

生物 無雙

Biology Enthusiast

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最強團隊

ANS

1. C

Oxygenated blood is received in the left atrium and flows to the left ventricle, then to the aorta. So we're looking for the bicuspid valve and the semilunar valve that separate left ventricle and aorta. P and Q are semilunar valves, while R and S are bicuspid valve and tricuspid valve respectively. To identify which one is the desired semilunar valve, we should know that the aorta has a much thicker wall than the pulmonary artery because it needs to withstand higher blood pressure. The wall of Q is thicker so we can deduce that Q is the semilunar valve that separate the left ventricle and the aorta. The answer is R and Q.

2. D

You can imagine atrioventricular valves (AV valves)(bicuspid valve and tricuspid valve) as one set while the semilunar valves as the other set. When the AV valves are open, the semilunar valves are closed. When the AV valves are closed, the semilunar valves are open. When ventricles contract, blood flows from ventricles to aorta or pulmonary artery, the semilunar valves need to be open to allow blood flow. Therefore, when ventricles contract, the AV valves, R and S close.

3. A

(1) is correct as crossing over only occur between homologous chromosomes. (2) is incorrect. Sister chromatids are the two genetically identical chromatids that result from the replication of a chromosome. They shall be connected to the same centromere. (3) is incorrect. Crossing over only occur at prophase I. During Prophase II, homologous chromosomes have been separated so it's impossible for it to occur.

4. B

(1) is incorrect. It is impossible for gametes to be parent cells because they are haploid. (2) is correct. The cell shown in the diagram is a gamete, meaning its homologous chromosomes have been separated. The original chromosome number should be double of the current number. (3) is incorrect. The cell is produced by meiotic cell division. Genetic variation between daughter cells is induced by independent assortment and crossing over.

5. C

As mentioned previously, gametes are haploid and are impossible to undergo both type of cell division.



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6. D

The amount of DNA have been doubled at prophase. There's two anaphase in meiosis, so the amount of DNA in each daughter cells is 1/4 of the amount of the parent cell during prophase.

7. B

Human has 23 pairs of chromosomes so 46 chromosomes in somatic cells. X is interneuron, a somatic cell so it has 46 chromosome. Y is sperm, it's haploid so it has 23 chromosome. Z is red blood cell. Mature RBC has no nucleus hence has no chromosome.

8. A

Chromatids of the maternal chromosome and the paternal chromosome cannot be called as sister chromatids, so (A) is wrong by definition. For (B), mitosis is still needed even in sex organ for growth and repair. For example, to produce sperm producing cell, hormone producing cells and to replace dead cells. For (D), the genetic composition of all somatic cells of the same person is same. Liver cells have different function to kidney cells because different gene is expressed.

9. A

Assuming a menstrual cycle last 28 days, the beginning of the last menstrual cycle should be at March 27. Ovulation occur at around day 14 of the cycle which would be April 9 in this case. Sperm can survive for ~3 days in woman's body and ovum can survive for ~1 day. So the ideal range would be April 6-10. However, in this case the best option is A.

10. A

Z is the space between cell wall and cell membrane. We shall know that cell wall is completely permeable meaning the sucrose solution can pass through the cell wall freely.

