

HKDSE Integrated Science Practice Papers
Samples of Student Performance

High Performance Sample 1: Paper 1 Question 1

Answer ALL questions. Write your answers in the spaces provided.

1. (a) A unique property of water is that its density when in the solid state (ice) is lower than when in the liquid state (water).

- (i) State the main type of attraction between water molecules. (1 mark)

Hydrogen bond ✓

- (ii) With reference to the structures of ice and water, explain why the density of ice is lower than that of water. (2 marks)

Water has a highest density at 4°C and the molecules start arranging neatly to form hexagons from free molecules when the temperature decreases after 4°C.

- (iii) Explain the importance of the above property of water to organisms living in lakes at freezing temperatures. (2 marks)

Since the density of ice is lower than that of water, ice floats on water. Organisms, eg. fishes, can live under the ice in the water without being frozen in the lake. The bottom of the lake is at 4°C.

- (b) Water shortages used to be a serious problem in Hong Kong. The problem was solved when Hong Kong began to receive a sufficient supply of Dongjiang water from Guangdong.

- (i) What was the main source of Hong Kong's fresh water before 1970? Why did the water supply become insufficient in the 1970s? (2 marks)

Water reservoirs was the main source of Hong Kong's fresh water before 1970.

Growing population and unreliable rainfall made the water supply insufficient in the 1970s.

Answers written in the margins will not be marked.

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High Performance Sample 1: Paper 1 Question 1

(ii) The Lok On Pai Desalination Plant was completed in 1975. It was intended to increase the supply of fresh water. In the plant, distillation was used to convert seawater into fresh water.

- (1) Using the following data, estimate the energy required to change 1 m^3 of water at 20°C to steam (at 100°C). (2 marks)

Mass of 1 m^3 of water	1000 kg
Initial temperature of water	20°C
Final temperature of steam	100°C
Specific heat capacity of water	$4200 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$
Specific latent heat of vaporisation of water	$2.26 \times 10^6 \text{ J kg}^{-1}$

$$\begin{aligned} \text{Required energy} &= (1000)(4200)(100 - 20) + (1000)(2.26 \times 10^6) \\ &= 2596 \text{ MJ} \end{aligned}$$

- (2) With reference to the properties of water, explain why desalinating seawater by distillation is costly. (2 marks)

Since water has a high specific heat capacity and specific latent heat of vaporization, large amount of energy is needed to boil the water and desalinate it. Huge cost is incurred.

(iii) The quality of Dongjiang water showed signs of deterioration in the 1990s.

- (1) Give a source of pollution of the Dongjiang River. (1 mark)

Heavy metals discharged by factories.

- (2) Suggest a method of ensuring the high quality of Dongjiang water supplied to Hong Kong. (1 mark)

Random check of the water sample from the water supplied by Dongjiang by the government.

Total: 13 marks

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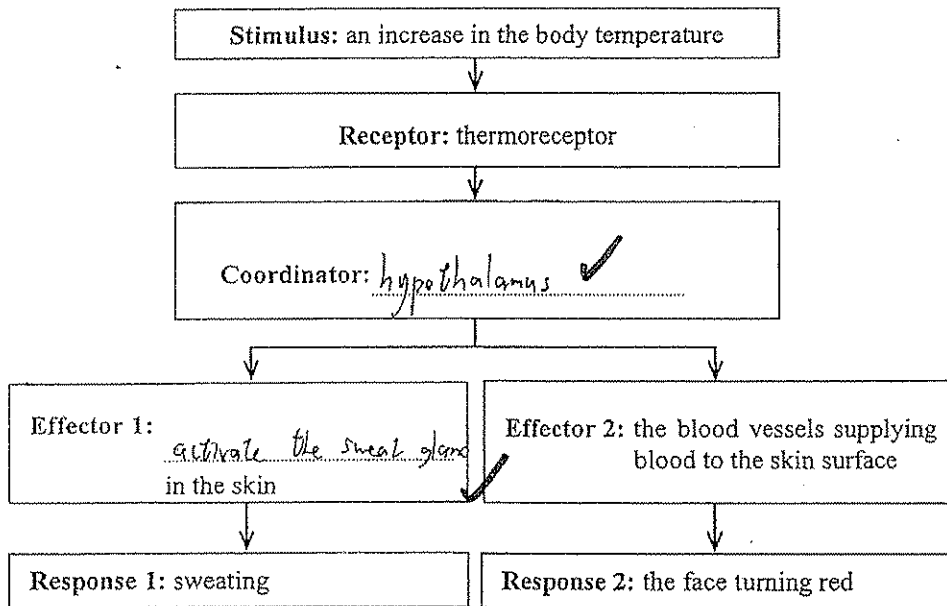
High Performance Sample 2: Paper 1 Question 4

