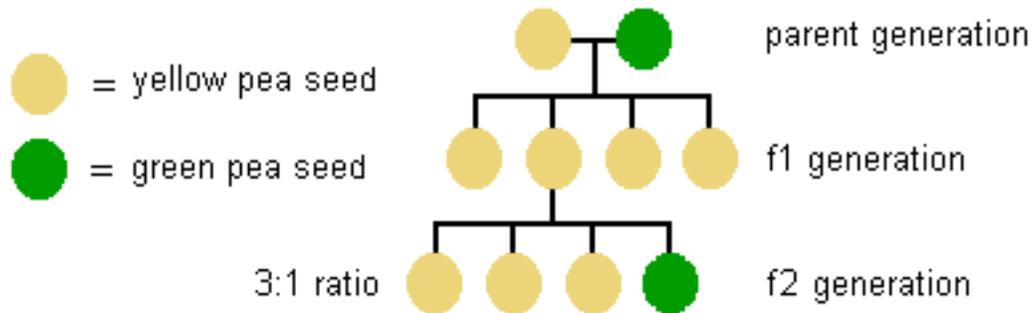
5. With which of the following are basal bodies **NOT** associated?
- animal cells
 - plant cells
 - microtubules
 - centrioles
6. The cytoplasm of a bacterium
- is supported by cytoskeleton
 - is supported by microtubules
 - is supported by keratin
 - is none of the above
7. ATP (adenosine triphosphate) can be termed the universal energy currency in life because it:
- enables cells to disobey the first law of thermodynamics
 - enables cells to disobey the second law of thermodynamics
 - releases energy as heat when it undergoes hydrolysis
 - is none of the above
8. Water constitutes about 70% of a typical cell. Water is able to form hydrogen bonds, which are:
- covalent bonds between hydrogen atoms
 - covalent bonds between hydrogen and oxygen atoms
 - strong electrostatic bonds between positive hydrogen ions and negative oxygen ions
 - weak electrostatic bonds between partially charged hydrogen and oxygen atoms

9. The synthesis of proteins involves polymerisation of:
- amino acids
 - glucose
 - monosaccharides
 - nucleotides
10. A codon is:
- a group of 4 different bases in the mRNA
 - a group of 3 nucleotides that codes for amino acid
 - one of the amino acids in proteins
 - the things that make proteins
11. What is the role of mRNA during protein synthesis?
- translation
 - transportation
 - translocation
 - transfer
12. What does the enzyme tRNA-amino acid synthetase do?
- releases amino acids from their cognate tRNAs
 - links amino acids to the anticodon of their cognate tRNAs
 - links amino acids to the codon of their cognate tRNAs
 - links amino acid to the acceptor stem of their cognate tRNAs
13. An allele is:
- word interchangeable for gene
 - homozygous genotype
 - heterozygous genotype
 - one of the several possible forms of a gene

14. Phenotype refers to what of an individual:

- a. genetic makeup
- b. actual physical appearance
- c. projected physical appearance
- d. recessive alleles

15. Assuming from the diagram below that both parent plants are homozygous, what would be the reason why all of the f1 generation have yellow phenotypes?



- a. because the f1 genotypes are homozygous
- b. because the f1 genotypes are heterozygous
- c. yellow is dominant allele
- d. both parents possessed and passed on yellow alleles.

16. What does meiosis create?

- a. 2 identical daughter diploid cells
- b. 2 identical daughter haploid cells
- c. 4 granddaughter diploid cells
- d. 4 granddaughter haploid cells

17. Crossing-over takes place during
- meiosis
 - mitosis
 - segregation
 - linkage
18. The scientist credited with the title of “father of genetics” is
- Gregor Mendel
 - Sir Thomas Hunt
 - Albert Einstein
 - Sir Isaac Newton
19. Which muscles contract to cause air to pass into the lungs through the trachea?
- internal intercostal muscles and diaphragm
 - internal intercostal muscles and abdomen wall muscle
 - external intercostal muscles and diaphragm
 - external intercostal muscles and abdomen wall muscle
20. Which of the following is NOT true concerning capillaries?
- they are the site of exchange between blood and body cells
 - they have walls that are only one cell thick
 - their diameter is so small that red blood cells must move through them in single file
 - they have valves to prevent blood from flowing backwards into them

