Life and Environmental Sciences
Processes of Life

Additional FCAT Practice Questions

Directions: Select the best answer for each of the following questions

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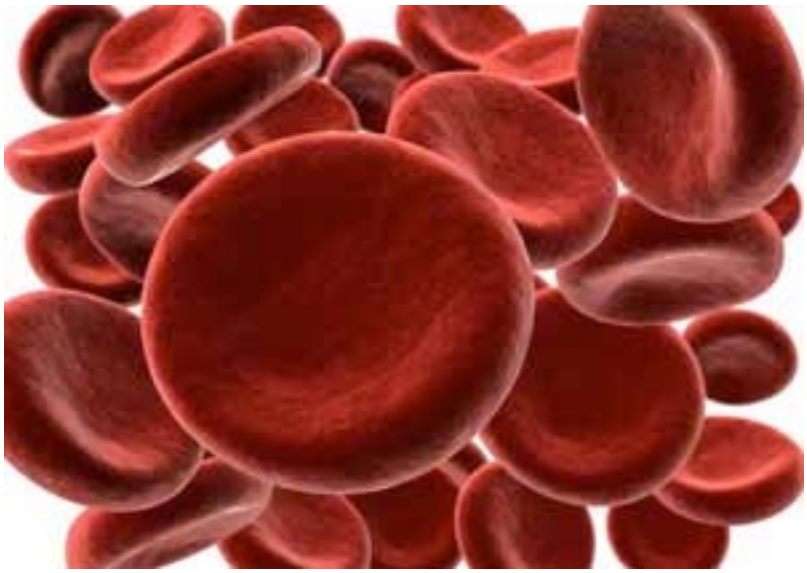
1. Red blood cells have a unique shape.



Red blood cells, like the blood they are carried in, are made mostly of water. What would happen to red blood cells that were placed into a highly concentrated salt solution?

A. The red blood cells would be unaffected.
B. The red blood cells would lose water and shrivel.
C. The red blood cells would gain water and eventually burst.
D. The red blood cells would gain both salt and water.

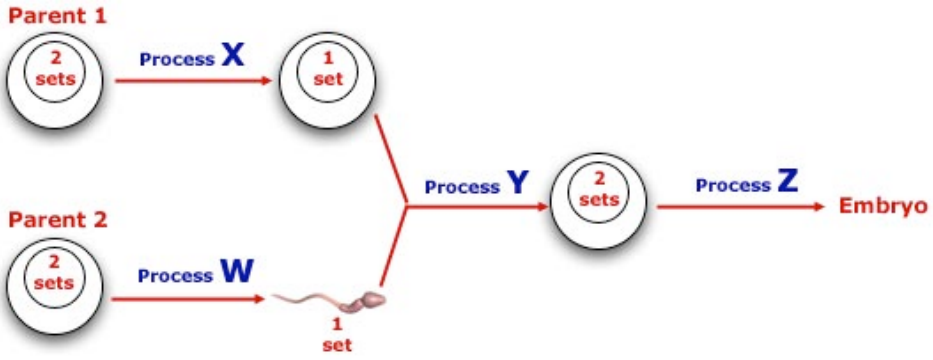
2. Recent studies have shown that the lack of a specific liver enzyme, dehydroepiandrosterone sulphotransferase (DHE ST), is common to a number of liver diseases. Which of the following bests describes the consequences of lacking the DHE ST enzyme?

A. The lack of DHE ST prevents the liver from efficiently carrying out certain chemical reactions.
B. The lack of DHE ST will prevent the person affected from eating certain foods.
C. The lack of DHE ST will accelerate the rate at which certain chemical reactions take place in the liver.
D. The lack of DHE ST will increase the metabolism of liver cells.

3. Which of the following controls material entering and leaving the cell?

A. Diffusion
B. Cell wall
C. Mitochondria
D. Cell membrane

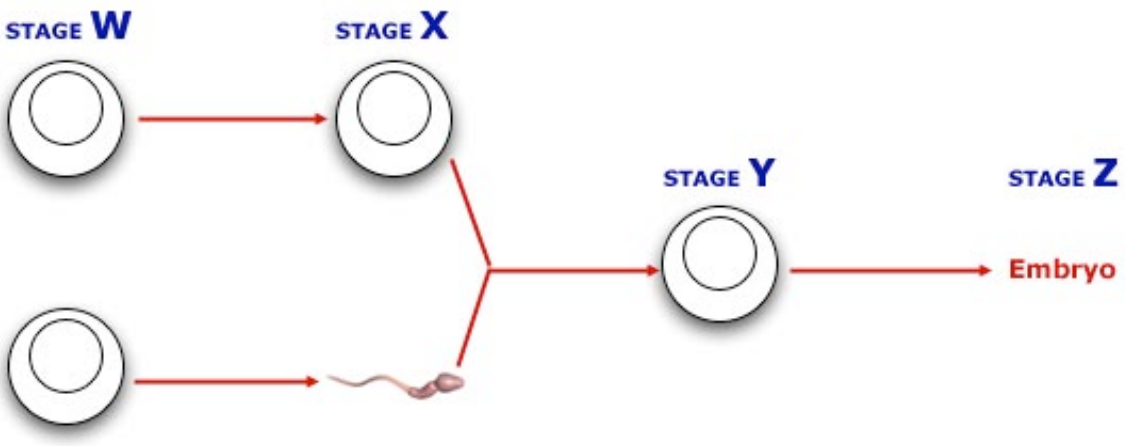
4. The following diagram represents events involved in human fertilization.



