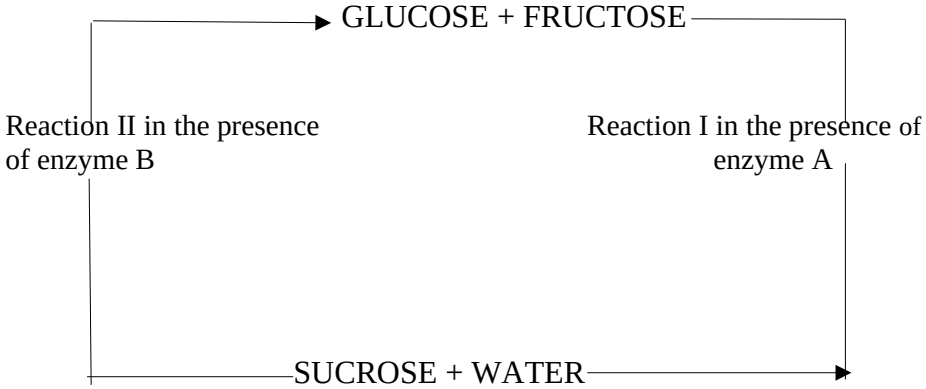
NUTRITION IN ANIMALS

1. 1989 Q1 P1

The diagram below shows chemical reactions I, and II which are controlled by enzymes respectively.



Name reaction II and enzyme B

2. 1991 Q4 P1

State one similarity and one difference between parasitic and predatory modes of feeding

3. 1991 Q9 P1

In an investigation, the pancreatic duct of a mammal was blocked. It was found that the blood sugar regulation remained normal while food digestion was impaired. Explain these observations.

4. 1992 Q12 P1

(b) Give four ways by which the tapeworm is (taenia Spp) is adapted to living in the alimentary canal of its host.

5. 1993 Q10 P1

Give a reason why lack of roughage in diet often leads to constipation

6. 1995 Q10 P1

7. 1996 Q4 P1

Name the disease in humans that is caused by lack of vitamin C (1 mark)

8. 1997 Q10 P1

Name a disease caused by lack of each of the following in human diet. (2 marks)

Vitamin D……

Iodine……..

9. 1997 Q20 P1

(a) What is meant by the term digestion? (2 marks)

(b) Describe how the mammalian small intestine is adapted to its function (18 marks)

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10. 1998 Q18 P1

A hungry person had a meal, after which the concentration of glucose and amino acids in the blood were determined. This was measured hourly as the blood passed through the hepatic portal vein and the iliac vein in the leg. The results were as shown in the table below.

Time (Hrs)	*Concentration of contents in hepatic portal vein (mg/100ml)*		*Concentration of contents in the iliac vein of the leg (mg/100ml)*	
	Glucose	*Amino acids*	*Glucose*	*Amino Acids*
0	85	1.0	85	1.0
1	85	1.0	85	1.0
2	140	1.0	125	1.0
3	130	1.5	110	1.5
4	110	1.5	90	3.0
5	90	3.0	90	2.0
6	90	2.0	90	1.0
7	90	1.0	90	1.0

(a) Using the same axes draw graphs of concentration of glucose in the hepatic portal vein and the iliac vein in the leg against time (2 marks)

(b) Account for the concentration of glucose in the hepatic vein from:
(i) 0/1 hour (2 marks)
(ii) 1-2 hour (3 marks)
(iii) 2- 4 hours (3 marks)
(iv) 5 – 7 hours (2 marks)

(c) Account for the difference in the concentration of glucose in hepatic portal vein and the iliac vein between 2 and 4 hours. (2 marks)

(d) Using the data provided in the table explain why the concentration of amino acids in the hepatic portal vein took longer to increase. (1 mark)

11. 1998 Q20 P1

Explain how the mammalian intestines are adapted to perform their function.

12. 2001 Q5 P1

State two functions of muscles found in the alimentary canal of mammals.

13. 2001 Q16 P1

An experiment was carried out to investigate the nutritional value of two dry powder animals feeds X and Y over a period of six months. Twenty 5 month's old castrated goats were use. The goats were divided into two equal groups A and B.

