EXCRETION AND HOMEOSTASIS

1. 1990 Q7 P1

(a) Explain why the body temperature of a healthy human being must rise up to 39^0C on a humid day.

(b) In an experiment a piece of brain was removed from a rat. It was found that the rat had large fluctuations of body temperature. Suggest the part of the brain that had been removed.

2. 1991 Q16 P1

(a) Explain how urea is formed in the human body

(b) Describe the path taken by urea from the organ where it is formed until it leaves the human body

3. 1992 Q4 P1

(a) Explain why sweat accumulates on a person's skin in a hot humid environment.

(b) Name the specific part of the brain that triggers sweating

4. 1992 Q10 P1

Explain why some desert animals excrete uric acid rather than ammonia.

5. 1992 Q19 P1

Explain the part played by each of the following in homeostasis

(a) Insulin and Glucagon

(b) Antidiuretic hormone

(c) Fibrinogen

6. 1993 Q2 P1

State the role of the following hormones in the body:

a. Insulin
b. Antidiuretic hormone

7. 1993 Q10 P1

What osmoregulatory changes would take place in a marine amoeba if it was transferred to a fresh water environment?

8. 1994 Q2 P1

Name two components of blood that are not present in the glomerular filtrate.

9. 1994 Q3 P1

How would one find out from a sample of urine whether a person is suffering from diabetes mellitus?

10. 1995 Q17 P1

Describe how excretion takes place in

(i) Mammalian Kidneys

(ii) Green plants (5 marks)

11. 1996 Q3 P1

When is glycogen which is stored in the liver converted into glucose and released into the blood (1 mark)

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12. 1996 Q21 P1

Explain how the mammalian skin is adapted to perform its functions (20 marks)

13. 1997 Q8 P1

A person was found to pass out large volumes of dilute urine frequently.

(a) Name the disease the person was suffering from (1 mark)

(b) Hormone that was deficient (1 mark)

14. 1997 Q15 P1

The equation below represent a metabolic that occurs in the mammalian liver

Amino acids → Organic compounds + urea

(a) Name the process. (1 mark)

(b) What is the importance of the process to the mammal? (1 mark)

(c) What is the source of amino acids in this process (1 mark)

(d) What is the difference between essential and nonessential amino acids? (2 marks)

15. 1999 Q11 P1

Give reasons for each of the following:

a)Constant body temperature is maintained in mammals. (1 mark)

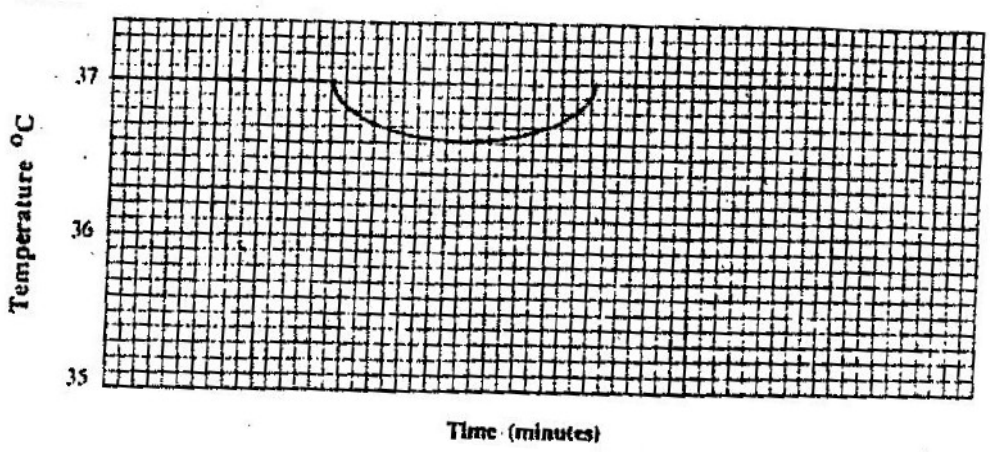
b)Low blood sugar level is harmful to the body. (1 mark)

16. 2000 Q5 P1

State the importance of osmo-regulation in organisms (1 mark)

17. 2000 Q13 P1

The temperature of a person was taken before, during and after taking a cold bath. The results are shown in the graph below



(a) Explain why the temperature fell during bath (2 marks)

(b) What changes occurred in the skin that enabled the body temperature to return to normal? (2 marks)

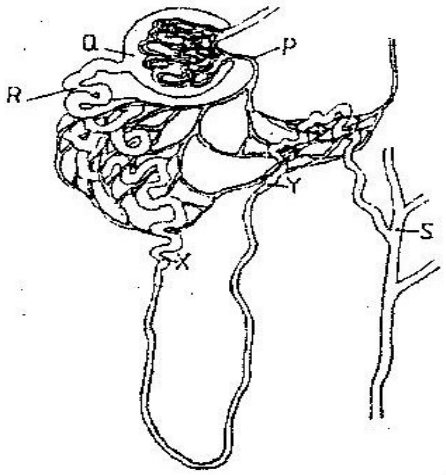
18. 2001 Q6 P1

Adult elephants flap their ears twice as much as their calves in order to cool their bodies when it is hot. Explain. (1 mark)

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19. 2001 Q11 P1

The diagram below represents a mammalian nephron



(a) Name the

(i) Structure labeled P (1 mark)

(ii) Portion of the nephron between point X and Y (1 mark)

