

1.
 - a

Glucose is released from the liver into the hepatic vein.	1m
By converting glycogen into glucose	1m
No glucose can be absorbed by the small intestine.	1m
Therefore no glucose is released from small intestine into hepetic portal vein	1m
 - b

Insulin causes the liver cells to convert glucose to glycogen stored in the liver and muscles.	1m
Body cells take in more glucose./Metabolic rate increase	1m
More glucose will then be broken down into carbon dioxide and water in the cells.	1m
 - c

Insulin affects the liver and the hepatic vein carries blood out of the liver.	1m
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2.
 - a.

Chlorophyll absorbs light	1m
and electrons are raised to higher energy levels.	1m
Electrons then pass from one electron carrier to another and emit energy.	1m
 - b.

Photolysis of water	
Using the energy from photochemical reaction,	
Splitting water molecule,	1m
the oxygen produced will be released as a by-product.	1m
 - c.

Providing the hydrogen needed for reduction of 3C-compound.	1m
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3.

Loss of water through evaporation from the plant surfaces,	1m
the water potential of cell decreases,	
Difference in water potential of cells creating a water potential gradient	1m
creating a transpiration pull, drawing water from the xylem,	1m
Evaporation of water removes heat from the plant.	1m
Creates a transpiration pull,	
which promote the transport of water and minerals from the root to leaves.	1m
Facilitates the absorption of water and minerals by the roots.	1m

- 4.
- a Q: pollen grain 1m
 R: sperm 1m
 They both transfer nucleus / DNA / genetic material to the ovum. 1m
- bi. Meiotic cell division. 1m
- bii. Independent assortment increases genetic variation , 2m
 Halving the number of chromosomes, maintaining the number of
 chromosome in the offspring. 2m
- 5.
- a Organism X: weight 1m
 Organism Y: height 1m
- b It is time-consuming/ Ethical issues/ Continuous growth cannot be
 measured (Any 1) (Organism will die) Not acceptable
- and is not suitable for large organisms like X and Y. 1m
 A large number of organism Z are available. 1m
- c Growth occurs in the meristem at the shoot tip. 1m
 The cells in the region of cell division divide
 by mitotic cell division to produce new cells. 1m
 The new cells then enlarge by taking in water in
 the region of elongation, thereby making the tree trunk taller. 1m

- 6.
- a. It destroys the neurotransmitters released by the ending of axons. 1m

The muscle fibres therefore cannot be stimulated to generate electrical impulses that trigger muscle contraction.

Or

It inactivates the muscle fibres.

Even when nerve impulses stimulate the release of neurotransmitters from the ending of axons, no electrical impulses are generated by the muscle fibres.

(any 1) 1m

- b. To relieve muscle pain: sensory neurones in the spinal cord 1m
To relieve cramps: motor neurones in the spinal cord 1m

- c. The substances in these fruits can block the transmission at neuromuscular junctions in intercostal muscles. 1m
This can stop the breathing process and cause death. 1m
(Heart / Medulla oblongata also accept)

7.

- a. Y --> Q --> S --> P --> X 2m

- b. Disagree. 1m

The signal R to the brain have nothing to do with the withdrawal of the arm, 1m

the reflex arc complete without the involvement of the brain.

And the action cannot be controlled by consciousness, therefore it cannot be considered as a voluntary action. 1m

Signal R is to signal the brain

for the memory of a dangerous object 1m

to prevent future harm. 1m

- c. Difference Importance
Innate Protection at birth
Stereotypical React to danger the same way
Faster/Slower(Not acceptable)
(Any 1) 2m