4. It was a warm day and Rosy was walking quickly up a hill. She was breathing heavily and her heart was beating fast. She felt hot and her face had turned red. She wiped off the sweat and drank some water.

(a) Explain how heavier breathing and a faster heartbeat helped Rosy's body cope with the vigorous activity. (3 marks)

During vigorous activities, the muscle uses lots of energy and require oxygen to produce energy or to break down lactic acid. Heavier breathing means she can breathe in more oxygen at a time, and faster heartbeat helps to transfer oxygen in blood to various parts of body.

(b) (i) Fill in each blank in the flow chart below with suitable word(s) to show how Rosy's body responded to the increase in body temperature. (2 marks)



Answers written in the margins will not be marked.

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High Performance Sample 2: Paper 1 Question 4

- (ii) Describe how Effector 2 caused Response 2. State the significance of the response. (3 marks)

Vasodilation ✓ occurred when the blood vessels expand, which allow more blood to flow through and increase heat lost to surroundings. Under effector 2, more blood is flowing in the vessels under the skin. ✓ the skin of face is very thin so that it is effective in losing extra heat ✓ with observable red ✓

- (c) Give one reason why it was important for Rosy to drink water after the vigorous activity. (1 mark)

To compensate the water lost of body during sweating. ✓

Total: 9 marks

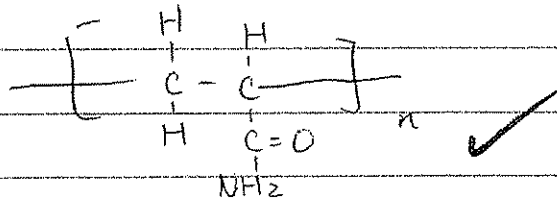
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High Performance Sample 3: Paper 2 Section B Question 3

(a) (i) Additional polymerization ✗



(ii) It's because the structure of polyacrylamide is surrounded by 2 hydrogen and oxygen, which can form 2 hydrogen bonds with water easily. ✓

(iii) (1) Whether the material would cause allergy on baby skins ✓

(2) It's because the production of cellulose only involve natural resources but those of polyacrylamide involve manmade materials and cost energy. Also, cellulose is natural material that can be biodegradable ✓ while polyacrylamide cannot ✓

(3) First, it can help to hold water in the soil to make sure the soil is moist enough for the crops. ✓

Secondly, it can help hold the crops into the soil to prevent being lost by blowing. ✗

High Performance Sample 3: Paper 2 Section B Question 3

(b)(i)(1) It stands for a reversible reaction. ✓

The yield is never 100% because ~~the~~ part of the product will turn back into the reactants during the process. ✓

(2) There are 4 reactants ~~for~~. The gaseous volume is higher thus the pressure will be greater. However, there ~~is~~ are only 2 NH_3 as the product, the pressure is lower as the gaseous volume is lower. ✓ Operate the process at a high pressure can transfer the equilibrium point to the product side ✓ as the pressure there is lower, this can increase the product yield. ✓

(ii)(1) It's because the ~~molecules~~ ^{atoms} of nitrogen is always connected with covalent bonds, which are strong and ~~not~~ ~~can~~ cannot be broken easily.

(2) lightning ✓ The ~~is~~ mass amount of energy released during lightning can break the strong ^{inside} covalent bond ~~between~~ the nitrogen molecules.