(b) Name the process that takes place at point Q (1 mark)

(c) Name one substance present at point R but absent at point S in a healthy mammal (1 mark)

(d) The appearance of the substance you have mentioned in (c) above is a symptom of a certain disease caused by a hormone deficiency. Name the

(i) Disease (2 marks)

(ii) Hormone

(e) State the structural modifications of nephrons found in the desert mammals (2 marks)

20. 2002 Q18 P1

Two person X and Y drunk volumes of concentrated solution of glucose. The amount of glucose in their food was determined at intervals. The results are shown in the table below:

Time (minutes)	**Glucose level in blood (Mg/100cm^3**	
	X	**Y**
0	87	84
15	112	123
30	139	170
45	116	188
60	100	208
90	95	202
120	92	144
150	88	123

a) On the grid provided, plot graphs of glucose level in blood against time on the same axes. (7 marks)

b) What was the concentration of glucose in the blood of X and Y at the 20th minute? (2 marks)

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c) Suggest why the glucose level in person X stopped rising after 30 minutes while it continued rising in person Y. (3 marks)

d) Account for the decrease in glucose level in person X after 30 minutes and person Y after 60 minutes (3 marks)

e) Name the compound that stores energy released during oxidation of glucose. (1 mark)

f) Explain what happens to excess amino acids and development of plants.

21. 2003 Q14 P1

a) Explain how marine fish regulate their osmotic pressure. (4 marks)

b) Explain the role of antidiuretic hormone when there is excess water in the humanbody. (1 mark)

22. 2003 Q17P1

Some students used a model to demonstrate the effect of sweating on human body temperature. Two boiling tubes A and B were filled with hot water. The temperature of water in the tubes was taken at the start of the experiment and then at 5 minutes interval.

The surface of tube A was continuously wiped with a piece of cotton wool soaked in methylated spirit. The results obtained are shown in the table below.

Time (minutes)	**Temperature ^{0}C in tubes**	
	A	**B**
0	80	80
5	54	67
10	40	59
15	29	52
20	21	47
25	18	46

a) On the same axes, plot graphs of temperature of water in the tubes against time. (8 marks)

b) At what rate was the water – cooling in tube A? (1 marks)

c) Why was tube B included in the set up? (1 mark)

d) Account for the rate of cooling in tube A. (3 marks)

e) State two processes of heat loss in tube b. (2 marks)

f) What would be the expected results if tube A was insulated? (1 marks)

g) What would the insulation be comparable to in: (2 marks)
   i) Bird
   ii) Mammals? (2 marks)

h) Name the structures in the human body that detect: (2 marks)
   i) External temperature changes
   ii) Internal temperature changes

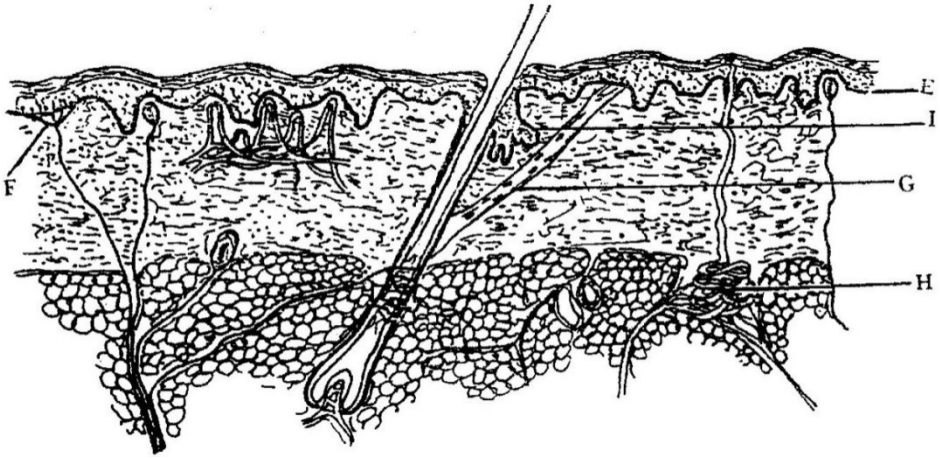
23. 2004 Q18 P1

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How is the mammalian skin adapted to its functions? (20 marks)

24. 2005 Q13 P1

The diagram below shows a section through the mammalian skin.



a) Name the parts labeled E, F and G. (3marks)

b) State two functions in each case of substance secreted by the structures labelled.

(i) H (2 marks)

(ii) I (2 marks)

25. 2006 Q4 P1

a) Name the fluid that is produced by sebaceous glands. (1 mark)

b) What is the role of sweat in human skin? (2 marks)

26. 2006 Q11 P1

State the role of insulin in human body. (1mark)

27. 2006 Q7 P2

Describe how human kidney functions (20 marks)

28. 2007 Q14 P1

(a) What is the meaning of the terms

(i) Homeostatic (1 mark)

(ii) Osmoregulation? (1 mark)

29. 2007 Q2 P2

(a) Explain what happens to excess amino- acids in the liver of humans (3 marks)

(b)Which portion of the human nephron are only found in the cortex? (3 marks)

(c)(i) What would happen if a person produced less antidiuretic hormone? (1 mark)

(ii) What term is given to the condition described in (c) (i) above (1 mark)

30. 2008 Q2 P1

State the importance of the following processes that take place in the nephrons of a human kidney

