

AABB 2021 Blood Bank Fundamentals Course

SBB/BB Exam Review *Supplemental Handout*

PROGRAM DESCRIPTION:

It would be impossible to present all information needed to pass the SBB or BB exams in a 3-4 hour program. This program will provide a "roadmap" for those preparing for the BB or SBB exam. Content areas of the exams will be highlighted with emphasis on where to find information required for successful completion of these exams.

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OBJECTIVES:

- Explain the American Society of Clinical Pathologist (ASCP) SBB and BB exam requirements
- Review and explain the topics outlined on the ASCP BB/SBB Exam Content Outline
- Define and relate pertinent information from the ASCP Content Outline that will be on these exams to aid in preparing for the BB or SBB exam.
- Discover helpful hints for studying for and taking these exams.
- Apply knowledge for interactive question and answer polling session.

Historical Background of the BB Fundamentals Course, formerly known as the SBB/BB Exam Review at the AABB Annual Meeting

This program was created by a group of blood bankers who were inspired by the Last Chance Review program. The purpose was to produce an AABB Annual Meeting workshop to prepare individuals for a certification in blood banking and provide study guide materials. This program attempts to condense **a great deal of information** into a manageable format.

OUTLINE OF RESOURCES PROVIDED IN THIS HANDOUT

- 1) Practice Questions for BB Exam
- 2) Practice Questions for SBB Exam
- 3) Key for BB Practice Questions
- 4) Key for the SBB Practice Questions
- 5) Lab Math for BB and SBB Exam Preparation
- 6) List of all CAAHEP Accredited SBB Programs
- 7) ASCP Content Outline
- 8) ASCP Reading List

DISCLAIMER

- *The information that follows is intended to provide a starting point for studying the body of knowledge required to successfully challenge the SBB and BB exams.*
- *We all know that it would be impossible to present all information needed to pass the SBB or BB exams in a three-hour workshop or one concise text.*
- *The ASCP Content Outline, references and practice questions included will give you the chance to increase your knowledge of the complex discipline of blood banking/transfusion medicine.*
- *If you study only the Power Point slide presentation, the ASCP Content Outline and quizzes provided, it is unlikely that you will pass these exams. However, if you use this as a place to begin your study and then put in the time and effort to complete your preparation, we sincerely feel that you will increase your chances.*

**We wish you the very best of luck in your efforts to attain
BB or SBB ASCP Certification!**

Practice Questions for BB Exam

1. A patient who has recently been diagnosed with a myelodysplastic disorder will require multiple transfusions of red cells and platelets. What red cell component is best for long-term support of this patient to prevent HLA alloimmunization?
- CMV-Negative Red Blood Cells
 - Deglycerolized Red Blood Cells
 - Irradiated Red Blood Cells
 - Leukocyte-Reduced Red Cells

2. A mother is O Rh Negative, and her infant is B Rh Positive. The infant's DAT is 2+. The eluate reacts as follows:

	A1 Cells	B Cells	I	II	III
Eluate	0	2+	0	0	0

Which of the following is the most appropriate ABO and Rh type of the red cells to select for an exchange transfusion?

- A, Rh Negative.
 - O, Rh Positive.
 - B, Rh Negative.
 - B, Rh Positive.
3. An accidental needle stick occurs during phlebotomy and it is determined that Hepatitis B Immune globulin will be administered to the phlebotomist. What type of immunity will they have?
- Natural Acquired Active
 - Artificial Acquired Active
 - Artificial Acquired Passive
 - Natural Acquired Passive
4. Which of the following apheresis platelet products is acceptable for labeling for patient use?
- 1.5×10^{10} platelets
 - 3.5×10^{10} platelets
 - 5.5×10^{10} platelets
 - 3.5×10^{11} platelets
5. A rosette test, performed on a post-partum sample from an Rh-Negative woman who delivered an Rh-Positive baby, is positive. Which of the following is true?
- The mother's antibody screen will be positive for anti-D.
 - A quantitative test for D-positive red cells must be performed.
 - The mother is not a candidate for Rh immune globulin.
 - The mother should receive two doses of Rh immune globulin.

