

Biomedical Admissions Test (BMAT)

Section 2: Biology

Questions by Topic

B9.2d - Digestive System

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B9.2d: Digestive System - Questions by Topic

(Mark Scheme and explanations at the end)

- 1 The following questions are about the digestive system.
- 1 The digestive system's role is the breakdown of large soluble molecules found in food to smaller soluble products.
 - 2 Food moves through the digestive system due to peristalsis.
 - 3 When stomach churning, bile and enzymes are used to digest food, this is known as chemical digestion.
 - 4 HCl in the stomach kills bacteria.
 - 5 Protease enzymes digest proteins in the small intestine.

Which of these statements are correct?

- A 1, 2, 3 and 4
- B 1, 2, 3 and 5
- C 1, 3 and 4
- D 2, 4 and 5
- E 1, 4 and 5
- F 2 and 4
- G 1 and 5
- H 2 and 5





2 The following statements are about animal physiology.

- 1 Stomach acid is neutralised by bile and pancreatic juice as it enters the small intestine.
- 2 The salivary glands produce saliva which contains amylase and lipase enzymes.
- 3 Gastric juice in the stomach is made up of hydrochloric acid and pepsin.
- 4 Bile is produced in the gallbladder and stored in the liver.
- 5 Pancreatic juice is made up of amylase and lipase.

Which of these statements are correct?

- A 1, 3, 4 and 5
- B 1, 2 and 5
- C 1, 3 and 4
- D 1, 3 and 5
- E 1, 4 and 5
- F 2 and 4
- G 1 and 2
- H 2 and 5

3 The following statements are about animal physiology.

- 1 Excess water is absorbed in the large intestine.
- 2 The pH of the gastric juice is 1-2.
- 3 Intestinal juice always has a pH greater than 8 as the enzymes require alkaline conditions.
- 4 Small intestinal juice contains carbohydrase, lipase and lipase enzymes.
- 5 The mouth has a neutral pH.

Which of these statements are correct?

- A 1, 2, 3 and 4
- B 1, 2, 4 and 5
- C 1, 2 and 3
- D 1, 3 and 5
- E 2, 4 and 5
- F 2 and 3
- G 1 and 4
- H 2 and 5





4 The following statements are about the digestive system.

- 1 Digestion takes 12 hours.
- 2 Only water and fibre enter the large intestine.
- 3 Proteins are absorbed in the stomach.
- 4 Salivary amylase is inactivated by the HCl in the stomach.
- 5 Water is absorbed in the stomach, small intestine and the large intestine.

Which of these statements are correct?

- A 1, 2, 3 and 4
- B 1, 2 and 4
- C 2, 3 and 4
- D 2, 4 and 5
- E 3 and 5
- F 1 and 4
- G 3 only

5 The following statements are about the digestive system.

- 1 Salivary amylase breaks down starch into shorter carbohydrate chains in the mouth in minutes.
- 2 Lipids are broken down into fatty acids and monoglycerides by gastric lipase.
- 3 It takes 2-4 hours for peptide chains to be broken into amino acids in the small intestine.
- 4 Proteins are only absorbed in the small intestine.
- 5 Starch is digested in the mouth and the stomach.

Which of these statements are correct?

- A 1, 2, 3 and 4
- B 1, 2 and 4
- C 2, 4 and 5
- D 3 and 4
- E 3 and 5
- F 1 and 4
- G 2 and 5



6 The following are all statements about the digestive system.

- 1** Lipids are broken down into fatty acids and glycerol in the small intestine.
- 2** Proteins are not broken down in the mouth.
- 3** Carbohydrases and pancreatic amylase in the small intestine break down short chain carbohydrates into monosaccharides.
- 4** Digestion always takes longer in the small intestine compared to the stomach.
- 5** Fats are digested in the mouth, stomach and in the small intestine.

Which of these statements are correct?

