1. Which of the following are the main components of a virus?

a. Protein
b. Nucleic acid
c. Sugar
d. Lipid

A. a, b

B. a, b, c

C. a, c, d

D. a, b, c, d

2. Which of the following nutrients do girls aged 14-18 need more than boys of the same age in order to achieve appropriate growth for their age?

A. Vitamin C

B. Vitamin A

C. Iron

D. Protein

3. When the experiment was done by boiling test tubes containing different substances (according to the table below) with Benedict's solution, the experimental results were as follows:

	Substances	Boil with Benedict's solution
1	Cheese	Blue solution
2	Lime	Brick red precipitate
3	Cooked albumen	Blue solution
4	Potato	Brick red precipitate

Which of the following conclusions is most correct?

A. In the case of cooked albumen, the cooking time may change if the benedict is cooked for a longer time.

B. Lime may contain some sugar, which changes the Benedict's color.

C. Potato is high in starch, which is why Benedict is so different.

D. Cheese is high in protein, which is what makes Benedict different.

4. Which of the following statements most accurately describes the differences between light microscopes and electron microscopes?

	Light microscopes	Electron microscopes
A.	The sample must be completely dry or still alive.	The sample does not need to be completely dry and must be dead.
B.	The sample does not need to be completely dry and must be dead.	The sample must be completely dry or still alive.
C.	The resulting image is black and white.	The resulting image is a color image.
D.	The resulting image is a color image.	The resulting image is black and white.

5. Which structure is important for sperm movement?

A. Intermediate filament and Actin fiber

B. Microtubule and Mitochondria

C. Microfilament and Centriole

D. Microfilament and Spindle fiber

6. Which of the following components can be found in blue-green algae?

a. Mitochondria b. Chlorophyll

c. Ribosome d. Cell wall

A. c

B. b, c

C. b, c, d

D. a, b, c, d

7. Which structure is found in both blue-green algae and red blood cells?

a. Lysosome b. Endoplasmic reticulum

c. Plasma membrane d. Vacuole

e. Ribosome

A. a, b

B. b, c

C. d, e

D. c, e

8. Cells are generally divided into two groups: prokaryotic and eukaryotic. The differences in cell structure, especially the distinct nuclear structure, are obvious. From the above information, which of the following living things can be grouped into the same group of cells? Though, they are not totally related.

A. Red algae, green algae, blue-green algae

B. Mushroom, Amoeba, Slime Mold

C. White blood cells, red blood cells, sperm cells

D. Mold, paramecium, yeast

9. Consider the following statement.

a. Osmosis is the movement of water across a cell membrane directly without the need for carrier proteins.

b. Aquaporins are proteins that are important for the transport of some substances across cell membranes.

c. All gases that enter the body can move to the bloodstream by diffusion, such as O_2, CO_2, N_2

d. During the resting phase of a neuron, there is no change in electrical charge.

Which statement is correct?

A. a

B. b

C. a, b, c

D. b, c, d

10. Phagocytes are white blood cells that have a process of eliminating pathogens or foreign substances through phagocytosis or cell engulfment. They will have a part of the cell membrane that looks like an arm and then embraces the foreign substance.

From the above, which of the following additional cell structures are related to the process of phagocytosis of white blood cells?