Practice Questions BB Exam Continued

6. A patient received 20 mL of compatible Red Blood Cells. Her blood pressure dropped, and she experienced difficulty in breathing. She was treated for shock. What type of Red Cells should she receive to prevent this type of reaction?
- Washed Red Blood Cells.
 - Packed Red Blood Cells.
 - Irradiated Red Blood Cells.
 - Leukocyte-Reduced Red Blood Cells.
7. In typing red cells with anti-Fy^a, which cell phenotype should be used as a positive control?
- Fy(a+b-)
 - Fy(a-b+)
 - Fy(a+b+)
 - Fy(a-b-)
8. A patient with anti-K was crossmatched with 4 units of ABO/Rh compatible, K negative donor blood. The units were compatible in all phases of testing. After the antiglobulin phase, IgG sensitized control cells were added and a 2+ reaction was noted. The proper interpretation of this reaction is that the
- cell washing was adequate.
 - crossmatch was performed properly.
 - patient's serum was added.
 - crossmatched units were Kell positive.
9. Three units of red blood cells were ordered for transfusion to a 69-year-old female. The patient has been pregnant twice but has never received a blood transfusion. These results were obtained in pretransfusion testing:

	37°C	Anti-IgG
Screening Cell I	0	2+
Screening Cell II	0	2+
Screening Cell III	0	2+
Auto control	0	2+
Crossmatch, donors 1-3	0	2+

What should be done to obtain compatible blood?

- Perform an autoadsorption at 4C and repeat the tests.
 - Perform a warm autoadsorption and test for alloantibody.
 - Prewarm the serum and cells to 37C before testing.
 - Determine the specificity of the autoantibody and give antigen-negative blood.
10. Hematopoietic stem cells have the marker
- CD34.
 - Le(a+).
 - IL-7.
 - HPA-1.

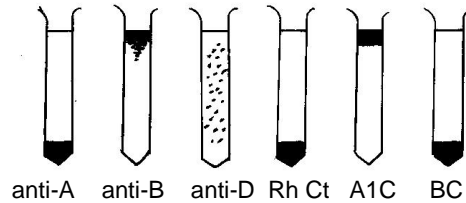
Practice Questions BB Exam Continued

11. It is acceptable to infuse which of the following solutions simultaneously with red blood cells?

- a. 5% dextrose in water
- b. Lactated Ringer's solution
- c. 0.9% sodium chloride
- d. hypotonic saline

12. What is the proper interpretation of these gel test reactions for a 20-year-old patient?

A1C = A1 cell, BC = B cell



- a. A, Rh Negative
- b. B, Rh Positive
- c. A, Rh Positive
- d. B, Rh Negative

13. Five units of blood are needed for a patient who has produced anti-E and anti-Jk^a. How many ABO/Rh compatible donor units should be phenotyped to find enough antigen-negative blood for transfusion?

- a. 10
- b. 14
- c. 20
- d. 25

14. A potential transfusion recipient has a history of a previous anti-Jk^b. The antibody is no longer detectable in the antibody screening test, even when enhancement techniques are used. What further action should be done before transfusion?

- a. Perform an antibody ID panel on the patient's serum.
- b. Crossmatch type specific units and release only compatible units for transfusion.
- c. Give Jk^b negative, crossmatch-compatible blood.
- d. Type the patient's red cells for Jk^b.

15. If a person inherits the genes A, H, se, and Le, what is his red cell phenotype?

- a. A, Le(a+b-)
- b. A, Le(a-b-)
- c. A, Le(a-b+)
- d. A, Le(a+b+)

Practice Questions BB Exam Continued

16. Irradiation of donor blood is done to prevent which of the following adverse effects of transfusion?

- a. Febrile Nonhemolytic (FNHTR)
- b. Transfusion associated graft vs. host disease (TA-GVHD)
- c. Cytomegalovirus (CMV) infection
- d. Transfusion Related Acute Lung Injury (TRALI)

17. You have 22 random units of RBCs on the shelf. For which of the following patients could you find 3 compatible units?

- a. O Positive with anti-f
- b. A Positive with anti-Jk^a
- c. B Negative with anti-D
- d. O Positive with anti-Fy^a

18. Given the following eluate results, answer the following questions.

MTS Eluate	A ₁ cells	A ₁ cells (2 nd source)	B cells	B cells (2 nd source)	Screening Cell I	Screening Cell II
Eluate	2+	2+	0	0	0	0
Last Wash	0	0	0	0	0	0

What is the most likely scenario that could have these results?

- a. A platelet transfused to an O patient
- b. A baby born to an O mom
- c. A baby born to a B mom
- d. O platelets transfused to a B patient

19. An obstetric patient has a type and screen sample submitted. The Blood Bank identifies an anti-E. The alleged father has been requested to give a sample for antigen phenotyping to determine the risk of the fetus of being E positive. The following are the antigen typing results:

Phenotype:

Antigen	Patient's Type
C	0
E	+
c	+
e	+

What is the chance that the fetus is E positive?

