

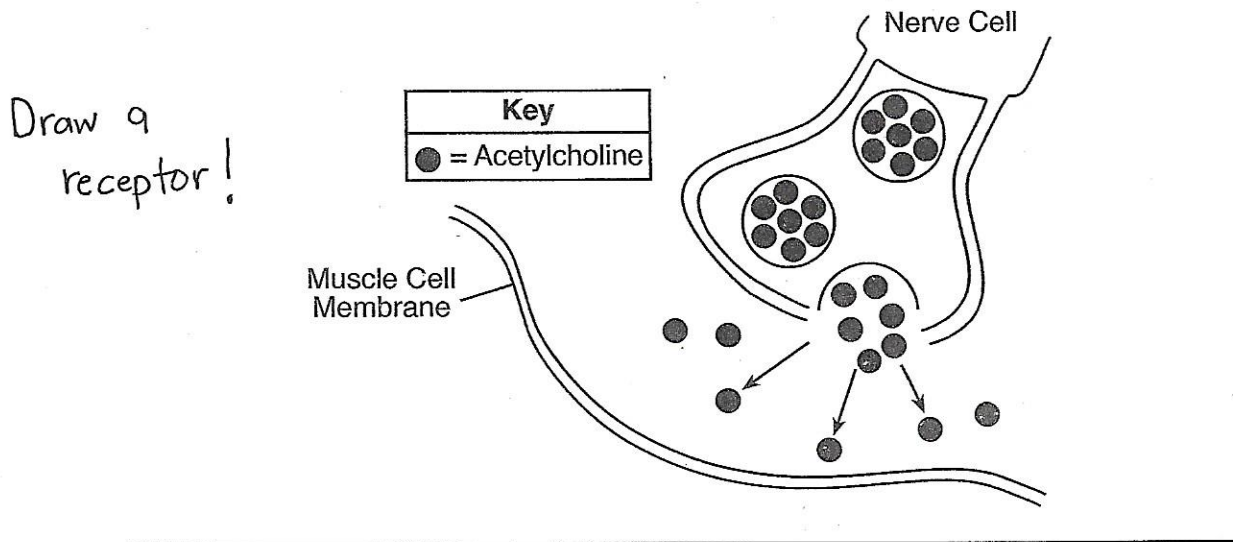
Name:

Do Now #4.4

Base your answer to question 1 on the information below and on your knowledge of biology.

Botulinum toxin is a protein produced by the bacterium *Clostridium botulinum*. It causes a serious form of food poisoning in humans. In a very dilute form, it is also commonly used to eliminate some signs of aging, such as wrinkles. It does this by preventing nerves from releasing a chemical messenger called acetylcholine into the synapse (space between a nerve cell and a muscle cell). The toxin affects the process that causes the muscle cell to contract and form wrinkles.

1. The diagram below represents a process that is involved in the formation of wrinkles. Complete the diagram by drawing an appropriate structure on the muscle cell membrane that would allow the nerve cell to communicate with the muscle cell. [1]



Feedback mechanisms have evolved that maintain homeostasis. Describe how homeostasis is maintained through feedback. In your answer, be sure to:

2. Identify one feedback mechanism in the human body.

3. Identify, other than death, one specific result if homeostasis fails in the human body.

4. Describe how a plant regulates water loss through feedback mechanism that involves guard cells.

5. Describe how Asexual reproduction differs from Sexual reproduction.

Base your answer to the following question on the information below and on your knowledge of biology.

Stem Cells

If skin is cut, the wound closes within days. If a leg is broken, the fracture will usually mend if the bone is set correctly. Almost all human tissue can repair itself to some extent. Much of this repair is due to the activity of stem cells. These cells resemble those of a developing embryo in their ability to reproduce repeatedly, forming exact copies of themselves. They may also form many other different kinds of cells. Stem cells in bone marrow offer a dramatic example. They can give rise to all of the structures in the blood: red blood cells, platelets, and various types of white blood cells. Other stem cells may produce the various components of the skin, liver, or intestinal lining.

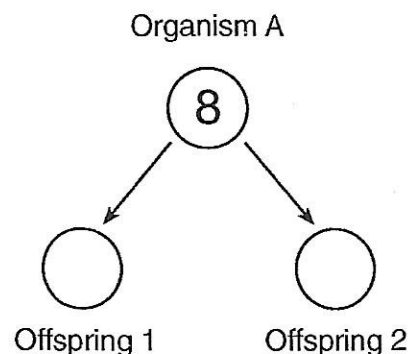
The brain of an adult human can sometimes compensate for damage by making new connections among surviving nerve cells (neurons). For many years, most biologists believed that the brain could not repair itself because it lacked stem cells that would produce new neurons.

A recent discovery, however, indicates that a mature human brain does produce neurons routinely at one site, the hippocampus, an area important to memory and learning. This discovery raises the prospect that stem cells that make new neurons in one part of the brain might be found in other areas. If investigators can learn how to cause existing stem cells to produce useful numbers of functional nerve cells, it might be possible to correct a number of disorders involving damage to neurons such as Alzheimer's disease, Parkinson's disease, stroke, and brain injuries.

1. Describe how this new discovery concerning stem cells might help to treat diseases such as Alzheimer's disease or Parkinson's disease. (2 points)

2. Sexually produced offspring often resemble, but are not identical to, either of their parents. Explain why they resemble their parents but are not identical to either parent. (2 points)

3. The diagram below represents reproduction of single-celled organism A, which has a normal chromosome number of 8. (2 points)



In the circles representing offspring 1 and offspring 2, write the number of chromosomes that result from the normal asexual reproduction of organism A.