

98 Biology Paper I Marking Scheme

Marks

(a) (i) F

(ii) * invertebrates

(iii)

A	C
has mammary glands	no mammary glands)
no scales	has slimy scales) any two
no lateral line	has lateral line)
breathes by lungs	breathes by gills
(accept other reasonable answers)	

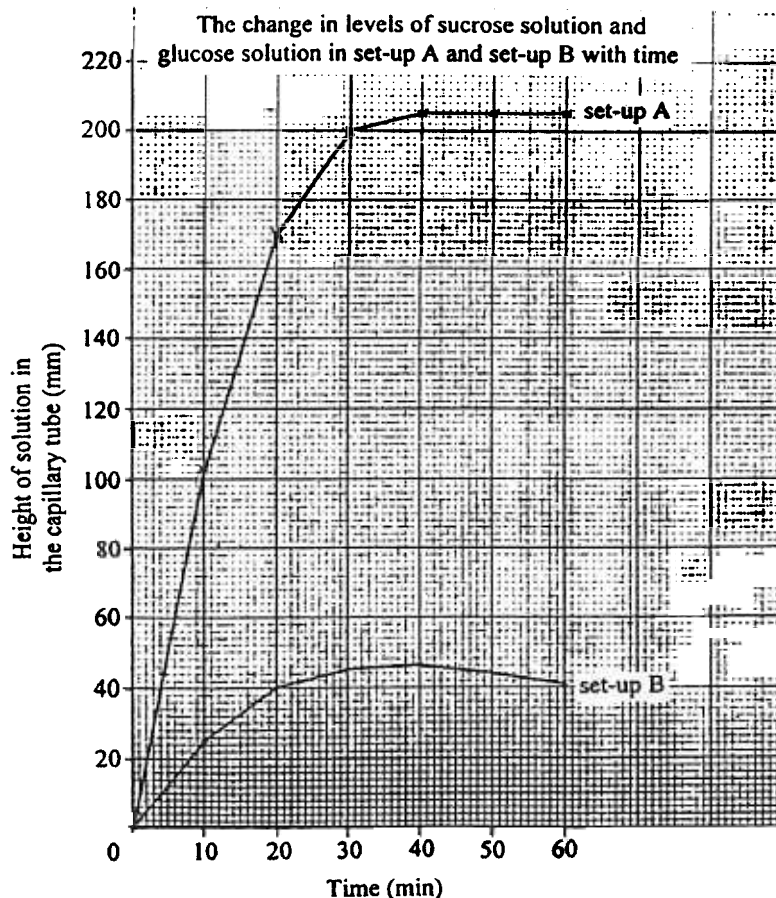
- (iv) A has a higher body temperature than C
 This enables A to achieve a higher metabolic rate
 Thus A needs more food for respiration to release more energy
 to compensate for the faster heat loss to the surrounding

Effective communication (C)**1**

- (v) Prohibit the overhunting of F)
 Prohibit the trading of F)
 Protect breeding grounds of F) any two ,1
 Establish a reserve area to protect F)
 Educate people to protect the animals)
 (accept other reasonable answers)

Total : 10 + 1 marks

- 1.(b) (i) Title (T) ½
 Correct choice of axes (A) ½
 Correct labelling of axes with units (L) ½, ½
 Correct plotting and joining of points (P) ½, ½
 Labelling of graphs (B) ½, ½



- (ii) The level of sucrose solution rose 1
 because the water potential of the sucrose solution was lower than that of
 distilled water 1
 Thus water entered the dialysis tubing 1
- (iii) The rate of increase of solution level in set-up A was greater than that in set-up B
 Since glucose could diffuse out of the dialysis tubing in set-up B while sucrose
 could not diffuse out in set-up A 1
 the difference in water potentials across the dialysis tubing in set-up A was greater
 than that in set-up B 1

Total : 10 marks

- 1.(c) (i) Individuals 1 and 2 have diabetes, therefore each of them must possess at least one allele for this type of diabetes 1
 Their children (individuals 3 and 4) are normal, that means at least one of the parents must also possess one allele for the normal character ...
 At least one of the parents is heterozygous
 In a heterozygous condition, only the dominant allele is expressed
 Thus the allele for this type of diabetes is dominant

<i>Effective communication (C)</i>	1
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- (ii) D = allele for this type of diabetes)
 d = allele for the normal character)
 DD
 Dd 1
- (iii) restrict carbohydrate/glucose intake
 injection of insulin

Total : 10 + 1 marks

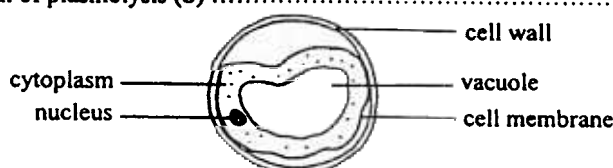
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Marks

98-P4

- 2.(a) (i) protection against mechanical damage/infection 1
- (ii) (1) It is covered by a cuticle 1
which is impermeable to water 1
to prevent excessive water loss by evaporation 1
- Effective communication (C)** 1
- (2) It has root hairs/outgrowth 1
to increase the surface area 1
for water/mineral absorption 1
- (iii) B/C → E → J → G 2
(½ mark for site of production, ½ mark for site of storage, 1 mark for route)
- Deduct ½ mark if there is no arrow sign**
- (iv) Large accurate diagram (D) 1
Labels and title (L) : * cell wall, cell membrane, cytoplasm, nucleus, vacuole (any 3)... 1½
sign of plasmolysis (S) ½