(a) Ultra filtration (1 mark)

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(b) Selective reabsorption (1 mark)

31. 2008 Q3 P1

(a) Name a disease of the liver whose symptom is jaundice (1 mark)

(b) State the causative agent of:

(i) Cholera (1 mark)

(ii) Candidiasis (1 mark)

32. 2008 Q11 P1

(a) What is homeostasis? (1 mark)

(b) Name three processes in the human body in which homeostasis is involved (3 marks)

33. 2008 Q26 P1

34. 2009 Q17 P1

35. 2009 Q21 P1

36. 2009 Q8 P2

37. 2010 Q18 P1

38. 2010 Q19 P1

State the changes that occur in arterioles in the human skin during thermoregulation. (2 marks)

39. 2010 Q6 P2

In an experiment to investigate a certain physiological process, a boiling tube labeled**A** and a test tube labeled**B** were covered with cotton wool. The two tubes were simultaneously filled with hot water and fitted with thermometers. The experimental set-up was as in the diagrams below.

The temperatures reading were taken at the start and after every two minutes for twenty minutes. The results were as shown in the table below.

Time (minutes)	Temperature (^{0}C)	
	Boiling tube A	Test tube B
0	60	60
2	59	54
4	57	50
6	55	46
8	53	43
10	52	40
12	51	37
14	49	35
16	48	33
18	47	32
20	46	30

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a) Using the same axes, draw graphs of temperature against time. (6 marks)

b) i) Work out the rate of heat in the boiling tube labeled **A** and test tube labeled **B** between the 5^{th} and 15^{th} minutes. (4 marks)

ii) Account for the answers in (b) (i) above. (2 marks)

iii) How does the explanation in (b) (ii) above apply to an elephant and a rat? (2 marks)

c) i) State the role of the cotton wool in this experiment. (1 mark)

ii) Name **two** structures in mammals that play the role stated in (c) (i) above (2 marks)

d) State **three** advantage of having constant body temperature in mammals. (3 marks)

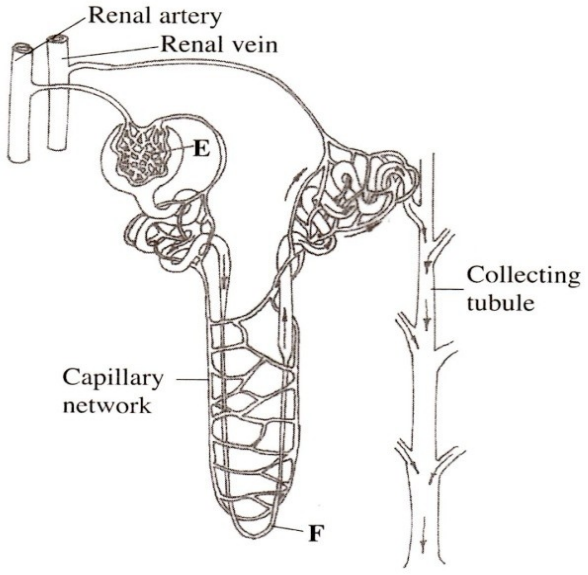
40. 2011 Q1P1
Name two kidney diseases. (2 marks)

41. 2011 Q25 P1

42. 2011 Q7b P2
Explain how the human skin brings about cooling of the body on a hot day. (7 marks)

43. 2012 Q19 P1
List four forms of diabetes mellitus. (4marks)

44. 2012 Q2 P2
The diagram below illustrates the structure of the kidney nephron.



(a) Name the part labeled E. (1 mark)

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(b) How the part is labeled F adapted to its function? (4 marks)

(c) State three physiological mechanisms of controlling the human body temperature during a cold day. (3 marks)

45. 2013 Q8 P2

46. 2014 Q8P2

(a) How does excretion take place in plants? (4 marks)

(b)Describe the role of the human skin in homeostasis (16 marks)

EXCRETION AND HOMEOSTASIS MARKING SCHEME

1. 1990 Q7 P1

(a) Heat from the body metabolism is not lost to the surrounding through sweating because evaporation of sweat will be low; as air is already saturated with moisture

(b) Hypothalamus

2. 1991 Q16P1

(a) Excess amino acids; converts into urea/ deaminated/ in the lever

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(b) Urea in the blood plasma is carried through hepatic vein into inferior/ posterior venacava; right auricle; right ventricle; pulmonary artery into lungs, aorta renal artery; glomarular into Bowman's capsule; kidney tubules ascending and descending/ nephroneuriniferous tubule to urinary bladder, urethra and out of the body in urine;
Acc. Urea in urine is passed out.

3. 1992 Q4 P1

(a) Sweat produced does not evaporate due high humidity and the body does not cool; hence more produced leading to accumulation.

(b) Hypothalamus

4. 1992 Q10 P1

- Elimination of uric acid requires less water than ammonia hence (more) water isconverse
- Uric acid is less toxic than ammonia hence safer to excrete where there is lesswater.

5. 1992 Q19P1

(a) Insulin is produced when there is an increase in the blood sugar level; Its role is to convert glucose into glucagons which is done in the liver/muscle thus lowering the sugar level:
Note-Acc. Bringing sugar level back to normal

- If site of production is wrong mark the rest right - x- cell- insulin
- When the glucose level decreases the glucagons is produced which break down of glycogen to glucose thus raising blood sugar level.