21. What is the role of the pacemaker or sinoatrial node (SAN)?
- to initiate contraction of the ventricle
 - to pass the excitation through Purkinje fibres
 - to originate excitation in myogenic muscle
 - to cause the relaxation of the atria
22. A blood clot contains a network of protein. What is the protein?
- fibrin
 - fibrinogen
 - haemoglobin
 - thrombin
23. Which hormone is produced by adipose (fat) tissue in the body?
- thyroxine
 - leptin
 - melatonin
 - insulin
24. Produced by the pancreas, what breaks down polypeptides into smaller polypeptides
- lipase
 - pepsin
 - amylase
 - trypsin

25. What generates new cells in dicotyledonous plants?

- I. apical meristems
- II. lateral meristems
- III. phloem

- a. I only
- b. II only
- c. I and II
- d. I, II, and III

26. Plants develop brightly coloured flowers to attract animals. Which process is directly assisted by this adaptation?

- a. seed dispersal
- b. pollination
- c. fertilization
- d. germination

27. What are the differences between monocotyledonous and dicotyledonous plants?

	Monocotyledonous	Dicotyledonous
a.	parallel venation; floral organs in multiples of 4 or 5	net-like venation; floral organs in multiples of 3
b.	net-like venation; floral organs in multiples of 3	parallel venation; floral organs in multiples of 4 or 5
c.	net-like venation; floral organs in multiples of 4 or 5	parallel venation; floral organs in multiples of 3
d.	parallel venation; floral organs in multiples of 3	net-like venation; floral organs in multiples of 3

28. Which of the following seed structure functions as a nutrient storage?

- a. embryo shoot
- b. testa
- c. cotyledons
- d. micropyle

29. Which of the following vascular tissue is responsible for the transport of sugars from source tissues?

- a. xylem
- b. phloem
- c. cork cambium
- d. vascular cambium

30. What would be the term to describe all the frogs in a freshwater lake?
- ecosystem
 - population
 - habitat
 - community
31. What is the difference between a food chain and a food web?
- a food chain shows some relationship between animals in a community
 - a food chain shows the amount of energy transfer between consumers
 - a food web shows the feeding relationships between animals present in the same community
 - a food chain takes place in a community while a food web takes place in a population
32. Which of these relationships results in harm to one of the species involved?
- Commensalism
 - Predation
 - Herbivory
- I only
 - III only
 - I and II
 - II and III
33. What is not the external feature of filicinophyta?
- roots and rhizoids are absent
 - vascular tissue used for conducting water
 - the leaves are tightly coiled up
 - are well adapted to terrestrial conditions

34. What is true about binomial system of nomenclature?
- in typed or printed text, it is written in capital letter
 - it is abbreviated to the initial letter of the species name with the full genus name when it has been used twice in a text
 - the original name consists of three words
 - the genus name begins with an uppercase letter
35. Which is not the an animal phylum?
- cnidaria
 - arthropods
 - platyhelminthes
 - bryophyta
36. Which of the factors form the basis of natural selection?
- random mating
 - limited environmental resources
 - stable genotype frequencies over time
 - crossing over in meiosis
37. What is correct about the temporal isolation in evolution?
- an example is a mountain range or ocean
 - it is when females does not find the males of the other population seductive enough to be potential mates and leads to temporal isolation
 - an example is when female parts of the flowers of one population of plants reach maturity at a different season compared with the release of pollen of another population
 - it is when populations of a species breed at the same time

38. In which of the following habitats are you least likely to find fossils?

- a. swamps
- b. tropical forest
- c. desert
- d. deep ocean

39. The wings of which of the following is not homologous?

- a. penguin
- b. fly
- c. eagle
- d. chicken

40. *Ranunculus repens* and *Hypericum repens* both have yellow flowers. Which statement is true?