The animal's in group A were fed on feed X throughout the experiment while those of group B were fed on feed Y.

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The feeds were supplemented with dry hay and water. The average body weight of each group of goats and the weight of the dry powder feeds were determined and recorded each month. The faeces produced by each group was dried and weighed and the average dry faecal output per month was also recorded. The results are as shown below.

	GROUP A			**GROUP B**		
Months since commencement of the experiment	Average total weight of goats (kg)	Average weight of total feed.(kg)	Average monthly dry faecal output (kg)	Average total weight of goats(kg)	Average weight of total feed (kg)	Average monthly dry faecal output (kg)
0	20.4	26.7	10.5	20.5	35.4	16.5
1	22.5	27.5	10.7	19.5	34.3	17.7
2	24.5	25.8	10.3	19.0	35.2	17.2
3	26.3	18.5	8.8	18.5	36.1	17.5
4	28.0	16.6	7.2	17.1	36.0	16.9
5	29.4	16.3	6.0	16.3	35.8	16.8
6	29.5	16.1	5.6	15.6	35.5	16.6

(a) (i) What is the relationship between the amount of feed and the faecal output (2 marks)

(ii) Work out the average increase in weight for the animal's in group A during
The first four months……. (2 marks)
The last two months…….. (2 marks)

(iii) Account for the average increase weight in goats in group A during the first four months and the last two months (2 marks)

(iv) Which of the two feeds is more nutritious? Give reason for your answer (1 mark)

(b) State four uses of digested food in the bodies of animals (4 marks)

(c) State four uses of water in the bodies of animals (4 marks)

14. 2002 Q3 P1

a) State the function for co-factors in cell metabolism (1 mark)

b) Give one example of a metallic co – factor (1 mark)

15. 2002 Q10 P1

What happens to excess fatty acids and glycerol in the body? (1 mark)

16. 2003 Q8 P1

State a function of the large intestine in humans

17. 2006 Q8 P1

State the role of vitamin C in humans. (2 marks)

18. 2006 Q11 P1

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

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19. 2006 Q17 P1

a) Distinguish between the terms homodont and heterodont. (1 mark)

c) A certain animal has no incisors, no canines, 6 premolars and 6 molars in its upper jaw. In the lower jaw there are 6 incisors, 2 canines, 6 Premolars and six molars. Write its dental formula. (2 marks)

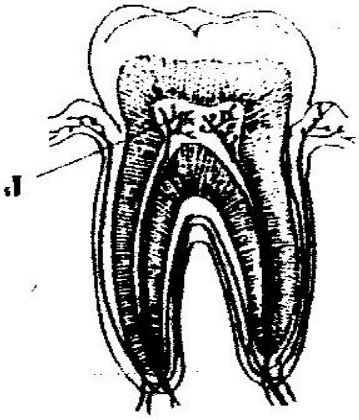
20. 2006 Q18 P1

a) State two functions of bile juice in the digestion of food. (2 marks)

b) How does substrate concentration affect the rate of enzyme action? (1 mark)

21. 2007 Q7 P1

The diagram below represents a section though a human tooth



(a) (i) Name the type of tooth shown (1 mark)

(ii) Give a reason for your answer in (a) (i) above (1 mark)

(b) State the functions of the structures found in part labelled J (2 marks)

22. 2007 Q8 P1

(a) Name a fat soluble vitamin manufactured by the human body (1 mark)

23. 2007 Q25 P1

(a) The action of ptyalin stops at the stomach. Explain (1 mark)

(b) State a factor that denatures enzymes (1 mark)

(c) Name the features that increase the surface area of small intestines (2 marks)

24. 2008 Q9 P1

Give three factors that determine the amount of energy a human being require in a day (3 marks)

25. 2008 Q10 P1

(a) Name the antigens that determine human blood groups (2 marks)

(b)State the adaptation that enables the red blood cells to move in blood capillaries (1 mark)

26. 2008 Q15 P1

Explain what happens when there is oxygen debt in human muscles (2 marks)

27. 2008 Q23 P1

The diagram below shows a human tooth (2 marks)