OR

- Insulin is produced when there is increase in concentration of blood sugar level; its role is to convert glucose to glycogen, which is in the liver/ muscle: thus lowering the blood sugar level.

- When the glucose level decreases glucagons is produced which cause breakdown of glycogen to glucose thus raising the blood sugar level.

(b) ADH is produced when there is less water/ high osmotic pressure/ a rise above normal concentration in the blood; (Rej. Body instead of blood) it acts as kidney tubules/ nephrone; (If parts of the nephrone is maintained then at least two must be mentioned) Thus increasing water reabsorbsion from the tubules to the blood stream/ tissues thus resorting/ conserving/ lowering the osmotic pressure;

- When there is more water/ lower the osmotic pressure/ decreased salt concentration on the blood little or no ADH is produced, less water is

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reabsorbed hence more water in urine/ more dilute urine is produced; hence raising the osmotic pressure of the body fluid/ blood.

OR

- ADH is produced when there is less water/ high osmotic pressure/ a rise above normal salt concentration in the blood.

Rej: Very dilute urine instead of more dilute urine.

(c) When blood vessel is cut, there is an exposure of blood platelets to the air, this triggers fibrinogen to be converted to fibrin; the fibrin plugs the cuts surface preventing body fluid/ body fluid/ blood from being lost thus conserving the salts in the water.

6. 1993 Q2 P1

(a) Regulation of blood sugar/ lowers blood sugar level/ controls the conversion of blood sugar to glycogen/ maintains correct blood sugar level(90-100 mg/100cc of blood)

(b) Controls the absorption of H_2O in the kidney (tubules) nephrone/ regulation of H2O in the body/O.P in the blood: rej./kidney body

7. 1993 Q10 P1

More water will enter the amoeba (by osmosis) rate of water discharge be contractile vacuole will increase: contractile vacuoles will formed to discharge the excess water.

8. 1994 Q2 P1

PROTEINS/PLASMA; protein/ fibrinogen, albumin, globulin, prothrombin
BLOOD CELLS; RBC/ white blood cells/ platelets

9. 1994Q3 P1

- Test/ React/ Boil urine with Benedicts/ Fehlings; Positive results/orange red precipitate is an indication of disease diabetes mellitus
- Brick red instead of orange. Use of benedicts solution with boiling/ heat

10. 1995 Q17 P1

(i) Mammalian Kidney

Blood reaches the kidney from the renal/ renal artery enters the kidney; then branches into capillaries/ glomeruli/ in the Bowmna's capsule, blood vessels leaving the capsule/ efferent are those entering it/ afferent causing high pressure to develop in the glomeruli. This forces the plasma/ causes ultra filtration into the capsule.

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The filtrate contains waste products (acc. One example) The filtrate moves into the proximal/ first convolulated tubule; where selective reabsorption of glucose amino acids, some water and vitamins take through the loop of henle; excretory products/ urea, excess water and salts acc, one example) pass into the distal tubule, where the remaining useful substance (acc. One example e.g salts and water) are reabsorbed; The filtrate passes into the collecting tubule; where more reabsorption of water takes place: Excess water, urea and salts (all three must appear)/Urine are removed through the ureter.

(ii) Green plants

CO_2 / O_2 /H_2O diffuse through the stomata lentils/ hydrathods some toxic wastes are converted into non – toxic substances; these are deposited in certain tissues of the plant/ stored in ageing structures. Resins/ tannins – are exuded though the bark of the stem; or lost during leaf fall.

11. 1996 Q21 P1

The cornified layer is made up of dead cells, that prevent entry of bacteria and prevent physical damage; melanin protects the body against U-V variation; sebaceous glands produce a chemical/ ring substance which is of blood vessel; which when the body temperature is high dilate and heat is lost or when body temp is low blood vessels constrict. And heat is retained. Hair when it is called, stands and traps air between themselves; to retain heat/ stop heat loss or when it is hot hair lies flat close on the skin; so does not trap air, and therefore heat is retained and sweat is lost; the skin has sweat glands which produces sweat; sweat evaporates thus cooling the body.

12. 1997 Q8 P1

(a) Disease the person was suffering from

Diabetes inspidus ref. Diuresis/ water diabetes

(b) Hormone that was deficient

Antidiuretic hormone/ ADH/Vasopressin

13. 1997 Q15 P1

(a) Deamination

(b) Removal of excess amino acids availing energy in the body formation glycogen/ fat for storage.

(c) Proteins

(d) Essentials amino acids are acquired from food

Non- essential are synthesized in the body

14. 1999 Q11 P1

a) Most enzymes in the body function within a narrow range of temperature;

High temperature denature enzymes

Low temperature inactive /inhabit enzymes

b) Sugar in a raw material for respiration, hence less energy, available to body/low/rate of metabolism.

15. 2000 Q5 P1

– Maintenance of constant levels of water/ salt/ ions/ osmotic pressure/ for optimum conditions of metabolism/ cellular functions

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16. 2000 Q13 P1

(a) Heat loss by conduction/ convection from the blood vessels
The body skin to the cold water, the cooler blood leaving skin enters general circulation cooling the whole body.

(b) Vasoconstriction; thus less blood flowing to the skin reducing heat loss.
Sweating eases heat produced through metabolism
Accept shivering producing heat

17. 2001 Q6 P1

The surface area to volume ratio is higher in calves than in adults; hence adults retain more heat than the young.

