gateways school

**Thermoregulation ms**

0 min

0 marks

**1.** (a) (Vaso) constriction of arterioles / correct reference to shunt  
vessels or sphincters; *ignore contraction*  
*Reject this first mark if any reference to moving blood vessels.*Less radiation / conduction / convection;  
Less blood to surface / more blood flows beneath fat; 2 max

(b) (i) Body cools down / hypothermia;  
(Low body temperature linked to) insufficient metabolism /  
muscle contraction; *accept references to enzymes / respiration* /  
*energy released*May drown / unable to escape predators; 2 max

(ii) Oxygen consumption linked to respiration;  
Heat production linked to respiration;  
High rate of respiration / more heat production at low  
temperature; *accept converse* 2 max  
*Reject any reference to ‘energy production’.*

[6]

**2.** **Quality of Communication**

The answers to all sections of this question require the use of continuous prose. Quality of language should be considered in crediting points in the scheme. In order to gain credit, answers should be expressed logically and unambiguously, using scientific terminology where appropriate.

Reptiles are ectotherms; *[Reject: cold blooded]*Body temperature varies with that of environment,  
Temperature of desert fluctuates greatly over 24 hours;  
Metabolic reactions controlled by enzymes;  
Enzyme activity/ metabolic rate changes with body temperature;  
Speed of bodily actions dependent on metabolic rate/ enzyme activity;  
Reptiles seek shade/ water when hot/ reduce contact with hot surface;  
Seek sun when cool; max 5

[5]

**3.** (a) (i) Maintains/ allows efficient/ high level of activity/ movement;

*[Ignore: Remain active]*

OR Allows/ maintains high/ efficient level of enzyme reactions; 1

*[Ignore: Reactions still occur]*

(ii) Requires more/ high amount of energy/ food/ respiration rate;

*[Ignore Loss of energy / heat]* 1

(b) (i) Evaporation of sweat removes heat from skin;

High(er) rate of sweating leads to low(er) skin temperature; 2

*[Ignore: Description only and Vasodilation references]*

(ii) Change/ fall in body/ core temperature results in reduced sweating;

*[Reject: Stops sweating]*

Reduced sweating results in increase in body core temperature/ body

core temperature returns to original level; *[ Ignore: Hypothalamus and  
receptors references]*

(This) results in subsequent increase/ return to original level of   
sweating; *[Ignore., Description only]* max 2

[6]

**4.** (a) Respiration for *muscular* activity; (*energy ‘needed/used’ for respiration’  
etc, disqualifies*)  
respiration inefficient / releases waste heat / all energy ‘ends up as ‘heat’ 2

(b) Larger surface area: volume ratio, or less fat under skin;  
more rapid / more heat loss from body surface. 2

(c) Humidity reduces diffusion gradient / less difference in water potential;  
less evaporation of sweat;  
less cooling due to use of heat energy for evaporation of sweat. 3

(d) Temperature receptors stimulated in; (*in skin disqualifies*)  
hypothalamus;  
heat loss centre stimulated;  
nerve impulses to sweat glands;  
increase rate of / start sweat production;  
nerve impulses to skin arterioles;  
vasodilation (*ref to vessels moving disqualifies*) max 5

[12]

**5.** (a) uptake of oxygen / production of carbon dioxide; 1

(b) constriction / narrowing / shunt effect;

of arterioles;

less blood flow to capillaries;

reduces heat loss via radiation / conduction / convection; 3 max

(c) (i) metabolism releases heat;

increase in environmental temperature provides heat / warms mammal;

less heat required from metabolism which falls / levels off; 3

(ii) lack of thermoregulatory control at high temp. / positive feedback;

increase in temperature increases metabolism / respiration; 2

[9]