(3) It will cause the ~~is~~ rapid growth of algae ✓ and cause algae bloom, which kills lots of aquatic lives by lackage of oxygen. ✓

Mid Performance Sample 4: Paper 1 Question 1

Answer ALL questions. Write your answers in the spaces provided.

1. (a) A unique property of water is that its density when in the solid state (ice) is lower than when in the liquid state (water).

- (i) State the main type of attraction between water molecules. (1 mark)

Intermolecular force. X

- (ii) With reference to the structures of ice and water, explain why the density of ice is lower than that of water. (2 marks)

Water had its highest density in 4°C . Ice formed when the temperature is 0°C so ice has lower density. Moreover, the density of the water molecules in ice is lower than water. X

- (iii) Explain the importance of the above property of water to organisms living in lakes at freezing temperatures. (2 marks)

Due to the property that the density of ice is lower than that of water, when the ice formed, it will stay on the water surface and inside it will keep in liquid state and temperature 4°C . So the organisms can still live in lakes at freezing temperatures. ✓

- (b) Water shortages used to be a serious problem in Hong Kong. The problem was solved when Hong Kong began to receive a sufficient supply of Dongjiang water from Guangdong.

- (i) What was the main source of Hong Kong's fresh water before 1970? Why did the water supply become insufficient in the 1970s? (2 marks)

Lake. X Because the population growth very fast, the water store in lake can't supply all the population, moreover, there are ~~less~~ ~~precipitation~~ sudden drop of rainfall, it made the water supply become insufficient in the 1970s. ✓

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Mid Performance Sample 4: Paper 1 Question 1

(ii) The Lok On Pai Desalination Plant was completed in 1975. It was intended to increase the supply of fresh water. In the plant, distillation was used to convert seawater into fresh water.

(1) Using the following data, estimate the energy required to change 1 m³ of water at 20°C to steam (at 100°C). (2 marks)

Mass of 1 m ³ of water	1000 kg
Initial temperature of water	20°C
Final temperature of steam	100°C
Specific heat capacity of water	4200 J kg ⁻¹ °C ⁻¹
Specific latent heat of vaporisation of water	2.26 × 10 ⁶ J kg ⁻¹

$$\begin{aligned}
 E &= mc\Delta T & E &= 1000 \times 2.26 \times 10^6 \\
 &= 1000 \times 4200 \times (100 - 20) & &= 2260000000 \text{ J} \\
 &= 336000000 \text{ J} & &2260000000 + 336000000 \text{ J} \\
 E &= \Delta m & &= 2596000000 \text{ J} \\
 & & &= 2.596 \times 10^9 \text{ J}
 \end{aligned}$$

(2) With reference to the properties of water, explain why desalinating seawater by distillation is costly. (2 marks)

Because water has a high specific heat capacity, it needs large amount of energy to raise its temperature. Desalinating seawater need to turn seawater into steam, it needs large amount of energy and so it is costly.

(iii) The quality of Dongjiang water showed signs of deterioration in the 1990s.

(1) Give a source of pollution of the Dongjiang River. (1 mark)

Factory ✓

(2) Suggest a method of ensuring the high quality of Dongjiang water supplied to Hong Kong. (1 mark)