a. Cyclosis
b. Cytoplasmic streaming
c. Microtubule
d. Actin fiber

A. a, b
B. b, c
C. c, d
D. a, b, d

11. Which of the following are involved in the process of nutrient absorption in the small intestine?

a. Energy
b. Pinocytosis
c. Phagocytosis
d. Trypsin

A. a, b
B. b, c
C. a, d
D. b, d

12. Which of the following statements is correct regarding the color blindness hereditary in humans?

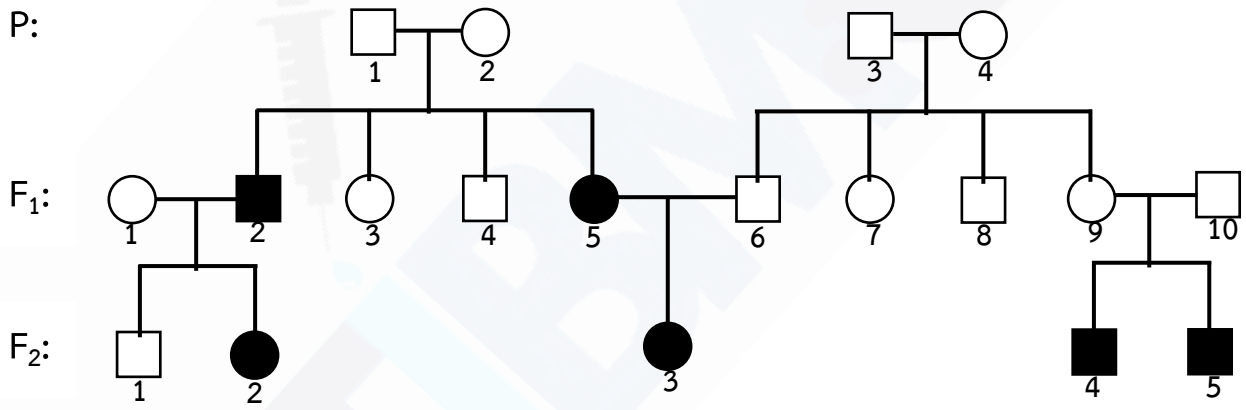
A. The color blindness gene is located on autosome, causing the incidence rate to be equal in males and females.

B. The color blindness gene is located on the Y-chromosome, meaning that color blindness occurs only in males.

C. The color blindness gene is located on the X-chromosome, meaning that color blindness more common in males than females.

D. The color blindness gene is located on the X-chromosome, meaning that color blindness more common in females than males.

Use the pedigree below for questions 13 – 15.



13. From the diagram above, what type of inheritance is the trait represented by black?

A. It is inheritance through dominant genes on autosomes.

B. It is inheritance through dominant genes on allosomes.

C. It is inheritance through recessive genes on autosomes.

D. It is inheritance through recessive genes on allosomes.

14. Which of the following diseases represent the genetic inheritance pattern shown in the diagram above?

A. Thalassemia, albinism

B. Hemophilia, albinism

C. Thalassemia, hemophilia

D. Hemophilia, polydactyly

15. Who has a heterozygous condition?

A. F_2-2, F_2-4

B. F_1-3, F_1-4

C. P-1, F_1-9

D. P-3, F_1-6

16. There are two main types of genetic abnormalities: abnormalities that occur on autosomes and abnormalities that occur on allosomes. Both types of abnormalities can occur at the gene-level up to the chromosome number-level. Which of the following statements is correct regarding Cri-du-chat syndrome and Down syndrome?

A. Cri-du-chat is an allosome abnormality, while Down syndrome is an autosome abnormality.

B. Cri-du-chat is an autosome abnormality, while Down syndrome is an allosome abnormality.

C. They are abnormalities that occur with the autosome as well.

D. They are abnormalities that occur with the allosome as well.

17. Which of the following is true about mutation?

A. Genetic mutations can be cured using chemotherapy.

B. Sickle cell anemia is caused by abnormal protein production in red blood cells due to iron deficiency.

C. Edwards syndrome and Down syndrome are mutations on the same chromosome but differ in the location of the gene.

D. Klinefelter syndrome and Turner syndrome are mutations of the same type.

18. Insulin is a hormone produced by the pancreas and its main function is to transport blood sugar to various tissues of the body to make energy. However, diabetic patients cannot fully utilize blood sugar for energy because they lack insulin, which results in high blood sugar levels. Patients will experience frequent urination, thirst, fatigue, anorexia, weight loss, and easy complications such as infection, hard-to-heal wounds, cardiovascular disease, kidney and eye diseases, etc.

Currently, insulin production relies on synthesis from *E. coli*, starting with cutting insulin-gene from human DNA. Then, they are connected to bacterial plasmids and the bacteria are cultured to increase the numbers via binary-cell division. From the above statement, which of the following statements is correct?