A cell of G under high power

Total : 12 + 1 marks

- 2.(b) (i) (1) The vaccine contains the hepatitis B antigen 1
which stimulates certain white blood cells 1
to develop a memory for the antigen 1
If P is exposed to the hepatitis B virus,
large amount of specific antibodies will be produced in a short time 1
so as to destroy the virus
- Effective communication (C)** 1
- (2) No 1
because the memory developed in the white blood cells is specific to
the hepatitis B virus only 1
- (ii) Both Q and R contracted the hepatitis B virus before 1
but only Q can form antibodies to destroy the virus while R cannot/has not
yet produced the antibodies 1
- (iii) Wear gloves when handling wounds)
Do not share toothbrush/nail cutter/razor etc.)
Use condom during sexual intercourse) any two 1,1
Screen the blood used in blood transfusion)

Total : 10 + 1 marks

- 2.(c) (i) * ball-and-socket joint : A and C 1 + 1
* hinge joint : B and D 1 + 1
- (ii) Vertebrae are linked together by ligaments)
to form a column) any two
and they allow the attachment of muscles)
for maintaining the posture
- (iii) Take in more vitamin D 1+
to help the absorption of calcium from food 1
- Take in more calcium 1+
for bone formation 1 any one set
- Do regular weight-bearing exercise ... 1+
to stimulate the increase in bone mass 1

Total : 8 marks

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98 Biology Paper I Marking Scheme

Marks

98-15

- (i) The capillary network has a large total cross-sectional area
so reduces the rate of blood flow/more time is allowed for the exchange of substances 1
- The numerous branches provide a large surface area
for rapid exchange of substances between the blood and the tissue cells
- (ii) The pressure of fluid A near the arterial end is higher than that of fluid B 1
Some of the plasma except large proteins/some of the blood except large proteins,
red blood cells and platelets 1
are forced through the thin wall of the blood capillary/P to form fluid B 1

Effective communication (C)

1

- (iii) (1) right atrium 1
- (2) The contraction of skeletal muscles helps to push fluid C along the
lymph vessels,
OR during inspiration, the drop in pressure of the thoracic cavity helps
to draw fluid C towards the heart
The valves of the lymph vessels prevent the backflow of the lymph

Total : 10 + 1 marks

- (i) (1) to prevent self-pollination/self-fertilization of the flower
- (2) to prevent any unwanted pollination/fertilization from other plants
- (ii) The pollen grains germinate and develop pollen tubes
which carry the male gametes towards the ovules
The male gamete fuses with the egg
to form the zygote

Effective communication (C)

1

- (iii) Parents with selected characters are crossed
so that offspring with desirable characters can be produced
- (iv) The desired quality of the plant can be maintained
because the daughter plants produced from the tubers are genetically identical
to the parent
The daughter plants can develop faster/they have a greater chance to develop
as more food is available in the tuber for the development/the development is more
independent of environmental conditions

Total : 11 + 1 marks

- (i) food/glucose + oxygen → carbon dioxide + water
- (ii) to absorb carbon dioxide in the air from the bell jar
- (iii) (1) The weight of flask A did not change
because carbon dioxide produced by the rat is absorbed by potassium
hydroxide
The weight of carbon dioxide absorbed was equal to the weight of water
lost from the potassium hydroxide
- (2) $(211.8 - 211.8) - (206.1 - 206.7)/30 \times 60 \text{ gCO}_2 \text{ h}^{-1}$
 $= 1.2 \text{ gCO}_2 \text{ h}^{-1} (0.02 \text{ gCO}_2 \text{ min}^{-1})$
- (iv) The bell jar has to be covered by a black cloth/paper 1
The pot of soil has to be covered by a plastic bag 1

Total : 9 marks

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4.(a) (i)



Marks

.... 1

98-P.6

- (ii) Light-sensitive cells on the retina were stimulated
Nerve impulses were set up
and transmitted along the optic nerve
to the cerebral cortex for interpretation into vision

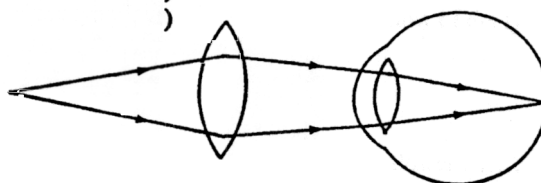
Effective communication (C)

1

Ciliary muscles would contract
Suspensory ligaments would slacken
Lens would become more convex

- (iv) Convex lens)
Lens of the eye)
Nearby object (diverging rays))
Converging rays) any 6
Arrow sign)
Image on retina)
Title)

3



Path of light rays from a nearby object after correction

Total : 11 + 1 marks

- 4.(b) (i) As the trees are cut, the soil is exposed/there is no tree roots to hold the soil firmly 1
so that the soil can be easily eroded by rainfall and wind 1
- (ii) (1) As food for humans or animals 1
To provide seeds for growing new plants 1
- (2) There are symbiotic nitrogen-fixing bacteria in the root nodules of
leguminous plants 1
The bacteria convert atmospheric nitrogen to nitrogenous compounds
(ammonium ion/amino acids) 1
Some of these is taken up by the plant for growth/protein synthesis 1
When the leaves and roots decompose, nitrogenous compounds are
released to the soil, thus increase the soil fertility 1

Effective communication (C)

1

depletion of specific minerals in the soil
spread/increase in the population of specific pest 1

Total : 10 + 1 marks

- 4.(c) (i) (1) Solution A is necessary for the breakdown of the egg white
(2) Hydrochloric acid and solution A are required for the breakdown
of the egg white
OR Hydrochloric acid is also required for the breakdown of the egg white
- (ii) Prepare another tube which is identical to tube 1
except solution A has been boiled
There would be no breakdown of the egg white in this tube
- (iii) (1) * gastric juice
(2) to kill bacteria which enter the alimentary canal
- (iv) The solution will turn violet in colour
because solution A contains an enzyme which is a protein