- A** 1, 2, 3 and 5
- B** 1, 2 and 4
- C** 2, 3 and 4
- D** 3 and 4
- E** 3 and 5
- F** 1 and 4
- G** 3 only

7 The following questions are about the digestive system.

- 1** The surface area of the small intestine is increased by villi.
- 2** The efficient blood supply in the villi makes sure there is a fast diffusion rate.
- 3** The villi have a wall that is one cell thick.
- 4** Nutrients are absorbed in the gut wall by active transport when there is a high concentration of nutrients present in the small intestine.
- 5** Water is absorbed into the body through osmosis.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 2, 3 and 5
- C** 1, 2 and 4
- D** 1, 4 and 5
- E** 2, 4 and 5
- F** 1 and 3
- G** 1 and 4
- H** 2 and 5



8 The following statements are about the digestive system.

- 1** The glucose absorbed by the body is used for aerobic respiration.
- 2** Enzymes are used to make new macromolecules are made from the absorbed nutrients, by hydrolysis reactions.
- 3** Cell membranes are produced using proteins.
- 4** All the excess glucose is converted into glycogen and stored only in the liver.
- 5** Amino acids absorbed are used to maintain cells.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 2, 3 and 5
- C** 1, 2 and 4
- D** 2, 3 and 4
- E** 3, 4 and 5
- F** 2 and 4
- G** 1 and 4
- H** 1 and 5

9 The following are statements about the digestive system.

- 1** Only excess amino acids are used to produce fatty acids, which are a concentrated energy store.
- 2** All of the digested food products should be absorbed by the end of the large intestine.
- 3** Faeces is undigested waste matter which contains bile pigments.
- 4** Salivary amylase works best at a neutral pH.
- 5** Amylase in the small intestine also works best at a neutral pH.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 3, 4 and 5
- C** 1, 3 and 4
- D** 1, 4 and 5
- E** 2, 4 and 5
- F** 1 and 4
- G** 3 and 4
- H** 2 and 5



10 The following are statements about the digestive system.

- 1** Food moves through the stomach by peristalsis.
- 2** Pancreatic enzymes work best at a pH of 8.
- 3** Cellulose cannot be digested.
- 4** Egestion is the expulsion of faeces from the body.
- 5** The concentration of digested products in blood increases over time.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 3, 4 and 5
- C** 1, 3 and 4
- D** 2, 3 and 4
- E** 1, 4 and 5
- F** 1 and 3
- G** 1 and 4
- H** 2 and 5





Answers and Explanations

1 The answer is D

- 1 is incorrect - the digestive system has a role to break down **large insoluble molecules** that are found in the food into **smaller soluble molecules** that can be absorbed into the body. The large molecules present in food are insoluble not soluble, these **cannot be absorbed into the body**.
- 2 is correct - it is true that food that is eaten is **moved** through the digestive system by **peristalsis**. Peristalsis is a **wave of muscular contractions** that take place in order to move the bolus of food along the digestive system.
- 3 is incorrect - it is true that **bile and enzymes** which are produced by **specialised cells in glands and tissues** in the gut enable **chemical digestion**. However **stomach churning** is **mechanical digestion** not chemical digestion.
- 4 is correct - **hydrochloric acid** is present in the **stomach**, this **kills any bacteria** that have entered the body.
- 5 is correct - it is true that **protease enzymes** also **digest proteins** in the **small intestine**.

Since **2**, **4** and **5** are the only correct statements, **D** must be the correct answer.

Exam Tip - It is essential to remember the roles of the digestion:

- Enable the breakdown of large insoluble molecules found in food into smaller soluble products.
- Enable the absorption of the products produced through digestion.

Exam Tip - It is essential to remember that there are two forms of digestion:

- Mechanical digestion: food broken down by teeth grinding and stomach churning.
- Chemical digestion: food broken down by enzymes and bile which are produced by specialised cells.





2 The answer is G

- 1 is correct - it is true that when stomach acid **enters the small intestine**, bile and pancreatic juice will **neutralise the acid** in order to provide **alkaline conditions** required by the enzymes in the small intestine. The stomach acid is neutralised as there are **hydrogen bicarbonate ions** present in bile and pancreatic juice.
- 2 is correct - it is true that the specialised cells in the **salivary glands in the mouth** produce **amylase and lipase enzymes**.
- 3 is incorrect - it is true that **gastric juice** contains **hydrochloric acid** and **pepsin (a protease)**, however gastric juice also contains **lipase enzymes**.
- 4 is incorrect - bile is **alkaline** and is **produced in the liver**, and the **bile is stored in the gallbladder**.
- 5 is incorrect - it is true that **pancreatic juice** contains **amylase and lipase enzymes**, however pancreatic juice also contains **protease enzymes**.

Since **1** and **2** are the only correct statements, **G** must be the correct answer.