A. *E. coli* is a bacterium that can multiply cells at high rates, allowing it to produce high amounts of insulin.

B. *E. coli* is a bacterium that has a structure like the pancreas, so it can produce insulin.

C. *E. coli* is a bacterium that has the same DNA structure as humans, so it can be adapted to produce other hormones, such as glucagon and thyroxine.

D. Diabetes is caused by a lack of insulin, which causes high blood sugar levels. The treatment is to reduce the intake of foods high in starch or sugar. If they do this continuously, they will be able to recover from diabetes.

19. Which statement is correct about human “DNA”?

A. Human DNA has many pieces, each piece is of different lengths.

B. Human DNA consists of many pieces, but they are the same length.

C. Human DNA is a single long strand.

D. Human DNA consists of many pieces, some of them are the same length.

Consider the following statements and answer questions 20 – 22.

Gene editing is done using a technology called "genetic engineering", which is part of biotechnology. It can be said that this method is a selection of species by directly targeting the desired gene, instead of breeding and selecting hybrids with desired characteristics, which takes a long time.

This direct gene targeting begins by searching for a new gene or using a gene that is already known to have the characteristics we want. This gene may come from a plant, animal, or microorganism. Once the gene is obtained, the gene is inserted into the chromosome of the organism that needs to be genetically modified. Once it is certain that the organism has been genetically modified, it can then proceed to the next step.

20. The process of cutting out the desired DNA fragment from the whole DNA requires which substance?

A. DNase

B. DNA polymerase

C. DNA ligase

D. Restriction enzyme

21. After cutting out the DNA fragments containing the desired genes, they must be joined to the DNA of the organism which is modified for use in the next step. Which of the following enzymes is required for this DNA joining process?

A. DNase

B. DNA polymerase

C. DNA ligase

D. Restriction enzyme

22. Which organism is commonly used as a receptor for cutting genes?

A. Virus

B. Sheep

C. Bacteria

D. Insect

23. From the evolutionary relationship, which statement is correct about "*Australopithecus afarensis*" and "*Homo habilis*"?

A. *Australopithecus afarensis* had a larger brain than *Homo habilis*.

B. Stone-tool use is not found in *Australopithecus afarensis* but is found in *Homo habilis.*

C. They come from the same family tree called *Hominids*.

D. *Homo habilis* was the first group to walk on two legs and stand upright.

24. Which of the following statements is correct about “Buccal mucosa” and “Endometrium”?

	Buccal mucosa	Endometrium
A.	Found single-celled, arranged in a few layers	Found cells of various forms, arranged in multiple layers.
B.	They are dead cells like the epidermis.	It is a group of living cells that are supplied with many blood vessels.
C.	They are tall cells that can change shape according to pressure.	They are flat cells but can be formed in multiple layers.
D.	DNA samples can be collected.	Unable to collect DNA samples.

25. It is well known that the “liver” is a very important organ because it has many important functions. Consider the following statement.

a. Bile production
b. Absorption and metabolism of bilirubin
c. Insulin production
d. Albumin production
e. Store fat-soluble vitamins
f. Store water-soluble vitamins

Which of the following statements is correct regarding functions of the liver?

A. a, b, c

B. d, e, f

C. a, b, e

D. c, d, f

Consider the following statements and answer questions 26 – 27.

One of the most common symptoms of a gastrointestinal disease is a burning pain in the stomach, which is located between the chest and the navel. The pain can occur when the stomach is empty, during meals, or at any time. Sometimes, the pain can cause the patient to wake up in the middle of the night. The pain can be short or long and can last from a few minutes to hours.

Other symptoms/signs that may occur include nausea, vomiting, bloody stools, or lack of appetite. Bleeding can be the first or only symptom of the disease. If the bleeding continues without treatment, the patient may become anemic and fatigued.