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(a) Identify the tooth (1 mark)
(b) How is the tooth adapted to its function (1 mark)
(c) State the role of the following vitamins in the human body
(i) C (1 mark)
(ii) K (1 mark)

28. 2009 Q22 P1

29. 2009 Q23 P1

30. 2009 Q24 P1

31. 2009 Q2 P2

32. 2009 Q6 P2

33. 2010 Q16 P1

What is the role of bile salts in humans? (2 marks)

34. 2010 Q17 P1

The following is the dental formula of a certain mammal:

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$$i\frac{0}{3}c\frac{0}{1}pm\frac{3}{3}m\frac{3}{3}$$

a) State the likely mode of feeding for the mammal. (1 mark)

b) Give a reason for your answer in (a) above. (1 mark)

35. 2011 Q2 P1

a) Write the dental formula of an adult human. (1 mark)

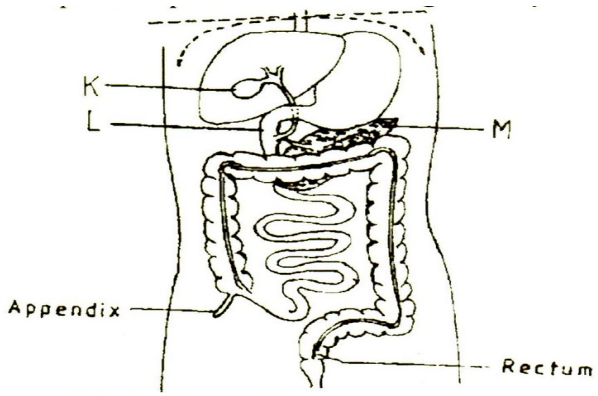
b) Name two dental diseases. (2 marks)

36. 2011 Q13 P1

State two functions of carbohydrates in the human body (2 marks)

37. 2011 Q17 P1

The diagram below represents part of the human digestive system



(a) Name the organs labelled L and M. (2 marks)

(i) Name the substance produced by the organ labeled K. (1 mark)

(ii) State the function of the substance named in b(i) above. (1 mark)

38. 2011 Q18 P1

a) Name one salivary gland in humans. (2 marks)

b) State two functions of saliva. (2 marks)

39. 2012 Q1 P1

How does nutrition as a characteristic of living organisms differ in plants and animals? (2 marks)

40. 2012 Q11 (b) P2

Name the muscles found in the following organs:

Stomach;

Bone (2 marks)

41. 2012 Q29 P1

Name two nutrients that are observed without being digested by enzymes in humans. (2 marks)

42. 2013 Q2 P1

(a) State two roles of mucus in the stomach. (2 marks)

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43. 2013 Q3b, c P2

(b)Name one appropriate food substance for each of the following enzymes:

(2 marks)

i) Ptyalin.

ii) Pepsin..

(c)State the cause and **two** symptoms of Beri-beri.

Cause..... (1 mark)

Symptoms..... (2 marks)

44. 2014 Q7b P2

Describe the process of carbohydrate digestion ion human beings (16 marks)

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MARKING SCHEME

1. 1989 Q1 P1

Reaction I: - Condensation
Enzyme B: - Sucrase

2. 1991 Q4 P1

Similarity- Both are heterotrophic.
Difference: Predators kill to get food while parasites obtain foods without (necessarily) killing the host.

3. 1991 Q9 P1

Pancreatic juice containing digestive enzymes; is prevented from reaching food
Insulin(and glucagons) which regulates sugar is released directly into the blood stream.

4. 1992 Q12 P1

a) i) Herbivorous
ii) Absence of incisors in the upper jaw
Presence of diastema/Absence of canines
b) –Long flat body suitable for fitting into the alimentary canal providing large surface area for absorption of food.
- Presence of suckers/hooks for attachment/preventing it from being egested (moved out)
-Produces Chemicals/mucus to neutralize/inhabit/prevent digestion of hosts enzyme.
- Loss/lack of simplified digestive systems because they are not needed
- High eggs production to ensure next generation
- Tolerance to low oxygen content/anaerobic.