Build tunnel to transport ~~Dongj~~ Dongjiang water to Hong Kong. ✓

Total: 13 marks

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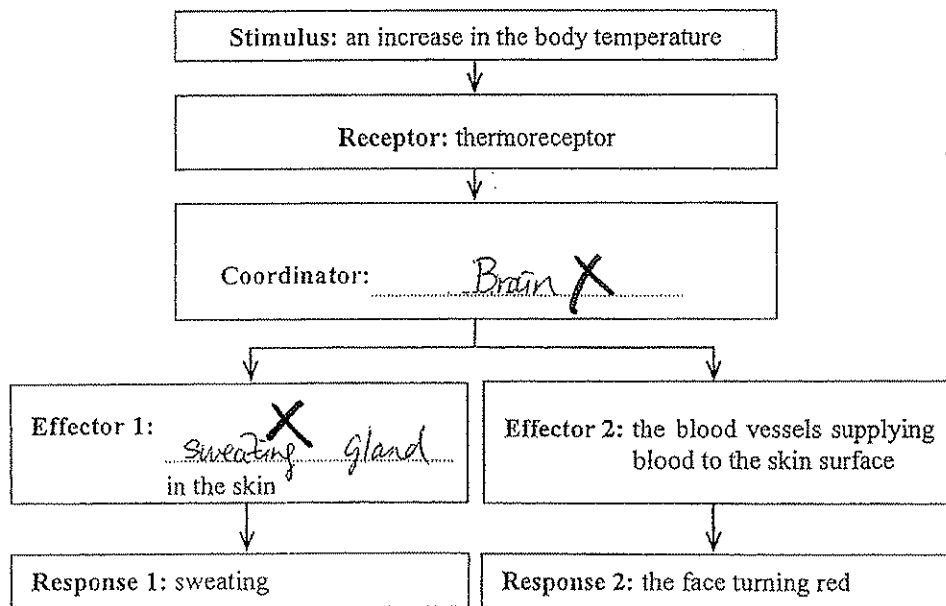
Mid Performance Sample 5: Paper 1 Question 4

4. It was a warm day and Rosy was walking quickly up a hill. She was breathing heavily and her heart was beating fast. She felt hot and her face had turned red. She wiped off the sweat and drank some water.

(a) Explain how heavier breathing and a faster heartbeat helped Rosy's body cope with the vigorous activity. (3 marks)

The heavier breathing was carried out in order to let the body collect more oxygen to carry out respiration. Oxygen is required for aerobic respiration to produce energy for the body to cope with the vigorous activity. Also, there was a faster heartbeat because the amount of blood pumped to the skin could be increased. This could increase the amount of heat loss to the surroundings to deal with the increasing body temperature.

(b) (i) Fill in each blank in the flow chart below with suitable word(s) to show how Rosy's body responded to the increase in body temperature. (2 marks)



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Mid Performance Sample 5: Paper 1 Question 4

- (ii) Describe how Effector 2 caused Response 2. State the significance of the response. (3 marks)

As the blood vessels supplying blood to the skin surface, more blood will be transported to the face in order to release heat through the skin surface. Therefore, the face will turn red as the skin of the face is thin. Red is the colour of the blood behind the skin.

- (c) Give one reason why it was important for Rosy to drink water after the vigorous activity. (1 mark)

To increase the water level back to normal as water is lost due to sweating.

Total: 9 marks

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Mid Performance Sample 6: Paper 1 Question 9

For question 9, candidates are required to present their answers in essay form. 6 marks will be allocated to knowledge and 2 marks to logical presentation and clarity of expression.

- 9. In recent years, large areas of forest have been cleared in some countries in order to build cities or grow crops. Comment on the socioeconomic and ecological impacts of this practice. (8 marks)

First of all, the ecological impacts will be some species of animal lose their habitats and makes them even died and so do the plants. Some species of animals and plants may even disappear because of these deforestation.

Also, for the global warming effect, the deforestation ~~strengthens~~ worsen the effect and thus ~~is~~ destroying the whole food chain, including human, some ~~to~~ coast area will be flooded and disappear because the ice melting caused by the global warming in the pole.

Moreover, as some species disappear, another ~~tertiary~~ ~~consumer~~ consumer will lack of food to eat and disappear too.

For human, we may have ~~less~~ lesser choices of food to eat caused by this.

The deforestation also cause the soil erosion because the land ~~are~~ without the trees's' ~~grabbly~~ protecting and their nutrient may be wasted or flow to the river ~~and~~ causing ~~the~~ algae over reproduction, leading many marine died. Also, the sand and rocks will flow to the river without the protection of trees and this may lead to flooding to the coast near the river and makes loss to human.

