Cellular function Marking key

You may need to check these as I have modified the test slightly again.

Multi choice

|  |  |
| --- | --- |
| Question | Answer |
| 1 | C |
| 2 | B |
| 3 | B |
| 4 | C |
| 5 | D |
| 6 | D |
| 7 | C |
| 8 | A |
| 9 | A |
| 10 | D |
| 11 | A |
| 12 | B |
| 13 | B |
| 14 | B |
| 15 | D |
| 16 | D |
| 17 | B |
| 18 | A |
| 19 | A |
| 20 | D |

Short answer section. 30 marks

1. A. List 4 risk factors for the development of Type 2 diabetes.

They get a ½ for each correct one. Acceptable answers include:

Obesity, too much simple sugar in diet, smoking, stress, genetics and lack of exercise.

(2marks)

1. A biologist is studying life in Antarctica, where the average daily temperature is -500C. His work requires him to be in the open air making observations for long periods of time.
2. Describe one (1) behavioural modification he would need to make, apart from wearing warmer clothing, when outside observing animals.

Curl into a ball to reduce SA exposed for heat loss, or light fire to produce heat, or move around to increase muscle activity and thereby produce heat. (1 mark)

1. **Physiological mechanisms** are also essential for the scientist to maintain his core temperature in these freezing conditions.
2. Name two (2) mechanisms that his nervous system would control and explain how they would maintain his core temperature.

(2 marks)

Shivering. Rhythmic contraction of skeletal muscles. This produces heat.

Vasoconstriction. Blood vessels leading to skin constrict. This reduces blood flow to the surface where heat could be lost from.

NB. They need to explain each one. Just writing shivering gets zero. No ½ marks for this question.

1. What is the modulator for the control of body temperature?

(1 mark)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Hypothalamus\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Two other biologists are studying other animal species in completely different conditions to that in Antarctica. One is in a hot desert and the outer in a tropical rainforest. Both climates have a similar average daily temperature of 340C. However, the biologist in the desert feels reasonably comfortable at his temperature whereas the one in the tropical rainforest finds it very uncomfortable. **Explain** why.

(1 mark)

In the rainforest the humidity is higher so less evaporation of sweat will occur, so there will be less of a cooling effect. Must have explanation. No ½ marks.

1. After a period of time without drinking, the blood volume of the scientist working in the desert would change more than that of the scientist in the tropical rainforest.
2. Describe what would change that would occur to scientist t in the desert.

(1 mark)

He would lose water from his body

1. Explain your answer to part d. (I).

He is sweating

(1 mark)

1. How would this affect his blood pressure?

(2 marks)

His blood pressure will drop. Blood volume is less as he has lost water due to sweating. So there is less blood to pump and therefore less pressure.\_\_\_\_\_ \_\_\_\_\_\_\_

1. Using a suitable labeled diagram show how a carrier protein functions. Your answer should have a diagram and a brief explanation of what is going on.

Diagram= 1 mark(shows heads and tails of phospholipid molecule and carrier changing shape)

Labels= 1 mark(phospholipid bilayer, carrier molecule, material being transported)

Specific molecules bind to specific carrier protein. = 1 mark

Carrier molecule changes shape and moves molecule through membrane.=1 mark

(4 marks)

1. In the diagram below water is the solvent. The water is represented by the smaller circles. The larger circles represent the solute particles. Explain, using the correct terminology (words), what has happened.

The left hand side of the tube has less solvent molecules than the right hand side of the tube. This means it is a more dilute solution. As a result the right hand side will have a higher osmotic potential (1mark). Water will move from the left hand side to the right hand side by osmosis. (1 mark). The right hand side has a greater solute concentration than the left and the particles would normally move to the left had side by diffusion. They cannot do this as the solute particles are too large to fit through the semi permeable membrane. (1 mark). As a result the solute concentrations cannot alter (1 mark). Water keeps moving left to right to balance the concentration gradient. This causes the right hand column to rise higher than the left (1 mark)

5 MARKS.

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| --- |
| STIMLUS |
| Drop in core body temperature(1 mark) |

1. Complete the table below for the control of body temperature if the external temperature has caused a slight **decrease** in core body temperature. (7marks)

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| --- |
| FEEDBACK |
| Core temp rises(1 mark) |

|  |
| --- |
| RECEPTOR/S |
| Thermo receptors in the spine, groin, gut and hypothalamus.  (1 mark) |

|  |
| --- |
| RESPONSE |
| -Thyroid releases Thyroxin increasing MB rate and in turn producing heat.  -Vasoconstriction. Blood vessels leading to the skin constrict. This reduces the volume of warm blood near the skin surface and thereby the amount of heat lost via the skin.  -Adrenal medulla releases adrenalin and nor adrenalin. This increases the MB rate and produces heat.  -shivering occurs. Rhythmic tremors of the skeletal muscles to generate more heat.  (2 marks for any two of these) |

|  |
| --- |
| MODULATOR |
| Hypothalamus  (1 mark) |

|  |
| --- |
| EFFECTOR/s |
| Adrenal medulla.  Skeletal muscles.  Blood vessels leading to skin.  Thyroid gland  ( 1 mark for any 2 of these) |

1. While studying the cell membrane a student found that water molecules would not move through the phospholipid bilayer. With reference to the structure of the bilayer explain this.

(2 marks)

The phospholipid molecules has a lipid tail that is hydrophobic (1 mark) which is water repelling (1 mark).

b. How would water molecules get through the cell membrane?

(1 mark)

Through channel proteins in the membrane.