5. 1993 Q5 P1

- Roughage provides grip needed for peristalisis/lack of roughage results in slow/no movement of food leading to constipation. (Acc. Add bulk to food peristalisis to take place:)

6. 1995 Q10P1

(a) K-Enzymes/ Sucrose/ Invertase/ Saccharise
L- Inhibitor Acceptance any example e.g. any acid

(b) – Addition of sucrose/ substrate
- Optimum/ suitable/ correct / right pH
- Removal of products

(c) - Competed with substance: for active site (of K)
- Acc. L made the medium acidic; unsuitable for K
- L occupies active sites

7. 1996 Q4 P1

Scurvy

8. 1997 Q10 P1

Vitamin D- Rickets/Osteoporosis
Iodine- Goitre

9. 1997 Q20 P1

(a) Breakdown of (complex) food substances by enzymes; to simpler compounds (which can be absorbed)

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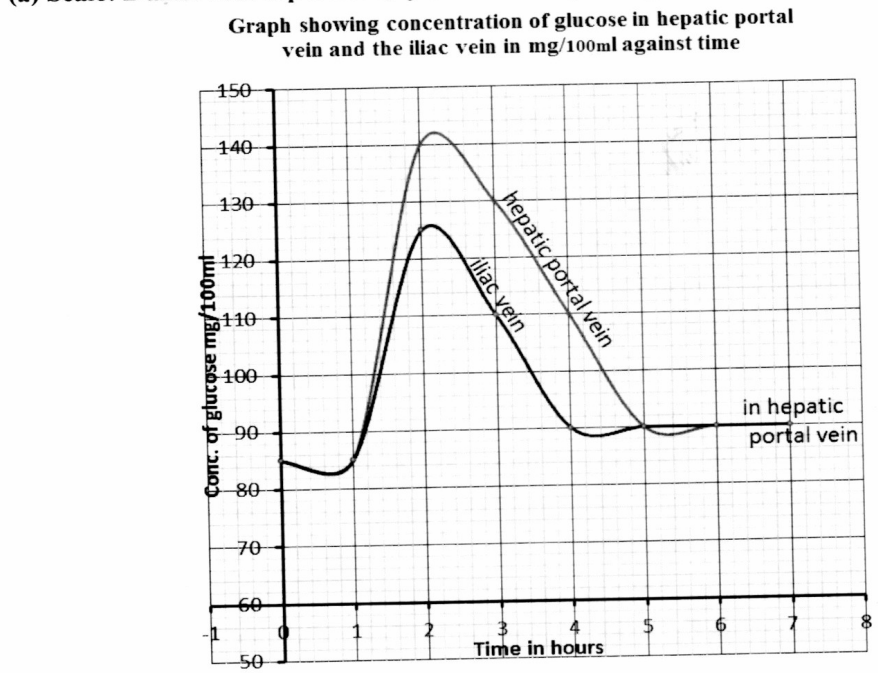
(b) Small intestines are long/coiled: to offer large surface area for digestion and absorption:
The walls are muscular: for peristalsis/ inner walls posses mucus glands/ accept goblet cells that secrets mucus; for lubrication; and protection of wall from digestive enzymes:
The inner walls have digestive glands: that secret (digestive) enzyme:
The inner walls have villi: to increase surface area,
absorption/ diffusion; accept 'epithelium is one cell thick'
The Villi have numerous blood vessels: for transport of the end products of digestion; accept at least two correctly named examples/ end products of glucose amino acids/ mineral salts vitamins.
The villi also have vessels for transport of fats/lipids
Accept illustrations of cell are thick epithelium

10. 1998 Q18 P1

(a) If axes reversed allow marks for identification of curves only max 2
Correct scales
Correctly leveled axes
Curves reject broken lines for curves

(a) Scale: x-axis: 1cm rep 1 hour, y-axis: 1cm rep 10mg/100ml



(b) 0-1 hour.
i) Acc constant/low/below normal levels in blood; No/little digested foods/glucose from the intestines/gut/alimentary canal/absorption.

ii) 1-2 hours
Sharp increase in concentration of glucose in blood; (more) absorption of glucose; after digestion of the meal.

iii) 2-4 hours.
Glucose concentration declining/decreasing; less glucose being absorbed; (more) glucose being converted to glycogen in the liver/tissue/used for (tissue) respiration.

iv) 5-7 hours.
Concentration of glucose stabilizes/constant/ this is the normal glucose level concentration in the blood.

