Serology Unit Review

Match the following words on the left to their definitions on the right.

1. Erythrocytes  J  A. Manufactured by the white blood cells to attack any antigen that does not belong.
2. Leukocytes  G  B. The genes are the same.
3. Thrombocytes  C  C. Platelets that are responsible for producing fibrin to form a clot.
4. Plasma  E  D. Blood changing from a liquid to a semi-solid state.
5. Antigen  I  E. The fluid portion of the blood that carries the solid components and is made up of water and metabolites.
6. Rh Factor  K  F. The genes are different.
7. Antibody  A  G. White blood cells that provide immunity and produce antibodies.
8. Coagulate  D  H. Red blood cells clumping together due to antibodies in the blood.
9. Agglutination  H  I. Identification proteins that are found on the surface of every red blood cell.
10. Heterozygous  F  J. Red blood cells that contain hemoglobin and transports gases through the body.
11. Homozygous  B  K. Another specific antigen found on the surface of every red blood cell.

Match the following words on the left to their definitions on the right.

1. Grid Method  H  A. Spatter projected outward and away from a source.
2. Perimeter Ruler Method  E  B. Momentum causes one end of a blood drop to contain more blood than the other end.
4. Impact Spatter  J  D. Spatter that consists of blood projected backward from a source potentially being deposited on the object or person creating the impact.
5. Forward Spatter  A  E. A rectangle border of rulers is made around the pattern to show the overall scale with small rulers by each drop to show the scale of individual drops.
8. Tail  C  H. Strings and stakes are used to create squares of a known dimension over the entire spatter pattern.
9. Satellite Spatter  F  I. The speed at which something travels with a direction.
10. Build-Up  B  J. A type of blood spatter pattern created when an object comes into contact with a source of blood.
11. Elongated  G  K. The location from which blood was projected from.
Match the following words on the left to their definitions on the right.

1. Angle of Impact  E  A. A pattern created when an exposed blood source is subjected to an action or force greater than the force of gravity.
2. Point of Convergence  J  B. An antibody test used to determine if the bloodstain is human or animal.
3. Passive Spatter Pattern  D  C. A pattern that lightens as the blood moves away from the source or less pressure is applied.
4. Skeletonization  H  D. Drops created or formed by the force of gravity acting alone.
5. Transfer Spatter Pattern  G  E. The acute angle formed between the direction of the blood drop and the plane of the surface it strikes.
6. Feathering  C  F. An enzyme that accelerates the oxidation of hemoglobin in blood.
7. Projected Spatter Pattern  A  G. A wet, bloody surface comes in contact with a secondary surface.
8. Peroxidase  F  H. The edges of a stain dry to a surface creating a ring.
9. Luminol  K  I. A solution that causes a change in color when exposed to blood.
10. Bluestar  I  J. The common point on a 2-dimensional surface from which the blood drops originated.
11. Precipitin Test  B  K. A solution that causes a reaction that releases light when exposed to an ultraviolet light source.

Answer the following questions in complete sentences.

1. Fill in the following table about the components of blood.

<table>
<thead>
<tr>
<th>Part of Blood</th>
<th>Components</th>
<th>Percentage</th>
</tr>
</thead>
</table>
| Solid         | Red Blood Cells  
White Blood Cells  
Platelets       | 45% total  
Red blood cells-99%  
White blood cells and platelets-1% |
| Liquid        | Water  
Metabolites (salts, glucose, waste, dissolved gases, etc.) | 55% total  
Water-92%  
Metabolites-8% |
| Plasma        |            |            |
2. Fill in the following table about blood types.