Exam Tip - it is essential to remember what enzymes and products are present in the different parts of the digestive system:

Salivary glands (saliva)	Stomach	Liver	Gallbladder	Pancreas	Small intestine
Amylase Lipase	HCl Protease (pepsin) Lipase	Bile (produced)	Bile (stored)	Protease Amylase Lipase	Protease Carbohydrase Lipase



3 The answer is B

- 1 is correct - it is true that any **excess water** that is still present is **absorbed in the large intestine**.
- 2 is correct - it is true that the **pH of the gastric juice** that is present in the stomach is **1-2**. This **low pH** is the **optimum condition** that is needed for enzymes in the stomach to work.
- 3 is incorrect - it is true that an **alkaline pH** is **optimum** for enzymes that work in the small intestine. However the pH in the small intestine is **8**, not above 8.
- 4 is correct - it is true that the juice present in the **small intestine** contains **carbohydrase, lipase and protease enzymes**.
- 5 is correct - it is true that the pH of the mouth is **neutral**, it has a pH of **7**.

Since **1, 2, 4** and **5** are the only correct statements, **B** must be the correct answer.

4 The answer is D

- 1 is incorrect - it is true that digestion can take up to 12 hours, however it can also take longer. Digestion can take **12 - 24 hours**.
- 2 is correct - it is true that **only water and fibre enter the large intestine**. **Fibre** enters the large intestine because it **cannot be digested**, as humans do not have the enzymes that are required to digest it. **Water is absorbed** into the body in the **stomach, small intestine and large intestine**.
- 3 is incorrect - proteins are **broken down in the stomach**, however they are not absorbed in the stomach. Proteins are broken down into **amino acids** and are **absorbed** into the body in the **small intestine**.
- 4 is correct - it is true that when the food bolus goes into the stomach and **salivary amylase** present is **inactivated by the** HCl present in the stomach.
- 5 is correct - it is true that **water is absorbed** in the body in the **stomach, small intestine and the large intestine**.

Since **2, 4** and **5** are the only correct statements, **D** must be the correct answer.



5 The answer is C

- 1 is incorrect - it is true that **salivary amylase** will **break down starch into short carbohydrate chains** however this occurs in the mouth in **seconds**, not minutes.
- 2 is correct - it is true that **lipids** are broken down by **gastric lipase into fatty acids and monoglycerides**. This occurs in the **stomach**.
- 3 is incorrect - it is true that **peptide chains** are broken down into **amino acids** in the **small intestine**, however this can take anywhere between **1-5 hours** not 2-4 hours.
- 4 is correct - it is true that proteins that are digested are **absorbed in the small intestine**.
- 5 is correct - it is true that **starch** in food is digested in the **mouth and the stomach**.

Since **2**, **4** and **5** are the only correct statements, **C** must be the correct answer.

Exam Tip - it is important to know where the different molecules are digested and absorbed in the body:

Carbohydrates:

- Digested in the mouth, stomach, small intestine and large intestine.
- Absorbed in the small intestine.

Proteins:

- Digested in the stomach and small intestine.
- Absorbed in the small intestine.

Fats (lipids):

- Digested in the mouth, stomach, small intestine and large intestine.
- Absorbed in the small intestine.

Fibre:

- Cannot be digested in the human body.
- Cannot be absorbed into the body.

Water:

- Absorbed in the stomach, small intestine and the large intestine.



6 The answer is A

- 1** is correct - it is true that the **lipids** are broken down into **fatty acids and glycerol** in the small intestine. This is done by **bile, pancreatic and intestinal lipase**.
- 2** is correct - it is true that **proteins are not broken down in the mouth**, as the protease is not present in the mouth in order for this to occur. Proteins are **broken down and digested in the stomach and the small intestine**.
- 3** is correct - it is true that **short chain carbohydrates** (that are present due to the starch being broken down into shorter chain carbohydrates in the mouth) are **digested into monosaccharides** by **pancreatic amylase and carbohydrase** in the **small intestine**.
- 4** is incorrect - this is because digestion in the stomach can take anywhere between **2-4 hours** and digestion in the small intestine can take anywhere between **1-5 hours**. This means that it is true that **digestion in the stomach can take longer than digestion in the small intestine**, however this is **not always the case**. Digestion in the stomach can take a **longer or shorter amount of time** than digestion in the small intestine.
- 5** is correct - it is true that the fats (lipids) are **digested in the mouth, the stomach and the small intestine**. They are digested by lipase enzymes and bile.

Since **1, 2, 3** and **5** are the only correct statements, **A** must be the correct answer.



