Regenerative Medicine Basics

1. Regenerative Medicine doctors and scientists are working on treatments to help people heal in ________________, not months, from serious injuries.

2. The type of engineering that works in collaboration with regenerative medicine to grow new cells to replace broken or diseased body parts is called ________________ engineering.

3. True or False? Circle the correct answer: Regenerative medicine is a new area of science that helps the body heal itself using scaffolds, stem cells, and growth factors.
   - True
   - False

4. ________________ cells can become any type of cell in the body.

Bone

5. Without bones and a skeleton, humans would be a highly-evolved bunch of squishy organs, like which of the following animals?
   - a. starfish
   - b. jellyfish
   - c. angel fish

6. Tissue engineering doctors can help fill large gaps in a broken bone using a structure called a ________________. This structure helps new tissue to grow.
7. __________________ are tiny blood vessels that carry blood throughout your entire body, including your bone, providing the nourishment that living tissues need to grow.

8. The bone marrow is like an amazing factory inside the center of your bones. What is made in the bone marrow?

________________________

For the following questions, please write the matching letter of the word that fills in the blank.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
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<tbody>
<tr>
<td>9. ___________ are found in the marrow and can be modified with growth factors to grow into a variety of different cells.</td>
<td>a. proteins</td>
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<td>10. ___________ can support stem cells and growing blood vessels while they make new bone. They are temporary and are replaced by new bone cells over time.</td>
<td>b. scaffolds</td>
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<td>11. The extracellular matrix is made of ________ and is the structure outside the cells. It fills the space between individual cells in human tissue, like bones.</td>
<td>c. calcium</td>
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<td>12. Humans need ___________ to harden bones and keep them from being soft, bendy, and easily breakable.</td>
<td>d. stem cells</td>
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The Heart

13. To treat heart conditions using regenerative medicine, stem cells are
harvested from bone marrow and placed on a flexible _________________ which is then placed on the heart. These new cells replace the dead cells found on the heart.

14. The heart is one of the largest and strongest muscles in your body, pumping ____________ gallons of blood through its chambers each day.

15. Your heart delivers oxygen from breathing and nutrients from the food you eat to your brain, muscles, bones and ________________.

16. The health of the heart can be affected by aging, unhealthy foods, lack of ____________, tobacco, and infection.

17. A ___________ ___________ is an interruption of the squeezing heartbeat.

18. Heart attacks happen because plaque builds up and keeps the heart from having enough blood flow through the capillaries to feed the heart cells. Draw a picture of what plaque looks like in a capillary.

19. Heart attacks occur when blood cells try to fix a plaque burst and block the ________________, keeping blood from feeding the heart’s cells.

20. When heart cells die, the remaining cells form a scar on the heart. What effects does this scar have on the human body? Circle the correct letter(s).

   a. It weakens the heart.
   b. It causes an irregular heartbeat.
   c. It helps the heart beat faster.
   d. All of the above.
21. ________ therapy can treat heart tissue weakened by scars. This, along with a special pump and stem cells, can boost and improve blood flow again.

22. Now that you have learned about tissue engineering and regenerative medicine, draw the following cells in the space below.

- Stem cell.
- Heart cell.