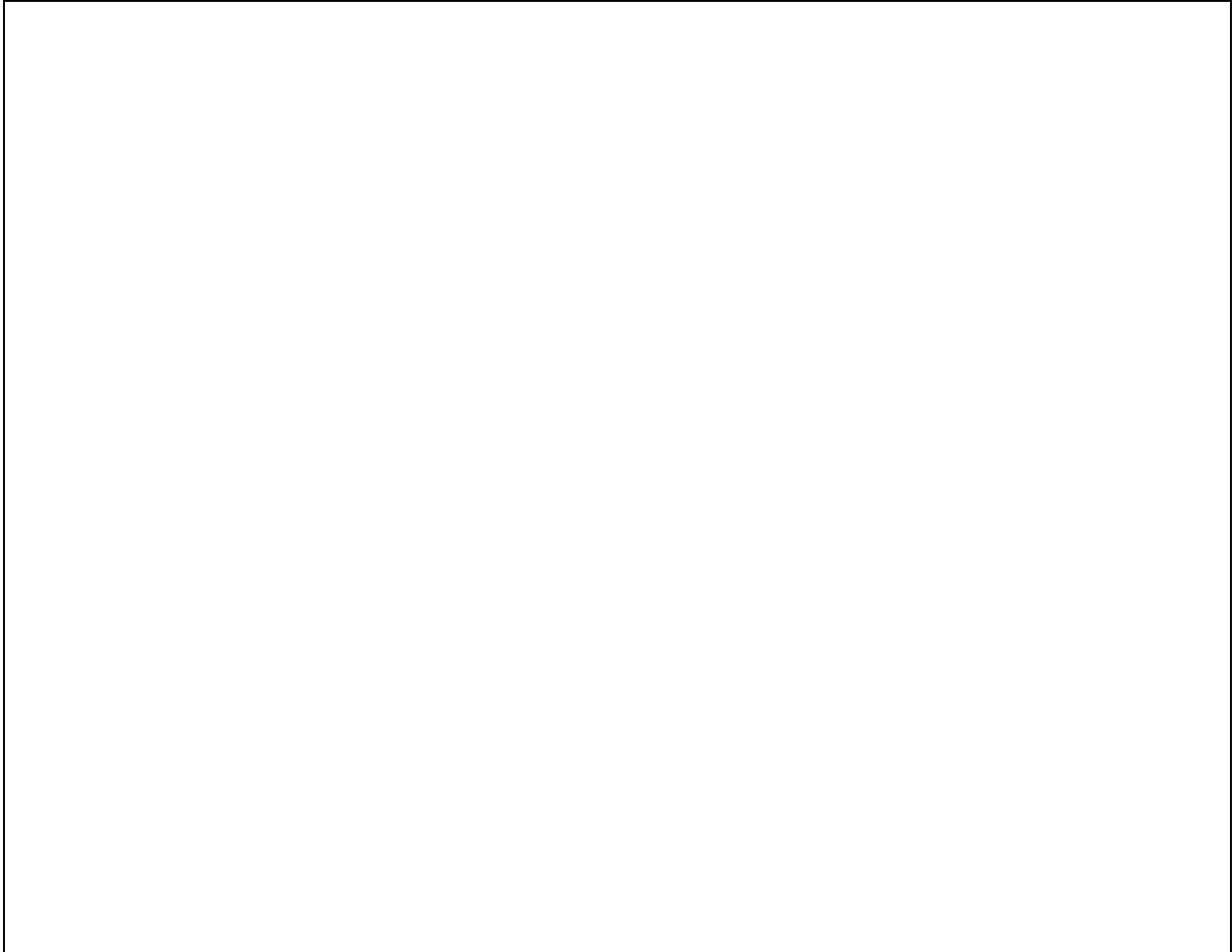
- a. they are angiospermophytes
- b. they are coniferophytes
- c. they are members of the same species
- d. they are members of the same genus

Section B

Answer *all* questions in the box provided. (Total: 30 marks)

1. [Maximum mark: 4]

Compare and contrast the differences of the characteristics of prokaryotic and eukaryotic cells.