- The surface area to volume ratio is lower in adults than in calves; hence calves loose more heat than adults.

18. 2001 Q11 P1

(a) (i) Efferent arteriole/ vessels
(ii) Loop of henle
(b) Ultra – filtration (acc. Pressure filtration) rej. Filtration
(c) Glucose (acc. Blood sugar)
(d) (i) Disease – diabetes mellitus (acc. Sugar diabetes)
(ii) Hormone – insulin
(e) – Small Bowman's capsule/ Groleruli`; Rej few Bowman's capsule
-long Loop of Henle

19. 2002 Q18 P1

(a) – For exchanged axis award maximum 3 marks for points x identity
The scale must however be correct. For graphs on separate axis mark both and award the highest mark.

(a) Axis = 2
(b) Scale = 1
(c) (plotting) = 1
(d) curves) = 1

(b) X = 120 + -3)
Y = 140 + -3

(c) Person X is capable of regulating glucose while person y is likely to be diabetic.
X – Insulin

(d) X insulin released, excess glucose is converted into glycogen (in liver) must be mentioned if insulin is not mentioned
Y Insulin not released, thus the decline is due to glucose being released in urine.

(e) A.T.P / Adenosine triphosphate

(f) Deaminated; resulting in formation of ammonia
Ammonia combines with CO_2 to form urea (and H_20); Urea is passed out in Urine carbohydrate group is oxidized/ stored as glycogen

20. 2003 Q14 P1

a) Swallow plenty of sea water to increase amount of water in the body

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- Have chloride secretory cells in the gills to remove excess salts
- Eliminate nitrogenous wastes in form of trimthylamineexide which requires little water for elimination.
- Few / small glomeruli; thus slow filtration rate in the kidneys.

b) Less ADH secreted (by pituitary gland); causing less reabsorption of water in the kidney tubules; thus resulting in dilute urine.

21. 2003 Q17 P1

a)

b) $\frac{80 - 18}{2.5} = \frac{62;}{25}$ 2.48C /Min

c) **Control**

d) Rate was faster in tube A; because the film of methylated sprit evaporated; removing heat from the tube;

e) Convection; radiation

f) Lower rate of heat loss;

g) i) birds

Feather

ii) Mammals?

Fur

h) i) external temperature changes

Temperature

ii) Internal temperature changes

Hypothalamus

22. 2004 Q18 P1

The skin is made of epidermis and dermis. The epidermis is made up of three layers. The outermost layer is known as cornified layer; made up of dead cells that protect against mechanical damage/ desiccation/ microbes; the granular layer; is made up of living cells that give rise to the cornified layer, the malpighian layer; contain actively dividing cells that rise to new epidermal cells, that contain melanin that protects the skin against ultra violet rays.

- The dermis has several components has sweat glands' sudondic glands that produce sweat; sweat evaporates carrying it with latent of vaporization) thus reducing the body temperature; under cold conditions little/ no.
- Sweat is produced thus heat is conserved; the sweat contains water/ sodium chloride/ uric acid/ urea; the skin is excretory organ.
- Has hair, the hair stands erect to trap air when temperature is low to reduce heat loss/ lies flat to allow heat loss when the temperature is high.
- Has nerve endings, which are sensitive to stimuli/ such as heat/ cold/ pain/ pressure/ touch
- Has subcutaneous fats/ adipose tissue that insulate the body against heat loss.

- Has arteriole; that vasodilate when temperature are high to lose heat by radiation/ convection (see converse)
- Has sebaceous gland; which secrete sebum, an antiseptic/ water repellant/ that prevent drying/ cracking of skin/ skin supple

Acc blood vessels/ capillaries for arterioles to supply food/ nutrients/ oxygen/ remove excretory products.

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23. 2005 Q13 P1

a) E – Malpighian layer
F – Nerve cell
G – Erector pili muscle

b) i) H – Excretion of waste products of metabolism from the body e.g. excess.
-Water, mineral salts traces of urea, lactic acid etc.
-Temperature regulation in the body brings a cooling effect through
- Loss of excess heat by evaporation of water.

(ii) -Keeps the hair and epidermis flexible and water proof
-Contains antiseptic substances for protection against bacteria.

24. 2006 Q4 P1

(a) Sebum
(b) Kills micro organisms
- Cools the body
- Getting rid of waste/ excretion
Accept named example. E.g. urea, sodium chloride, excess water, uric acid, tactic acid.

25. 2006 Q11 P1

Stimulates conversion of excess glucose to glycogen for storage
Enhances break down of glucose; stimulates glucose converts to fats and stored.

26. 2006 Q7 P2

The afferent arteriole which is the branch of renal artery supplies blood to glomerulus; the afferent arteriole has a wider diameter than the afferent arteriole; this causes high pressure; leading to ultra filtration. The walls of the blood capillaries are one cell thick hence glucose, amino acids, (vitamins, hormones) salts, (creatinine) urea and water filter into Bowman's Capsule to form glomerular filtrate; White blood cells/ red blood cells and plasma proteins such as (Globulin, fibrinogen, platelets) are too large to pass through the capillaries: the filtrate flow into the proximal convoluted tubule; where amino acids (vitamin) and all glucose are selectively reabsorbs back into the blood stream. Many mitochondria provide energy for re- absorption of these substances against concentration gradient/ by active transport. The Glomerular filtrate flow into loop of henle.
Water in descending loop moves by osmosis into the blood capillaries; sodium chloride is actively pumped from the ascending arm of loop henle into the blood capillaries.