7 **The answer is B**

- 1 is correct - it is true that there are **little finger like projections** present on the **wall of the small intestine**, these are called **villi**. These villi will **increase the surface area** that is present in the wall of the small intestine. This increase in surface area **increases the rate of diffusion** at which digestion products e.g. amino acids can be absorbed into the body.
- 2 is correct - it is true that there is an **efficient blood supply** to the villi on the wall of the small intestine because there are **many blood capillaries** present which will **take away the products of digestion** as soon as they have diffused into the blood. The **blood flow is constantly maintained** which ensures that there is a **steep concentration gradient**. This is one of the factors that enables a **fast rate of diffusion**.
- 3 is correct - it is true that the villi that are present on the wall of the small intestine are only **one cell thick**. This is essential as it enables a **fast diffusion rate** due to the **short diffusion distance**.
- 4 is incorrect - when there is a **high concentration of nutrients present in the small intestine** nutrients are absorbed into the body by **diffusion not active transport**. This is because the nutrients from digestion are present in the small intestine at high concentration and there is a **lower concentration in the blood**, therefore they diffuse from a high concentration in the small intestine to a low concentration in the blood.
- 5 is correct - it is true that **water** is absorbed into the body by **osmosis**. This occurs in the **stomach, the small intestine and the large intestine**.

Since **1, 2, 3** and **5** are the only correct statements, **B** must be the correct answer.



8 The answer is H

- 1 is correct - it is true that the **glucose** that produced from digestion is used in **aerobic respiration**.
- 2 is incorrect - it is true that enzymes are used to make **new macromolecules** from the **absorbed nutrients**, however this is done by **condensation reactions** not hydrolysis reactions.
- 3 is incorrect - **cell membranes** are produced using **lipids** not proteins.
- 4 is incorrect - it is true that the **excess glucose** that is present in the body is **converted into glycogen** however it is not only stored in the liver. Glycogen is **stored in the liver and in the muscle cells**.
- 5 is correct - it is true that the **amino acids** are used to **maintain cells** in the body. Amino acids do this by joining together to form **protein structures**.

Since **1** and **5** are the only correct statements, **H** must be the correct answer.

9 The answer is G

- 1 is incorrect - it is true that **excess amino acids** are used to produce **fatty acids**. However **dietary fats** and **excess glucose** are converted into fatty acids.
- 2 is incorrect - this is because all of the **digested food products** should be absorbed **before the end of the small intestine**, not before the end of the large intestine.
- 3 is correct - it is true that **faeces is undigested waste matter** that cannot be absorbed in the body. The reason why faeces is **brown** is due to **bile pigments** that are present in it.
- 4 is correct - it is true that **salivary amylase has an optimum pH of 7**, this is a neutral pH. The mouth has optimum conditions for salivary amylase as its pH is 7.
- 5 is incorrect - amylase in the small intestine has an **optimum pH of 8**, the neutral pH (7) is not the optimum pH at which amylase works best.

Since **3** and **4** are the only correct statements, **G** must be the correct answer.