Which process or processes represent meiosis?

A. Y and Z
B. W and X
C. Process Y only
D. Process X only

5. The following diagram represents events involved in human fertilization.



At which stage will a haploid number of chromosomes be present?

A. Stage W
B. Stage X
C. Stage Y
D. Stage Z

6. When stickbugs reproduce, they do so asexually. All the stickbugs are female, and at a certain point in their life cycle, they become pregnant. When the eggs hatch, genetically identical offspring result.

What is a potential drawback to this method of reproduction?

A. With each generation of offspring, the chromosome number will be reduced.
B. Asexual reproduction takes a longer period of time.
C. If the environment changes significantly, all members of the stickbug population may perish.
D. With each generation of offspring, the chromosome number will increase.

7. One theory of why sexual reproduction evolved is called the "Red Queen hypothesis". In short, it states that sex is needed to fight disease. Which of the flowing is the most reasonable explanation of the Red Queen hypothesis?

A. Disease organisms are more likely to attack an asexually reproducing organism, rather than a sexually reproducing one
B. Sexual reproduction always creates members of the population that have stronger immune system cells
C. Parasites and disease causing organisms are constantly changing. The variation produced by sexual reproduction ensures there will likely be some member of the population with resistance to new diseases
D. Sexual reproduction creates a natural defense against disease

8. In the late 1970s, a computer model was first attempted that pitted asexual versus sexual reproduction. In the computer model, the asexual reproducing organisms always "won". These results are not borne out in reality. What is the most reasonable explanation for why the computer model did not reflect reality?

   A. The computer model assumed that sexually reproducing organisms died at a greater rate
   B. The computer model assumed that sexually reproducing organisms reproduced faster
   C. The computer model assumed that sexually reproducing organisms lived longer
   D. The computer model did not take into account environmental change and disease, both of which can wipe out entire populations of asexually reproducing organisms

9. Research has shown that asexual reproduction is much more common in microscopic species and "boom-and-bust" insects that have a very short life cycle. What is the most reasonable explanation for asexual reproduction being more common in these species?

   A. Asexually reproducing organisms are more vulnerable to disease, but to organisms with short life cycles, disease is less of a concern
   B. It is more difficult for smaller organisms to find mates for sexual reproduction
   C. It is more difficult for smaller organisms to exchange genetic information
   D. Asexual reproducers have shorter chromosomes more suited to smaller organisms

10. A very interesting fish called the topminnow is found in Mexico. This fish sometimes crossbreeds with another similar fish to produce a hybrid that reproduces asexually. Both the sexual topminnow and the asexual hybrid are attacked by a parasitic worm that causes "black spot disease". Researchers have found that the asexual hybrids have many more disease causing worms than the sexual topminnow. Which of the following best explains the difference in parasite infestation between these two fish?

    A. The sexual topminnow can devise more defenses via the recombination of genes that occurs with sexual reproduction.
    B. Sexual topminnows are more likely to swim in worm-infested areas.
    C. Asexual topminnows are born already infested with the worm parasite.
    D. Asexual topminnows are more likely to engage in behavior that will result in worm infection.

11. Which of the following best describes where protein synthesis takes place?

    A. In the bloodstream.
    B. In the nucleus of cells.
    C. In the cytoplasm of cells.
    D. In red blood cells.

12. Which of the following organelles is best associated with protein synthesis?

    A. Lysosomes
    B. Mitochondria
    C. Ribosome
    D. Golgi apparatus

13. Cystic fibrosis (CF) is a hereditary disease that causes many problems, including difficult breathing and chronic lung infections. CF is due to an abnormal gene called CFTR. Without a normal version of the gene, production of digestive juices respiratory system mucus is abnormal. One new therapy that has been in clinical trials is gene therapy. In this therapy, a normal copy of the CFTR gene is placed in the CF patients affected cells. Which of the following best describes the gene therapy treatment for CF?

A. The transplanted gene would mutate the CF patient's DNA into a version that can produce more proteins
B. The transplanted gene would boost the immune system of the CF patient.
C. The transplanted gene would allow the CF patient to make the proteins that would make for normal mucus and digestive juices..
D. The transplanted gene would replace the DNA of the CF patient.

14. Which of the following best describes the mechanism of protein synthesis?

A. Information from DNA is transported to the cell membrane where proteins are constructed.
B. The information for making DNA is held in the proteins. Proteins are combined in the correct order to make the DNA.
C. The genes in DNA gather the appropriate amino acids and the construct the correct protein.
D. The information for making proteins is held in the DNA. The information from genes is transcribed and carried outside the nucleus where the appropriate protein is constructed in the cytoplasm.

15. Sickle-cell disease results from a unique version of a gene called beta-globin. When carriers have one copy of this gene, they have a greater resistance to malaria than those individuals with two copies of the normal gene. The sickle-cell gene can also cause painful disease in individuals who have two copies of the sickle cell gene. What best describes the ultimate source of the sickle cell gene?

    A. The sickle cell gene is the result of a mutation of the normal version of the gene.
    B. The sickle cell gene was transmitted to the population by infection.
    C. The sickle cell gene is the result of a malfunctioning cell membrane protein.
    D. The sickle cell gene is the result of the chromosome combinations that occur during sexual reproduction.

Answers

1. B
2. A
3. D
4. B
5. A
6. C
7. C
8. D
9. A
10. A
11. C
12. C
13. C
14. D
15. A