2. [Maximum mark: 4]

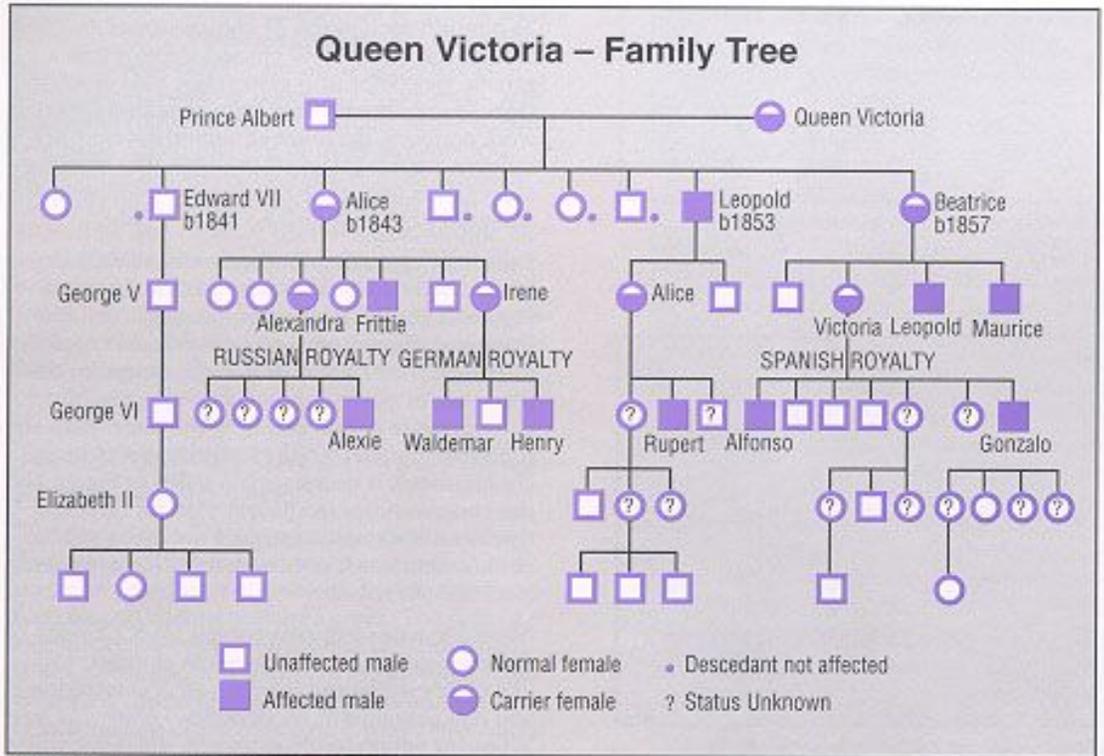


Figure 1. Queen Victoria's family tree.

Looking at the pedigree chart for Queen Victoria, what is the probability that the unknown first offspring of Alice (daughter of Leopold) to be a carrier female and what type of disease would it be?

3. [Maximum mark: 4]

Contrast between type I pneumocytes and type II pneumocytes.



4. [Maximum mark: 4]

State how much energy made available by producers passes to primary consumers and why.



5. *[Maximum mark: 4]*

Discuss the process of endocytosis.



6. [Maximum mark: 10]

When there is an excess of substrate present in an enzyme-catalysed reaction in room temperature, explain the effect on the rate of reaction of increasing the concentration of: (also sketch graphs for each aspect)

- a. the substrate [3]
- b. the enzyme [4]
- c. raising the temperature [3]