26. From this symptom, which of the following illnesses is most likely associated with this symptom?

A. Gastric cancer

B. Peptic ulcer disease (PUD)

C. Gastroesophageal Reflux Disease (GERD)

D. Acidosis

27. Which of the following may be the cause of this disease?

A. *Helicobacter pylori* (*H. pylori*) infection

B. Taking high doses or long-term NSAIDs

C. Eating food that is very spicy and sour

D. A and B

28. Which of the following groups of organs <u>are not</u> in the same system?

A. Mouth, pharynx, esophagus

B. Heart, platelets, capillaries

C. Rectum, bladder, kidneys

D. Bronchia, diaphragm, lungs

29. Consider the following structure.

a. Coronary arteries
b. Pulmonary arteries
c. Renal arteries
d. Carotid arteries
e. Pulmonary veins
f. Renal veins

Which of the following sets is incorrect regarding a classification of blood vessels using the amount of gas that is a component of the internal components as a criterion?

A. a, b, c, d
B. a, c, d, e
C. c, d, e, f
D. a, d, e, f

30. Consider the following statement.

a. The normal heart rate of athletes is usually above 60-100 beats per minute because it requires more energy than normal.
b. Single circulation is found only in vertebrates of the fish family.
c. The circulatory systems of arthropods and mollusks are similar.
d. People whose blood pressure is more than 100 mmHg are considered to have hypertension

Which statement is correct?

A. a
B. b
C. a, b, c
D. a, b, c, d

31. Which statement is not the meaning of excretion?

A. Excrete waste products from cellular respiration

B. Ammonia excretion in aquatic animals

C. Excrete undigested food waste through the anus

D. Uric acid excretion in insects and birds

32. Consider the following statement.

a. Active immunity
b. Passive immunity
c. Vaccine
d. Colostrum
e. Toxoid
f. Serum

Which of the following are related to each other?

A. a, c, d

B. b, e, f

C. a, d, e

D. b, d, f

33. Examination for COVID-19 infection by testing the amount of IgG, IgM against SARS-CoV2 virus and is also part of the immune system test after COVID vaccination. From the above statement, IgG and IgM should mean which of the following?

A. Antibody

B. Antigen

C. Virus

D. Viral genetic material

34. “Balloon angioplasty” is the process of widening the coronary arteries by inserting a coronary catheter, which is a flexible tube with a “miniature balloon” at the end, into a blood vessel in the groin or wrist. When reaching the area where the blood vessel is narrowed, the balloon is connected to an instrument outside the body to push the balloon to expand, compressing the fatty deposits and plaques on the blood vessel walls to shrink or flatten them, and widening the blood vessel to allow blood to flow well to the heart muscle again. From this article, which of the following statements is incorrect about balloon angioplasty?

A. It takes an average of 1-2 days to recover and then patients can return to their normal life.

B. Reduce the risk of acute myocardial infarction from coronary artery occlusion.

C. There is no need to worry about the ischemic heart disease, but it cannot be repeated many times in case the coronary artery becomes narrower in the future. Other forms of treatment must be sought according to the medical opinion.

D. Reduces the risk of complications compared to “Bypass surgery” because it does not require surgery and anesthesia.

35. Consider the following statement.

a. Insulin - reduces blood sugar levels

b. Growth hormone - stimulates the development of cartilage and muscle cells.

c. Luteinizing hormone – produced by the uterus to stimulate ovulation.

d. Testosterone - is a male sex hormone produced by the male sex organs.

Which statement correctly describes the relationship between hormones and their functions?

A. a

B. a, b

C. a, b, c

D. None of the above

36. Consider the following statement.

a. Cerebrum - learning, abilities and skills, speech, vision, smell, taste

b. Cerebellum - Controls muscle coordination and body balance.

c. Hypothalamus - Controls body temperature, wakefulness, sleep, hunger, satiety, sexual feelings.

d. Optic lobe - Controls eye movement and pupil changing, hearing.

e. Thalamus – Transmits nerve impulses to various points in the brain, senses and responds to pain sensations.

Which of the following statements correctly describes the brain and the functions of each part?

A. a, b, c

B. b, c, d

C. c, d, e

D. d, e, f

37. Consider the following statement.

a. Chordates must have encountered a notochord at every stage of their life.

b. Squids have all the same structural systems in their bodies as snails, as they are in the mollusk group.

c. Starfish, sea urchins, and sea anemones are all in the same group.