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S = 0
E = 3
P = 1
4

Mid Performance Sample 7: Paper 2 Section B Question 1

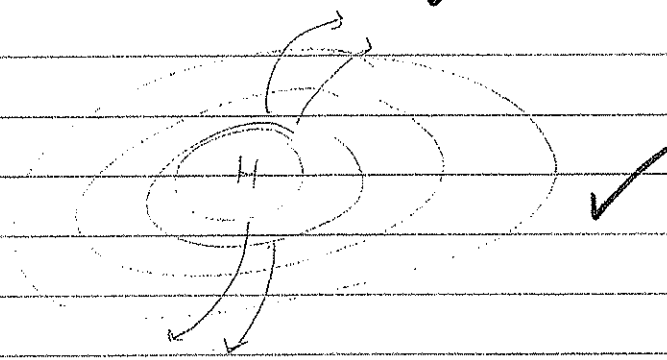
(a)(i)

Under cold weather, air temperature drops. The humidity of air particles drop, the density of air increase since the air particles are packed more closely together. High pressure region is formed above a region with low surface temperature. ✓

(ii)

The self-rotation of earth. ✓

(ii)



寫於邊界以外的答案，將不予評閱。

寫於邊界以外的答案，將不予評閱。

b)(i)

(1) The land of Siberia is reflective icy surface, which means the insolation can't be catch and absorbed by the ground, but reflected by the icy surface. There is few heat conversion at the ground surface and insolation cannot contribute heat. The prevailing wind may also disturb the conversion process, and further lower the air temperature. ✓

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(2) Siberia is located at inland areas that the monsoon from sea to land can't reach and provide moisture there. The relative humidity is very low as the evaporation is few. ✗

Mid Performance Sample 7: Paper 2 Section B Question 1

(b)(i)

In winter, a high pressure system is formed above the inland area of China and Siberia, while the Pacific Ocean is relatively warmer since the land lose heat faster than oceans. A low pressure system is formed on the Pacific Ocean. The prevailing wind goes from high pressure area to low pressure area, which means it blows from Siberia to Pacific Ocean. The dry, cold prevailing wind reach Hong Kong before the ocean, which is the north-west monsoon in winter in Hong Kong.

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(c)(i)

Respiratory disease ✓

(ii)

(1) The rise in RSP concentration is caused by the air pressure system. At 14:00, the weather chart shows a high pressure region above the Pacific Ocean while a low pressure region at the south-west of Hong Kong. The prevailing wind blows from North-east to South-west. Tai Wan is on the way of prevailing wind, RSP from sandstorm in Taiwan is ~~trans~~ transmitted to Hong Kong through prevailing wind. ✓

(2) On 22 March, the prevailing wind is weakened. The RSP carried by the wind move slowly above Hong Kong, which lowers the visibility.

(3) The air quality would be improved as the rainwater is capable to attach the RSP in the air, and bring them to ground. ✓

Low Performance Sample 8: Paper 1 Question 2

2. Mr. Chan was driving along a horizontal, straight road. He suddenly saw a box on the road and applied the brakes. The speed-time graph of the car is shown in Figure 1. The moment he saw the box is taken as time $t = 0$.

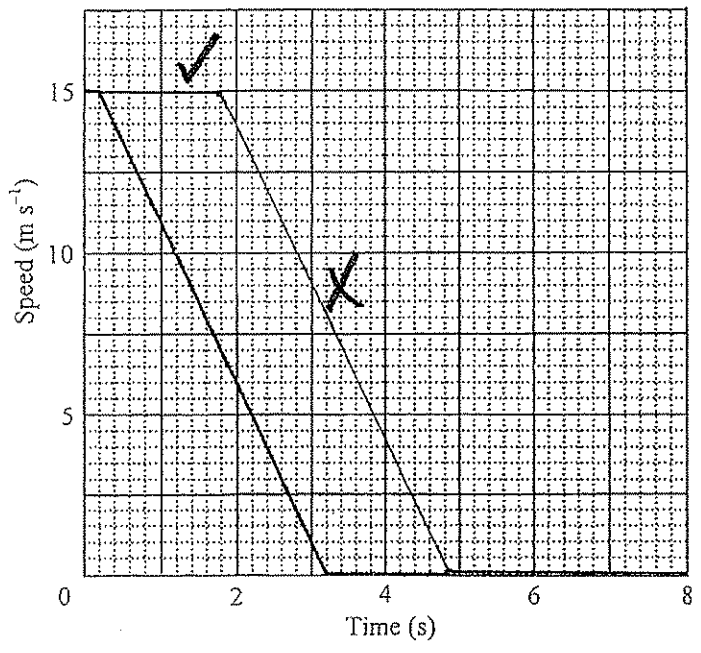


Figure 1

(a) The speed limit for this road is 70 km h^{-1} . Was Mr. Chan speeding at $t = 0$? Support your answer with a calculation. (1 mark)