<table>
<thead>
<tr>
<th>Blood Type</th>
<th>Antigens Present</th>
<th>Antibodies Present</th>
<th>Can Donate To</th>
<th>Can Receive From</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>B</td>
<td>A, AB</td>
<td>A</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>A</td>
<td>B, AB</td>
<td>B</td>
</tr>
<tr>
<td>AB</td>
<td>A and B</td>
<td>None</td>
<td>AB</td>
<td>All</td>
</tr>
<tr>
<td>O</td>
<td>None</td>
<td>A and B</td>
<td>All</td>
<td>O</td>
</tr>
<tr>
<td>Rh⁺</td>
<td>Rh</td>
<td>None</td>
<td>Rh</td>
<td>All</td>
</tr>
<tr>
<td>Rh⁻</td>
<td>None</td>
<td>Rh</td>
<td>All</td>
<td>None</td>
</tr>
</tbody>
</table>

3. Describe the process used to determine an unknown blood type.
   An unknown blood type is mixed with blood of a known type. If the blood agglutinates, then you know that the unknown sample is NOT the same as the known sample you mixed it with.

4. Write the genotype for each person based on the description:
   a. Homozygous for the “A” allele __I^A_I^A__
   b. Heterozygous for the “B” allele __I^B_i__
   c. Type O __ii__
   d. Type “B” with a type “O” parent __I^B_i__
   e. Type “AB” __I^A_I^B__.

5. Candace has type B blood. Her husband Dan has type AB blood. Is it possible for Candace and Dan to have a child that has type O blood? Use a Punnett square to explain your answer.
   Candace’s genotype: __I^B_i__ or __I^B_i__
   Dan’s genotype: __I^A_I^B__
   Possible offspring genotypes: I^A_I^B, I^A_i, I^B_i, I^B_i

   No, it is not possible for Candace and Dan to have an offspring with type O blood. In order for them to have a child with type O blood, both parents need to contribute the recessive i gene.

6. Kathy has type A blood and her husband Mark has type AB blood. Their son is heterozygous type A. Is this possible? Use a Punnett square to explain your answer.
   Kathy’s genotype: __I^A_i__
   Mark’s genotype: __I^A_I^B__
   Possible offspring genotypes: I^A_I^B, I^A_i, I^A_i, I^B_i

   Yes, this is possible if Kathy’s genotype is I^A_i.
7. List two things that a blood spatter pattern can tell us.
   - Blood spatter patterns can tell us about the events that happened and their sequence. For example, they can tell us if the victim was sitting or standing or if any movement occurred.
   - Blood spatter patterns can also confirm or refute statements made by the witness, suspect, or victim.

8. Fill out the following table about the velocity of blood spatter.

<table>
<thead>
<tr>
<th>Speed of Force</th>
<th>Size of Blood Drop</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Velocity</td>
<td>Up to 5 feet/second</td>
<td>Larger than 4 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gravity pulling a drop off a wound.</td>
</tr>
<tr>
<td>Medium Velocity</td>
<td>Up to 25 feet/second</td>
<td>1-3 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blunt force trauma, beating, stabbing</td>
</tr>
<tr>
<td>High Velocity</td>
<td>Up to 100 feet/second</td>
<td>&lt;1 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gunshot, explosives, cough or sneeze</td>
</tr>
</tbody>
</table>

9. Describe what happens to a blood drop as you increase the height at which it was dropped.
   The drops get larger and there tends to be more satellite spatter as the height from which the drop fell increases.

10. Describe what happens to a blood drop trail as the source of blood increases the speed of movement.
    The drops are close together and small and get farther apart and bigger as the speed of movement increases.

11. On the drops below, draw an arrow to indicate the direction the blood was moving when it hit the surface.

12. Estimate the angle of impact in the previous blood drops based on their shape.
    a. ~30
    b. ~60
    c. ~20-30
    d. ~10-15
13. Calculate the angle of impact of the following drops.

14. Determine the point of origin in the following diagram.
15. Fill out the table below about types of blood spatter patterns.

<table>
<thead>
<tr>
<th>Description</th>
<th>Types</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Passive</strong></td>
<td>Drops created or formed by the force of gravity acting alone.</td>
<td>Flows, pools, drip trails, drip patterns, simple drops</td>
</tr>
</tbody>
</table>