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(c) The concentration of glucose in the iliac vein is lower than in the hepatic portal vein because it hasn't been stored in the liver to be used respiration. Portal vein because most of it was stored/used up by the liver/other tissues/respiration.

(d) Proteins take longer to digest.

11. 1998 Q20 P1

The mammalian intestines are relatively long/coiled/folded. This allows food enough (enough) lime/increases surface area for digestion and absorption of products of digestion. The intestinal surface area for absorption. The glands have enzymes which secrete enzymes for digesting e.g. of correct enzyme, maltase, sucrase, lactase, enterokinase and peptidases. Some glands/goblets cells also produce mucus which protects the intestinal wall from being digested, reduce friction. Intestines have opening of ducts which allows bile/pancreatic juice into the lumen. The intestines have circular and longitudinal muscles whose contraction/relaxation/peristalis leads to the mixing of food with acc.

At least enzymes/juices facilitating rapid digestion and helps pus food along the gut. Intestines are well supplied with blood vessels to supply oxygen/remove digested food. Presence of lacteal vessels for transport of fats/lipids.

Have thin epithelia to facilitate fast/rapid absorption/diffusion. Allow increase in surface area for absorption only.

Cell biology/cytology. Occurrence of cell e.g. mitochondria, ribosome's, nucleus, cytochromes organelle point to a common ancestry.

12. 2001 Q5 P1

Act as valves for regulations of food movement/ to close or open various parts of the canal.

- Churning (acc. mixing food with enzymes) pushing food along peristalsis

13. 2001 Q16 P1

(a) (i) The more the feed the more the faecal output

The less the feed the less the faecal output

(ii) The first four months

$\frac{2.1 + 2.0 + 1.8 + 1.7}{4}$ | $\frac{28.0 - 20.4}{4}$ | $\frac{7.6; 1.9 \text{ (kg)}}{4}$

The last two months

$\frac{14 + 0.1}{2}$ | $\frac{29.5 - 28.0}{2}$ | $\frac{1.5}{2} = 0.75\text{kg}$

(iii) Fast/ rapid/Active growth hence increase in weight

The last two months

Slow growth, reached maturity

(iv) Feed X

Give reason for your answer

Group A gained (more) weight, on less food while group B lost weight on more food.

a) growth, repair, protection, energy production

b) a solvent, transport medium.. Hydrolyses of food, maintenance of temperature.

14. 2002 Q3 P1

a) Substances that activate enzymes

b) Metallic ions e.g. iron / mg / Zn / Cu /(accept correct iron forms)

Fe^{2+}, Mg^{2+}, Ca^{2+}, $Mn^{2+,}$ $C0_2^{+}$, Kl, mo^{2+}, (Reject wrong charges).

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15. 2002 Q10 P1

Converted into fatty acids and stored beneath skin (adipose tissue)

16. 2003 Q8 P1

Absorption of water; accept absorption of salts / calcium / iron;
secretion of mucus

17. 2006 Q8 P1

Prevents scurvy/ prevent bleeding of gums/ prevent bleeding of gums/ Prevents poor healing of wounds/ prevent degeneration of muscle and cartilages/ prevent red spot on skin/ prevent anaemia
Excretion absorption of iron
Enables absorption of iron
Boost immunity
Development of healthy gums
Synthesis/ maintenance of collagen fibres/ connective

18. 2006 Q11 P1

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

19. 2006 Q17 P1

(a) Homodont – having same kind/ type/ similar teeth. Heterodont – having different type kind of teeth

(b) Cutting/ chopping/ Shearing/ Slicing/ crusting

(c) C $\frac{0}{1}$ PM $\frac{3}{3}$ M $\frac{3}{3}$

Either capitals or small letters accepted. Their must horizontal line separating upper jaw from lower jaw.

