



Body systems, growth and diet

Name: _____

Class: _____

1. During quiet exhalation in a healthy student, which combination correctly describes changes in the thorax?

- A. Diaphragm relaxes and domes; external intercostals relax; lung volume decreases
- B. Diaphragm contracts and flattens; external intercostals contract; lung volume increases
- C. Diaphragm contracts; internal intercostals relax; pressure in lungs falls below atmospheric pressure
- D. Diaphragm stays contracted; rib cage is pulled upward; air is sucked in without volume change

2. A red blood cell is in a capillary beside a muscle fibre in the leg. It next returns to the heart and is then sent to the lungs. Which sequence correctly names the main vessels and chambers it must pass through on this journey?

- A. Vena cava → right atrium → right ventricle → pulmonary artery
- B. Pulmonary vein → left atrium → left ventricle → aorta
- C. Aorta → left atrium → left ventricle → pulmonary vein
- D. Pulmonary artery → right atrium → left ventricle → vena cava

3. Which statement correctly compares blood in the hepatic portal vein with blood in the hepatic vein just after a carbohydrate-rich meal in a healthy person?

- A. Hepatic portal vein blood has higher glucose content than hepatic vein blood
- B. Hepatic portal vein blood has lower glucose content than hepatic vein blood
- C. Both vessels always contain identical glucose levels because the liver does not alter blood glucose
- D. Hepatic portal vein blood has higher oxygen content than blood in the hepatic artery

4. A student eats steamed fish (mainly protein) and plain rice (mainly starch). Where does chemical digestion of the starch first begin, and where are most of the final soluble products of both starch and protein absorbed?

- A. Starch first in mouth; main absorption in small intestine
- B. Starch first in stomach; main absorption in large intestine
- C. Starch first in small intestine only; main absorption in mouth
- D. Starch first in oesophagus; main absorption in stomach

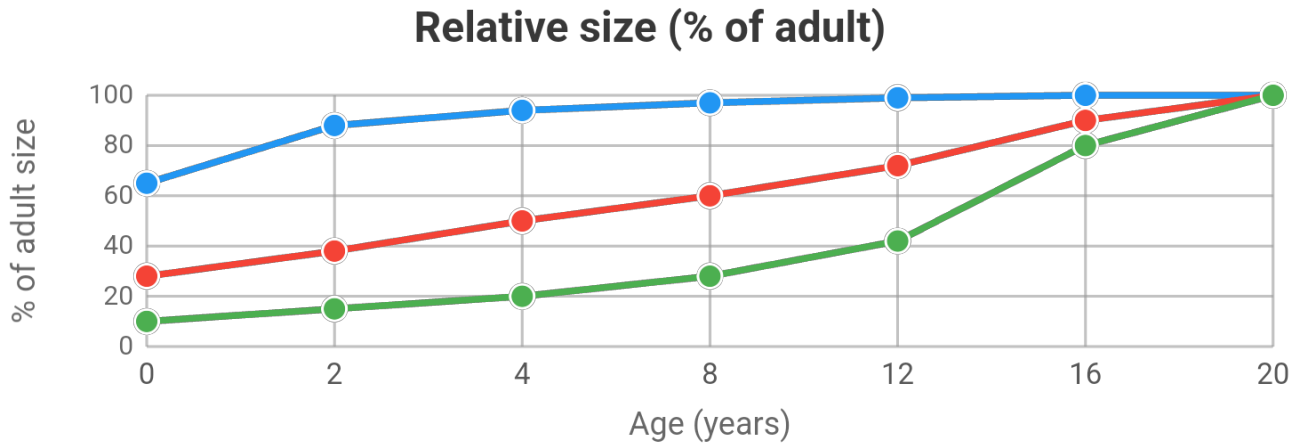
5. Which organ produces bile that contains no digestive enzymes, and how does bile help fat digestion in the small intestine?

- A. Liver; emulsifies fats to increase surface area for lipase
- B. Pancreas; digests fats directly with bile salts that are enzymes
- C. Stomach; stores lipase and breaks peptide bonds in fats
- D. Salivary gland; converts fats into amino acids by hydrolysis

6. After digestion, fatty acids and glycerol leave the lumen of the small intestine mainly via lacteals. Which statement correctly describes the first major route these products take toward the heart compared with glucose?

- A. Most fats enter lymph via lacteals; most glucose enters blood and the hepatic portal vein
- B. Most fats enter the hepatic portal vein directly; glucose enters only lacteals
- C. Both fats and glucose enter only lacteals and never blood capillaries
- D. Both fats and glucose enter the aorta directly from the villus epithelium

7. The graph shows relative size (as percentage of adult size) of three body parts from birth to age 20.



—●— Curve P —●— Curve Q —●— Curve R

Which combination correctly identifies the curves?