The glomerular filtrate flow into the distal convoluted tubule, water is absorbed from distal convoluted tubule into blood capillaries; the glomerular filtrate flows into collection tube/ duct from where more water is reabsorbed into the blood stream.

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Antidiuretic hormone influences the amount of water reabsorbed (depending on osmotic pressure of blood); the glomerular filtrate from collecting duct now referred to as urine; is emptied into pelvis. The urine passes through pelvis and ureter into bladder out of the body through urethra.

27. 2007 Q14 P1

(a) (ii) maintenance of a concentration of water and salts ion the body fluid.

(b) Insulin - Glucagon

28. 2007 Q2 P2

(a) The amino acids are broken into amino group (NH_2) and carboxyl group (COOH). The amino group combines with hydrogen forming highly toxic ammonia
It immediately combines with carbon (iv) oxide forming urea that is less toxic.
- The carboxyl group converted to carbohydrates and then oxidized or converted into neutral fats and deposited on the parts of the human

(b) Bowman's capsule
- Proximal convulated tubule
- Distal convulated tubule

(c) (i) Less water reabsorbed the blood stream and dilute urine produced
(ii) Diabetes insipidus

29. 2008 Q2 P1

(a) To remove toxic/ harmful substances/ urea nitrogenous waste from the blood streams

(b) To return useful substances/ glucose and Amino acids loose into the Bloodstream.

30. 2008 Q3 P1

(a) Hepatitis (A- E lipids)

(b) (i) Vibriachlerae
(ii) Canida/ candida albinism

31. 2008 Q11 P1

(a) Ability of organism to maintain a stable/ constant internal/ tissue fluid

(b) Gaseous exchange; Thermoregulation; Osmoregulation; regulation of blood sugar; regulation of pH of tissue fluid.

32. 2008 Q26 P1

(a) Inducing polyploidy/ treatment

(b) Meat tenderizer

33. 2009 Q17 P1

Some wastes e.g. gases easily diffuse out;
- Waste products are mainly made from carbohydrates and (NB: Must mention some /most) hence are not as harmful as proteineous materials; / waste products are formed slowly / little accumulation of wastes / plants are less active; / some waste

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products (such as 0_2 and are re-usable – recycled; / some water products are store in non-toxic forms in leaves, flowers, fruits and old bark.

34. 2009 Q21 P1

– Pancrease releases glucagons; to stimulate liver cells to convert stored glycogen to glucoses; fat converted to glucose; / reduces rate of respiration. *Rej: if source of glycogen is the liver*

35. 2009 Q8 P2

Regulation of blood glucose

The normal amount of glucose in the blood is 90mg/1000m^3, increase in blood sugar level is detected by cell of the (beta cells) pancrease, which secrete insulin; insulin stimulates the liver to convert excess glucose to glucogen. Further excess glucose is converted to fats. Excess glucose is also oxidized to energy (carbon IV) oxide & water / respiration

Decrease in blood sugar level below the normal level is detected by the (alpha cells) by the pancreases, which secretes glucogen that stimulates the liver, to convert glocogen to glucose, fats/ amino acids are converted to glucose, there is reduced oxidation of glucose until the normal level of blood sugar is attained).

Deamination / excess amino acids are deaminated (removal) of amino group; the amino group is converted to ammonia which combines carbon (iv) oxide to form urea that is excreted through the kidney, urea is excreted through the skin s sweat (4 marks)

- Detoxification / poisonous substances are converted to less harmful compounds (1mark)
- Thermoregulation / maintenance of body temperature heat is generated (in the liver) by chemical activities; the heat is distributed (3 marks)

$NH_2 + H \longrightarrow NH_3$

$2NH_3 + CO_2 \longrightarrow CO(NH_2)_2 + H_2O$

Ammonia urea

36. 2010 Q17 P1

Animal form waste products more rapidly than plants/ Produce more metabolic wastes

Animals don't reuse their waste while plans reuse some of their wastes;