$$a = \frac{0 - 15}{3.2 - 0} = -5 \text{ ms}^{-2}$$

$$v = u + at$$

$$0 = u + (-5)(3.2 - 0)$$

$$u = 15 \text{ ms}^{-1}$$

$$70 \text{ km h}^{-1} = \frac{70 \times 1000}{3600} \text{ m s}^{-1} = 19.4 \text{ ms}^{-1} > 15 \text{ ms}^{-1}$$

No

(b) Describe how the different parts of Mr. Chan's nervous system enabled him to see the box and initiate the response of applying the brakes. (4 marks)

Sensory neuron in Mr Chan's eyes saw the box.

Signals are transmitted to the inter neuron in the spinal cord.

~~motor neuron fibres~~

signals are then sent to the brain for analysis.

signals are sent back to the motor neuron from the brain.

motor neuron initiate response and apply the brake.

Answers written in the margins will not be marked.

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Low Performance Sample 8: Paper 1 Question 2

- (c) Given that the box was 30 m away from the car at $t = 0$, determine whether the car hit the box. (3 marks)

$$s = ut + \frac{1}{2}at^2$$

$$= (15)(3.2 - 0.2) + \frac{1}{2} \left(\frac{0 - 15}{3.2 - 0.2} \right) (3.2 - 0.2)^2$$

$$= 22.5 \text{ m} < 30 \text{ m}$$

\therefore The car does not hit the box.

- (d) (i) If Mr. Chan had consumed some alcoholic drinks, which part of his central nervous system would have been affected? (1 mark)

infer neurons

- (ii) If Mr. Chan was drunk, his reaction time would have been longer. In addition, he would have applied a smaller force to the brake. In Figure 1, sketch the speed–time graph of the car. (Assume the speed of the car at $t = 0$ is the same as that in (a).) (2 marks)

Total: 11 marks

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Low Performance Sample 9: Paper 2 Section B Question 2

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(i) (1) It is necessary to check whether mosquitoes are vector of dengue fever, if the volunteer in dengue-free area got dengue fever after bitten by the mosquitoes which bite the dengue patient, then the mosquitoes are the vector.

(2) The body will give a signal of itchy or even pain as a defense response.

(3) A person who has recovered from dengue fever caused by a particular subtype of the dengue fever virus will develop immunity to that subtype because when he recovered, his body developed a kind of antibodies and make him able to fight against that subtype of dengue virus.

(ii) (1) From figures 2.1 and 2.2, it can be found that when global average air temperature is higher, incidence of dengue fever also increase, vice versa.

(2) As shown in the figure, when global temperature rises, incidence of dengue fever also rise, it may because of rised global temperature increase the rate and produce more suitable environment for mosquitoes to breed, also, rising temperature makes diseases like flu or even dengue fever spread more quickly.

寫於邊界以外的答案，將不予評閱。

Low Performance Sample 9: Paper 2 Section B Question 2

(iii) In order to control the spread of dengue fever, we can have a practical way. First of all, mosquitoes breed in water, we can put a cover on water containers in the cities or even single vase, jar that contains water, cover it well when not used, to minimize the chance and environment for mosquitoes to breed and it will be able to control the spread of dengue fever, since the number of mosquitoes become less and they will have lower chance to spread dengue fever.

b) (i)

Male: is more prone to liver cancer, since male has higher incidence rate of liver cancer than female.

(ii) (1)

X

(2) Infection by HBV is a risk factor but consumption of fruit is not.

(3) It is because ^{some} non-smoker can also be found having liver cancer and ^{some} smokers can also be found do not have liver cancer, so it is just a risk factor.

(iii) They are essential to ~~give~~ avoid infection in the body.

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