20. 2006 Q18 P1

(a) Emulsification of fats/ breaking into small droplets; Increase surface area for digestion; Neutralizes acidity of chime/ provides alkaline media for enzyme action.

(b)Increase in substrate concentration rise enzyme action up to a certain point and further rise of substrate will have no effect.

21. 2007 Q7 P1

(a) (i) – Pre- molar tooth
(ii) – presence of two roots
- Presence of cusps of the crown

(b) Has nerve cells that increase sensitivity of the tooth to heat and pain
- Has a blood vessel that provides nourishment to the tooth and remove Waste products

22. 2007 Q8 P1

(a) Vitamin D, Vitamin K.

(b)- Transmission of nerve impulses
- Ionic balance/ osmotic balance
- Contraction of muscles

23. 2007 Q25 P1

(a) In the stomach there is acid medium and ptyalin only acts at slightly

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alkaline medium

(b) High temperature above 40^0

(c) Villi- microvilli

24. 2008 Q9 P1

(a) Body size; sex; age

25. 2008 Q10 P1

(a) Antigen B, Antigen A

(b) Flexible/ able to change in shape

26. 2008 Q15 P1

Muscles respire anaerobically; resulting in accumulation of lactic acid in the tissue; causing fatigue/ muscle crumps.

27. 2008 Q23 P1

(a) Canine

(b) Pointed/ sharp for piercing/ tearing/ cutting food

(c) (i) C- Absorption of lien/ prevent scurvy/ quick healing of wounds/ best immunity/ ant oxidants/ prevents anaemia/ formation of connective tissues/ K – blood clothing

28. 2009 Q22 P1

Large / powerful for cracking / breaking / crushing bone;/ slide past each other / scissor – like for shearing / cutting / slicing (off) flesh / tendons / skin from bone;

29. 2009 Q23 P1

A component of hemoglobin / formation of haemoglobin; *Acc: Myoglobing*

30. 2009 Q24 P1

(a) Young people are actively / rapidly growing hence require more energy than older people *NB: Growth has to be mentioned*

(b) Manual workers require more energy than secretary workers

(c) Males are more muscular hence require more energy than females

31. 2009 Q2 P2

(a) Herbivorous: *Rej Herbirore Acc Herbirory*

(b) Tooth J is narrow / sharp / chisel like while tooth L is broad / ridged.
Accept: J has one root while L has 2/3/4 roots

Functional

(a) (i) Diastema

(ii) For manipulation of food by the tongue

(b) Calcium phosphate; Rj calcium / phosphorous / phosphate.

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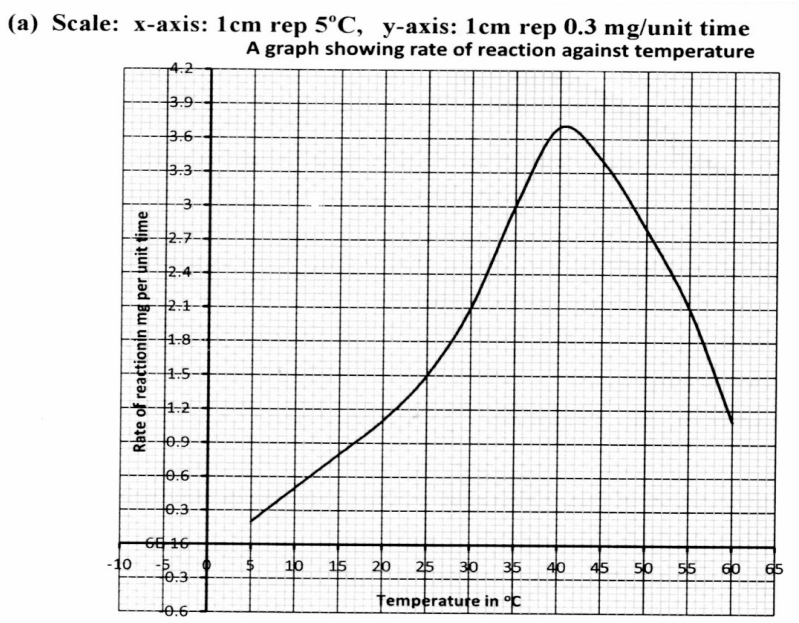
32. 2009 Q6 P2