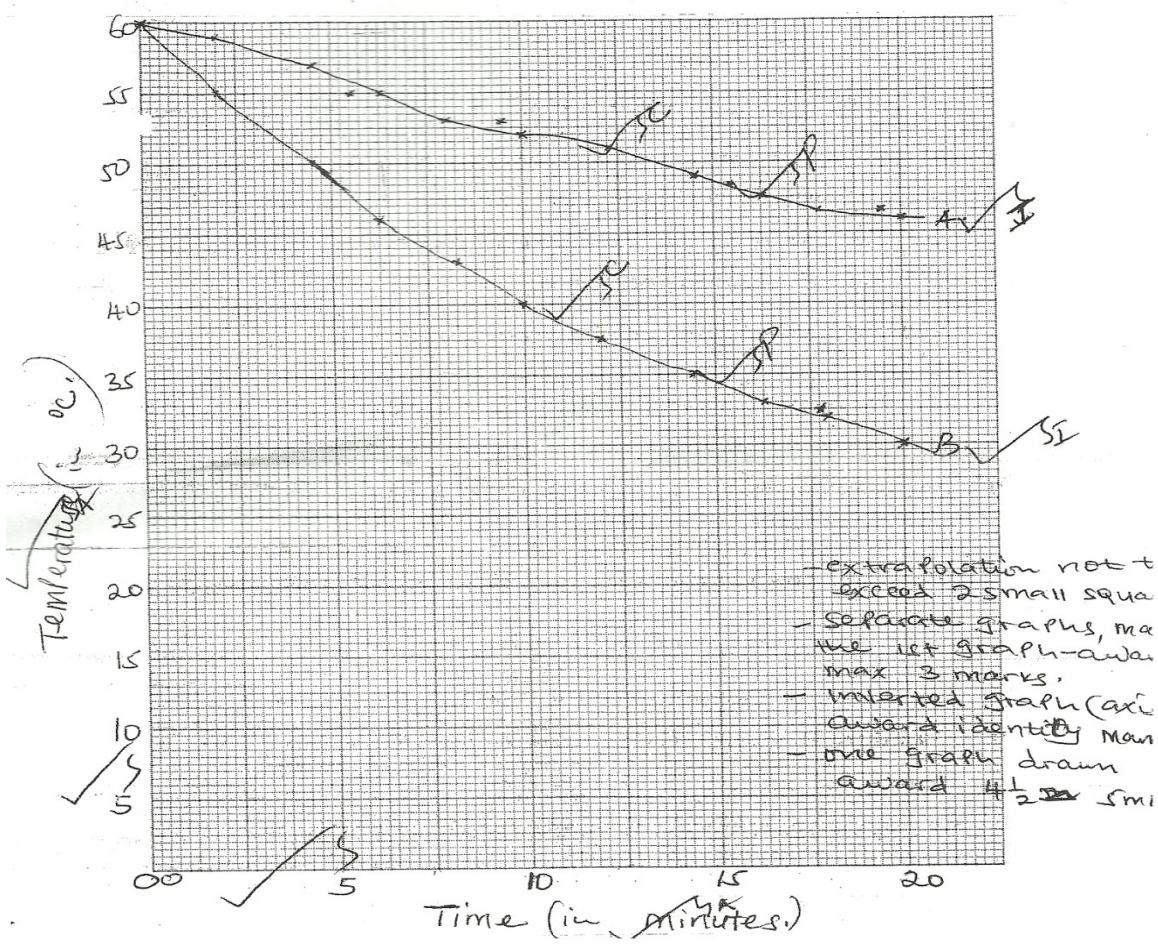
37. 2010 Q19 P1

When temperature is high they dilate; when low they constrict (Acc. Vasodilatation)

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38. 2010 Q6 P2

a) .



b) i) **A** $\frac{56 - 48.5}{15 - 5} = \frac{7.5}{10} = 0.75 + - 0.05$ per minute.

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B $\frac{48 - 34}{15 - 5} = \frac{14}{10} = 1.4 + - 0.05$ per minute.

ii) B has a large surface area to volume ratio making it to lose heat to the to the surrounding faster; Acc the converse/ viceversa.

iii) A rat has a larger surface area to volume ratio compared to an elephant; making the rate to lose heat at a faster rate than an elephant; Acc: the converse/ Viceversa.

c) i) Insulate against heat loss (to surrounding)

ii) Subcutaneous fat (layer) / Adipose tissue/ Bludder; fur/ hair; Rej: wool.

d) Are active always(even under very cold conditions);
Able to escape from predators/ search for food/ mates (because they are active always)
Can survive in (any habitat) both cold & hot habitat / wide range of habitats.

39. 2011 Q1 P1

(i)Nephritis

(ii) Kidney stones (2marks)

40. 2011 Q25 P1

(a) Softening of leather; (1mark)

(b) Treatment of malaria; (1 mark)

(c) Stimulant used in beverages; (1mark)

41. 2011 Q6(b) P2

(b)

- (When the osmotic pressure of blood increases by the normal level) Osmoreceptors in the hypothalamus detects this and stimulates the (posterior tube) pituitary gland to secrete more ADH; which make kidney tubules more permeable to water and more water is reabsorbed into the blood; reducing the osmotic pressure to normal; when the osmotic pressure of the blood decrease beyond the normal level the osmorecepetors in the hypothalamus detect this. The pituitary gland is less stimulated; less / little ADH is secreted; which makes kidney tubules less permeable to water; less water is reabsorbed into the blood; raising osmotic pressure to normal;
- When there is too much Na^+(ions) in the blood; adrenal cortex responds by secreting less aldosterone; which causes less Na^+ to be absorbed from the gut into the blood; and less Na^+ to be reabsorbed from the kidney tubules into the blood; lowering the Na^+ level.
- When O.P is low, where there is too little Na^+ ions in the blood adrenal cortex responds by secreting more aldosterone; which causes more Na+ to be absorbed from the gut into the blood; and more Na^+ ions to be reabsorbed from the kidney tubules into the blood; raising sodium level back to normal.