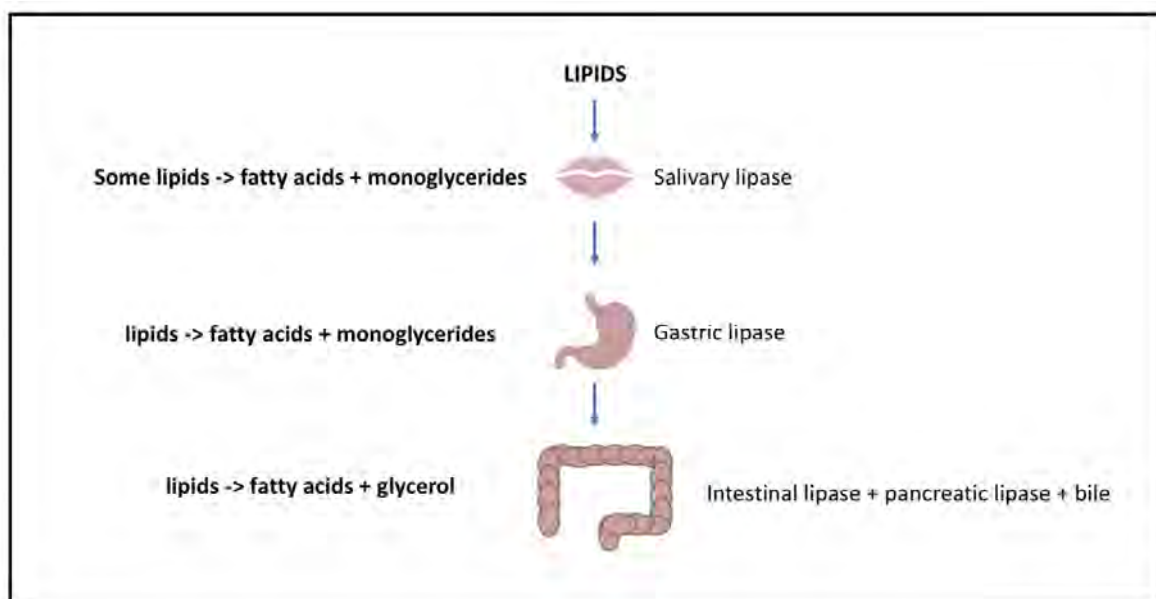
10 The answer is D

- 1 is incorrect - it is true that food moves through the digestive system by peristalsis however food moves in the stomach due to the **churning movement of the stomach**, not peristalsis. The food bolus will move through the **oesophagus, the small intestine and the large intestine due to peristalsis**.
- 2 is correct - it is true that pancreatic enzymes (pancreatic amylase, lipase and protease) have an optimum pH of 8.
- 3 is correct - it is true that **cellulose cannot be digested**. Cellulose is a **fibre** that is an indigestible part of food, that is from **plant based foods**.
- 4 is correct - it is true that the **removal of faeces** from the body is known as **egestion**.
- 5 is incorrect - the **concentration of digested products** in blood **decreases** over time, this is because the products are used up.

Since **2, 3 and 4** are the only correct statements, **D** must be the correct answer.

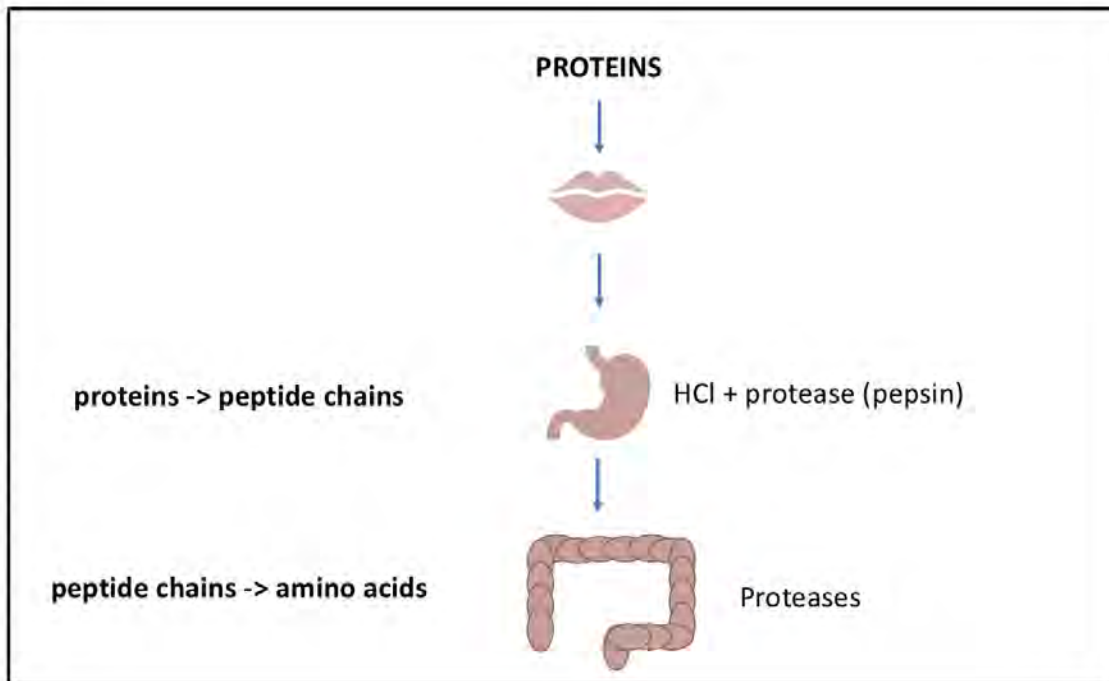
Diagrams showing breakdown of lipids (A), proteins (B) and carbohydrates (C)

A)





B)



C)