Which statement is incorrect?

A. a

B. b

C. a, b

D. a, b, c

38. Obesity occurs when there is an excessive amount of fat stored in the body, which can lead to other diseases and health problems. This complex disease can result from many factors. Choosing exercise and losing weight can help treat and prevent health problems that may arise. Some behavioral changes, including changing the way you eat and exercising more, may be made. Doctors may also provide medical assistance to patients, such as giving medication or other medical procedures to promote weight loss. From the above article, which of the following statements is incorrect?

A. There are many causes of obesity, including genetics, behavior, metabolic rate and hormones. Consuming more calories than the body can burn off.

B. Obesity can be inherited, just like diabetes, but obesity is inherited through genes on autosomes, while diabetes is inherited through genes on allosomes.

C. Obesity can be a side effect of certain medications, such as anticonvulsants, diabetes medications, and antidepressants.

D. Obesity can lead to complications such as diabetes, hypertension, stroke, osteoarthritis, sleep apnea, sexual and reproductive problems.

39. A man wanted to lose weight, so he chose to control his diet that limited the amount of fat, protein and salt each day. One day, this man wanted to eat dessert, but he had to meet the following conditions:

- Contains no more than 0.6 grams of salt.
- Contains no more than 50 grams of fat.
- Contains at least 5 grams of protein

The table below shows the nutritional information for the desserts this man was interested in eating.

	Energy (kcal)	Salt (mg)	Fat (g)	Protein (g)	Carbohydrate (g)
Egg tart	3200	350	48	4	58
Chocolate Sundae	4030	730	69	5	93
Rocky road sunday	3300	300	49	8	88
Creme Brulee	1235	100	20	6	87

When this man wants to eat a low-carb dessert for weight loss purposes, find out how many carbs the man's dessert choice contains.

A. 58

B. 87

C. 88

D. 93

40. Monkeypox was first discovered in 1958 during studies of infectious diseases in monkeys, while the first human case was reported in 1970 in the Republic of the Congo. After that, cases were mostly confined to countries in central and western Africa, with most cases reported in the Republic of the Congo and Nigeria. Monkeypox is caused by the virus which smallpox is also a member. Animal-to-human transmission stems from contact with the blood, secretions, or open wounds of infected animals, as well as through eating raw meat from an infected specimen. In Africa, such transmission can generally be linked to the consumption of rodents, including squirrels and rats, as well as some types of monkeys. While scientists are still unsure of the disease's true origins, it is most likely that rodents are where the disease may first originate. From this article, which of the following statements is correct?

A. The virus that causes this disease is a mutation of the plague virus.

B. Monkeypox infection can occur in the same way as the infection that causes AIDS.

C. Treatment of this disease requires antibiotics only to be able to cure it.

D. Treatment of this disease can only treat the symptoms of the disease and prevent complications or may be treated in conjunction with antiviral drugs.

41. What is the name of the device shown in the picture below and what is it used for?

A.	Forceps	Used for gripping and holding objects.
B.	Stethoscope	Used for listening to sounds inside the body.
C.	Tongue Depressor	Used for depressing tongue to allow examination of the mouth and throat.
D.	Laryngoscope	Used for larynx examination and assist in inserting a breathing tube into the trachea to protect the airway during anesthesia.

42. What does the symbol in the image below mean?

A.	The Caduceus	a healthcare symbol
B.	The Rod of Asclepius	the true nursing symbol of healing
C.	The Star of Life	Emergency Medical Services
D.	Biohazard	Warning people of infectious bodily fluids and other biological dangers.

1.	A
2.	C
3.	B
4.	D
5.	B
6.	C
7.	D
8.	A
9.	B
10.	D
11.	A
12.	C
13.	C
14.	A
15.	C
16.	C
17.	D
18.	A
19.	D
20.	D
21.	C

22.	C
23.	C
24.	A
25.	C
26.	B
27.	D
28.	C
29.	A
30.	B
31.	C
32.	D
33.	A
34.	C
35.	D
36.	A
37.	D
38.	B
39.	B
40.	D
41.	D
42.	C