- 8.
- ai Antibodies are produced by the body. 1m
- aii The level of antibody remains high. /
The immunity lasts long. /
Memory cells remain in the body. (any 1) 1m
- aiii It takes time for the level of antibody to rise
to a level that is enough to kill all the pathogens. 1m
- b. Entry of pathogen recognized by helper T cells, 1m
T cells activates B cells to differentiate 1m
plasma cells and memory B cells 1m
plasma cells will then produce antibodies 1m
specific to that pathogen. 1m
- ci. Inhibit the formation of cell wall/
Inhibit the synthesis of protein/
Prevent the pathogen from reproducing/
Inhibit enzymatic activity
(Any 2) 2m
- cii. Genetic variation exist among the population of bacteria, 1m
some bacteria may have antibiotic resistance, 1m
bacteria that do not have antibiotic resistance are killed
when antibiotics are used, 1m
while the resistance bacteria stay alive. 1m
resistance bacteria reproduce rapidly because of no
intraspecific competition. 1m
- 9.
- a. Ball-and-socket joint 1m
Shoulder joint, hip joint (any 1) 1m
- b. X: ligament
It holds the bones in position to avoid dislocation of
the joint during movement. 1m
Y: synovial membrane
It secretes synovial fluid to reduce friction
between the ends of the bones. 1m

10.

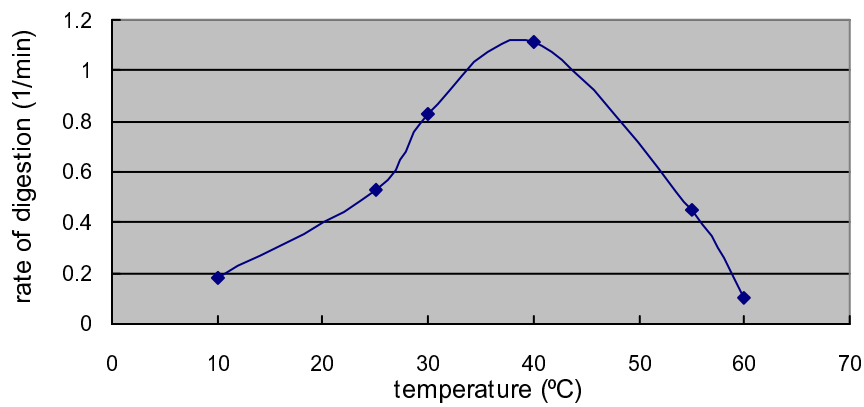
a.

1m x 2

Temperature (°C)	Time taken for starch to be digested (min)	Rate of digestion (1/min)
10	5.5	$1/5.5 = 0.18$
25	1.9	$1/1.9 = 0.53$
30	1.2	$1/1.2 = 0.83$
40	0.9	$1/0.9 = 1.11$
55	2.2	$1/2.2 = 0.45$
60	10.0	$1/10.0 = 0.10$

b.

The graph showing the rate of digestion against temperature



Correct title

1m

Correct axes and scale

1m

Correct graph

1m

11.

Risks

Effects on human health are unknown.	DNA are responsible for the production of proteins and lipids in the plant, changing it may cause harmful substance to be produced.	2m
Breed with wild type	GMOs may breed with wild plants and transfer their modified genes to the offspring, which may out compete the wild types and result in a loss of biodiversity.	2m
Ethics	Some people may argue that human should not play the role of god and altering the creation can create serious consequence.	2m
Drug resistance bacteria	Use of antibiotic gene raises concerns in creating antibiotic resistance bacteria.	2m

(Any 2)

Benefits

Use of pesticides	Use of pesticides can be greatly reduced due to the development of pest resistance corps. Reducing the harmful substance in our food.	2m
Use of chemical fertilizers	More efficient use of minerals in the plant can reduce the use of chemical fertilizers, reducing the effect to nearby environments.	2m
Use of land mass	More efficient corps need less land mass to grow, therefore agricultural activity will be less harmful animal habitats, increasing biodiversity.	2m
Food quality	Food will be higher quality (ie. sweeter fruit/ bigger grains) at a lower price, benefiting the consumers, especially the poor.	2m

(Any 2)

Good communication

2m