42. 2011 Q7b P2

- Erector pili muscles relax; and hair lies flat; trapping les air; thus reducing insulation; more heat is lost;

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- Blood capillaries / vessels / arterioles in the skin vasodilate and more blood is brought near the skin surface; increasing heat loss, the sweat takes away heat from the body when it evaporates;

43. 2012 Q18 P1

Most of the waste products are harmless; converted into harmless products

43. 2012 Q19 P1

Passing urine frequently/polyuria; Glucose/excess glucosein urine/constant feeling of thirst/Dehydration;excess glucose in blood/hyperglycaemia;loss of weight;excessiveeating;poor resistance to diseases;excessive eating/polyphagia/hyperphagia

44. 2012 Q2 P2

. (a) Glomerulus

(b) (i) It is long;to increase surface area for reabsorption of water

(ii) It is lined with a network of capillaries;to enhance reabsorption of water

(iii) It is U-shaped;to bring about counter current multiplier effect/to concentrate salts in the medulla to bring about reasborption of water;

(iv) Has ascending and descending limb;In the descending limb water is reasbsorbed into the blood stream while in the ascending limb solutes/sodium ions/potassium chloride ions are reabsorbed into the bloodstream.

(c) Vasoconstriction
Hair rises; Accpiloerection
Metabolic rate increases
Shivering

45. 2013 Q8 P2

(a) • <u>Regulation of blood sugar /glucose:</u>

Normal amount of glucose in the blood is 90 mg/100cm^3. Increase in blood sugar level is detected by cells in the pancreas i.e. beta cells which secrete insulin hormone. Insulin stimulates the liver to:-

- Convert excess glucose into glycogen
- Further excess glucose be converted to Fats
- Oxidize excess glucose to produce energy, carbon (IV) oxide and water i.e. increases oxidation of glucose to yield energy.
- Inhibit conversion of glycogen into glucose - these mechanisms lower blood sugar back to normal. Decrease in blood sugar level below normal is detected by alpha cells in the pancreas. They secrete glucagon hormone that stimulate the liver to:
- Convert glycogen stored in muscle cells and liver cells into glucose
- Convert fat and amino acids to glucose
- Reduces oxidation of glucose to energy until normal levels of blood sugar is attained.

These mechanisms raise blood sugar back to normal.

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- Deamination: It's a process where excess amino acids are broken down by removal of amino group to ammonia. Ammonia being toxic combines with carbon (IV) oxide in ornithine cycle to form a less toxic substance i.e. urea. Urea is excreted via kidney, some traces through the skin as sweat.

- Detoxification: It's a process where poisonous or harmful substances are converted to less harmful compounds to avoid altering cell metabolism if they are left to accumulate. This can be done through oxidation, reduction or combining with other substances then excreted in urine.

  Example: hydrogen peroxide is produced by every respiring cells and it is toxic. It's broken down by enzyme catalase into oxygen and water which are harmless.

$$2H_2O_2 \rightarrow 2H_2O$$

- Thermoregulation: the liver carry's out many metabolic activities which release heat energy, which is then distributed by the blood to the rest of the body.

- Regulation of plasma proteins: many plasma proteins are synthesized from amino acids in the liver. Examples are globulin, fibrinogen, and prothrombin albumen. The liver also destroys them when in excess through deamination to regulate their quantities.

- Haemoglobin elimination: - worn out red blood cells are broken down in the liver by kupfer cells and residual pigments urochrome - excreted through urine and gives it a yellow tinge colour. Haemoglobin is also broken down into haem group and globin. Globin is digested into amino acids while haem group is changed into biliverdin and bilirubin, taken to the gall bladder then released into gut as bile. They are then passed out through faeces and they give faeces its characteristic brown colour.

- Bile production: bile is formed by the liver cells and contains secretory and excretory products. Secretory products are bile salts for fat emulsification while excretory products are bilirubin and biliverdin from breakdown of haemoglobin.

(b) When in hot environmental condition, the body temperature rises above normal, the skin sets in place corrective mechanisms to reduce the temperatures back to normal. Sweat glands in the skin become active hence excrete sweat which contains excess water, heat, traces of urea, lactic acid and salts, that are bought on the skin surface by sweat ducts.

As sweat evaporates, it absorbs latent heat of vapourisation from the body cells and this brings a cooling effect to the body.
Superficial arteries in the skin vasodilate hence the lumen becomes wider and more blood flows near the skin surface. This encourages heat loss from the body through conduction and radiation to the atmosphere.
The erector Pilli muscles of the skin hair relax making the hair to lie flat on the skin surface, tapping less air between hairs thus reducing insulation so that the heat is lost by radiation and convection to the atmosphere.

46. 2014 Q8P2

(a)

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Diffusion of carbon (IV) oxide and oxygen; through stomata / lenticels; deposition /some wastes are stored in tissues in non-toxic form (calcium oxalate, caffeine, nicotine quinine; some of these tissues /organs drop off from plants (leaves flowers fruits and bark)
Some wastes are released by transpiration, stomata and lenticels (as water vapour) others are released by guttation; (through hydathodes as water)
Others are released by exudation (eg salts, gum, calcium plate, resin water(wrong examples don't ward)

(b)

When body temperature is lowered below normal blood vessels / blood arterials in the skin constrict; blood is diverted to a shunt system , accept less blood flows to the skin / less heat vessels lost when body temperature is

When body temperature is lowered below normal
Erector muscles contract; hair stands erect; more is trapped; air is a hard conductor and insulates the body against heat loss; when body temperature is raised above normal, erects, pelil muscles relax; hair lies on skin; less air is trapped; more heat is lost;

When body temperature is lowered below normal, less fluids are absorbed by sweat glands / less sweating; less vaporization of water; when body temperature is raised above normal, sweat glands are stimulated more sweat is produced , sweat evaporates / water in the sweat evaporates and takes up heat from the body. Body is cooled / body temperature is lowered.

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