(a)

(a) Scale: x-axis: 1cm rep 5°C, y-axis: 1cm rep 0.3 mg/unit time



(b) 33˚C and 51.5 (±0.5˚C)
32.5 – 33.5 AND 51.0 - 52.0)

(c) (i) As temperature is increased, rate of reaction is increased / more products are formed (per unit time), because enzymes become more active.
(ii) As temperatures increase rate of reaction decreases less products are formed (unit per time) because enzymes become denatures, by high temperature

(d) Increase in enzyme concentration and substrate concentration
Rej: increasing number of enzymes
Acc: increasing number of enzymes

(a) (i) Pepsin, rennin/chymosin
(ii) Wall of stomach / gastric glands / oxyntic / pariental / cell, produced hydrochloric acid

(b) (i) Duodenum

(ii) Bile juice /SANS *Acc: any correct salt e.g. $NaHCO_3$*
Acc: Bile

33. 2010 Q16 P1

Emulsification / breaking down of fats into (tiny) droplets creating alkaline medium for digestive enzymes/ neutralizing acidic chime (from the stomach)

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34. 2010 Q17 P1

(a) Herbivorous; Rej Herbivores

(b) Lack canines/ incisors on upper jaws

35. 2011 Q2 P1

a) I $\frac{2}{2}$ c $\frac{1}{1}$. pm $\frac{2}{2}$ m $\frac{3}{3}$;

b) Dental carries

Periodontis; gingivitis / pyorrhoea

35. 2011 Q13 P1

Source of energy; Storage materials;

36. 2011 Q17 P1

(a) L – Duodenum;

M- Pancreas;

(b) (i) Bile

(ii) Emulsification / emulsifies fats;

37. 2011 Q18 P1

a) Sublingual gland ; sub maxillary gland; parotid gland first one

b) Lubricating food; digestion; moisten food; provide alkaline medium;

38. 2012 Q1 P1

Plants make their own food from carbon (IV) oxide and water in the presence of light/photosynthesis/autotrophic,while animals eat readymade food (from plants and animals) heterotrophic

39. 2012 Q11b P1

(b) Stomach – smooth

Bone – skeletal

40. 2012 Q29 P1

water; mineral ions/salts; vitamins

41. 2012 Q3 P2

- has lacteal for absorption of fatty acids and glycerol.
- numerous mitochondria for absorption of food by active transport
- thin walled epithelium to reduce distance for diffusing molecules.
- dense network of capillaries to maintain a steep concentration gradient.
- has microvilli to increase surface area for absorption of soluble products of digestion.

42. 2013 Q4 P1

(a) • forms a protective barrier to the stomach wall against corrosions by hydrochloric acid and protein digesting enzymes

•lubricates the chime

(b) Young persons are growing hence rate of cell division is more than adults. They are physically more active than adults hence they require more energy.

43. 2013 Q3b, c P2

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(b) Cause: lack of vitamin *BJ* Thiamine
Symptoms: • retarded growth, • swelling of feet and legs, • wasting of muscles,
• general body weakness

44. 2014 Q7b P2

In the mouth

Food is chewed to increase the surface area for enzyme activity (saliva contain) salivary amylase / ptyalin , saliva (mixes with food and) provides an alkaline medium

For amylase enzymes / ptyalin

Salivary amylase acts on starch // amylase and converts them to maltose

In the duodenum; food is mixed with bile and pancreatic juice

Bile provides alkaline medium for activity of duodenum / enzymes and neutralizes acidic chyme / food from the stomach;

Acc. Sodium hydrogen carbonate for bile rej. Sodium bicarbonate

Pancreatic juice contain) pancreatic amylase; which converts starch to maltose;

In the ileum; epithelial cell s ileum secretes succusentericus / intestinal juice which contain enzymes.

This acts on sucrose and converts it to fructose and glucose;

Lactase; which acts on lactose and converts it to galactose and glucose; maltase acts on maltose and converts it to glucose

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