- A. P = head; Q = general body; R = reproductive organs
- B. P = reproductive organs; Q = head; R = general body
- C. P = general body; Q = reproductive organs; R = head
- D. P = head; Q = reproductive organs; R = general body

8. A class wants to record growth of the same living mung bean seedlings every three days for two weeks without killing them. Which parameter is most suitable?

- A. Height of the main shoot
- B. Dry mass of the whole seedling
- C. Total leaf area after cutting off every leaf
- D. Fresh mass after washing and blotting the whole root system each time

9. In humans, fertilisation normally occurs in which structure, and implantation of the early embryo normally occurs in which structure?

- A. Fertilisation in oviduct; implantation in uterus
- B. Fertilisation in uterus; implantation in ovary
- C. Fertilisation in vagina; implantation in oviduct
- D. Fertilisation in ovary; implantation in vagina

10. Which food component is the main long-term energy store in the body, and which deficiency disease is classically linked to a severe lack of vitamin C?

- A. Fat; scurvy
- B. Protein; scurvy
- C. Fat; rickets
- D. Dietary fibre; beriberi

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Answers

1 A

In quiet exhalation the diaphragm relaxes and returns to a dome shape, and the external intercostal muscles relax.

Thoracic volume therefore decreases, pressure inside the lungs rises above atmospheric pressure, and air flows out.

Contraction of the diaphragm and external intercostals, or an increase in lung volume, occurs in inhalation, not quiet exhalation.

2 A

Deoxygenated blood from leg capillaries drains into veins and reaches the heart via the vena cava, entering the right atrium then the right ventricle.

Contraction of the right ventricle pumps blood into the pulmonary artery toward the lungs.

Routes that start with the pulmonary vein or that place the cell on the left side of the heart before the lungs reverse the normal systemic return path.

3 A

After a meal, glucose absorbed from the gut enters the hepatic portal vein, so glucose concentration there is relatively high.

As blood flows through the liver, much of this glucose is taken up and stored as glycogen, so blood leaving in the hepatic vein has a lower glucose concentration.

The reverse glucose comparison, or claims that the portal vein is always oxygen-richer than the hepatic artery, do not match this post-meal route.

4 A

Salivary amylase begins chemical digestion of starch in the mouth.

Protein digestion begins later (mainly in the stomach), but most absorption of simple sugars and amino acids occurs in the small intestine, which has villi and a large surface area.

The large intestine mainly absorbs water and minerals; the oesophagus does not start starch digestion with enzymes.

5 A

The liver produces bile (stored in the gall bladder and released into the duodenum).

Bile salts emulsify large fat droplets into smaller droplets, increasing the surface area so pancreatic lipase can act more effectively. Bile itself does not contain lipase or other digestive enzymes.

The pancreas secretes lipase; the stomach and salivary glands secrete enzymes but not bile.

6 A

Most fats enter lacteals as lipids in lymph and reach the blood circulation via lymph vessels before entering veins near the heart.

Glucose mainly enters blood capillaries of the villi and travels first in the hepatic portal vein to the liver.

Fats do not primarily go straight through the hepatic portal vein in the same way as glucose, and assimilation is the later use of nutrients by cells, not the exit path from the gut lumen.

7 A

The head / brain reaches a high percentage of adult size early in childhood, matching Curve P.

The general body shows a steadier intermediate rise, matching Curve Q.

Reproductive organs remain relatively small until puberty and then rise steeply, matching Curve R.

8 A

A non-destructive method is needed so the identical seedlings can be measured repeatedly.

Shoot length (height) can be measured with a ruler without harming the plants.

Dry mass requires killing and drying. Removing all leaves for total leaf area, or uprooting and weighing whole plants including roots each time, damages or destroys them.

9 A

Fertilisation normally takes place in the oviduct (Fallopian tube), where a sperm meets the ovum.

The resulting early embryo then travels to the uterus, where implantation in the uterine lining normally occurs.

Fertilisation does not normally occur in the uterus or vagina; the ovary releases the ovum but is not the usual site of fertilisation or implantation.

10 A

Fat (lipid) is the main long-term energy store because it yields more energy per gram than carbohydrate or protein and can be stored in adipose tissue.

Severe lack of vitamin C causes scurvy (bleeding gums, poor wound healing).

Protein is not the main energy store; rickets is linked to vitamin D (or calcium) deficiency, not vitamin C.