- a. 100%
- b. 50%
- c. 25%
- d. 0%

Practice Questions BB Exam Continued

20. A cord blood sample was sent to the Blood Bank on a baby girl for evaluation.

Red Cell Type:

Anti-A	Anti-B	Anti-D	Monoclonal Control
Negative	4+	Negative	Negative

Direct Antiglobulin Test:

Polyspecific (anti-IgG, anti-C3)	Check Cells
2+	NT

NT – Not Tested

Weak D testing:

	AHG	Check Cells
Anti-D	2+	NT
Monoclonal Control	2+	NT

NT – Not Tested

Acid Elution:

	A ₁ cells	B cells	B cells (2 nd source)	O cells	
				I	II
Eluate	0√	2+	2+	0√	0√
Last Wash	0√	0√	0√	0√	0√

√- Check Cells were positive

What ABO/Rh type of Red Blood Cells would be the best choice to transfuse this patient?

- O Pos
- B Pos
- B Neg
- O Neg

Practice Questions BB Exam Continued

21. A Caucasian male in the SICU has a new sample drawn for type and screen after going to cardiac surgery 3 days ago where 6 PRBCs were transfused. The patient's previous sample was O Pos with a negative antibody screen. Patient's current sample types as O Pos antibody screen is positive on screening cell I and negative on screening cell II. The following LISS panel was performed.

	D	C	c	E	e	f	V	C _w	K	k	F _y a	F _y b	J _k a	J _k b	L _e a	L _e b	M	N	S	s	L _u a	L _u b	X _g a	R _T	37C	AHG	
1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	0	+	0	+	0	0	0	0	0√
2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	+	0	+	0	0	0	+	+	0	0	0√
3	+	0	+	+	0	0	0	0	0	+	+	+	+	0	0	+	0	+	0	+	0	0	+	+	0	0	2+
4	0	0	+	0	+	+	0	0	+	+	+	+	+	0	+	0	+	+	+	+	0	0	+	0	0	0	2+
5	+	0	+	0	+	+	0	0	0	+	0	0	+	+	0	+	0	+	0	0	0	0	0	+	0	0	0√
6	0	0	+	0	+	+	0	0	0	+	0	0	+	0	+	0	0	+	0	+	0	0	0	+	0	0	2+
7	0	0	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	0	0	+	+	0	0	0	0√
8	0	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	+	0	+	+	0	0	+	0	0	0	0√
9	0	0	+	0	+	+	0	0	+	0	+	0	0	+	0	+	+	+	0	+	0	0	+	+	0	0	0√
10	0	+	+	0	+	+	0	0	0	+	+	+	+	0	0	0	0	+	0	+	0	0	+	+	0	0	2+
11	+	+	0	0	+	0	0	0	0	+	+	0	+	0	0	+	+	+	0	+	0	0	0	+	0	0	2+
AC																							0	0	1+		

Which of the methods listed should be performed?

- a. Autologous Adsorption
- b. Phenotype on current sample
- c. DAT battery
- d. Donath-Landsteiner

22. You need 50 mL of 6% bovine albumin. You have only 22% albumin available. How much 22% albumin must be diluted to make 50 mL of 6% albumin?

- a. 8.4 ml
- b. 13.6 ml
- c. 36.4 ml
- d. 41.6 ml

23. A patient who has anti-U is going to surgery in seven days, he has previously donated an autologous whole blood unit for his surgery 20 days ago and it has already been shipped to the hospital. He comes in today to donate a second whole blood unit for his upcoming surgery, which of the following must be completed at this donation?

- a. Disease marker testing
- b. Full length donor history questionnaire
- c. Hemoglobin/Hematocrit assessment
- d. He must be deferred

Practice Questions BB Exam Continued

24. A donor provides a medication list at the time of donation. Which drug would disqualify this donor today?

Melatonin, Daily
Topical Steroid for Itchy Skin, As Needed
B Pollen, Daily
Finasteride (Proscar), Daily
Albuterol Inhaler, As Needed

- a. Melatonin
 b. Topical Steroid
 c. B Pollen
 d. Proscar
 e. Albuterol Inhaler
25. The donor has answered all the donor history questionnaire with no issues determined. He has the following mini-physical results. Is this donor eligible to donate today?

Weight and Height	52kg, 5'9"
Blood Pressure	Systolic 150, Diastolic 80
Pulse	65 beats per minute
Temperature	39.0 C
Hemoglobin	13.2 g/dL

- a. Not eligible due to blood pressure out of range
 b. Not eligible due to temperature
 c. Not eligible due to weight
 d. Not eligible due to irregular pulse
26. A pheresis platelet donor complains of tingling of their lips. Which of the following actions is the most appropriate to take in order alleviate these symptoms?
- a. Administer a Ca⁺⁺ containing product orally.
 b. Raise their feet above their head.
 c. Give an IV solution containing Ca⁺⁺
 d. Immediately stop the procedure and defer donor from further pheresis platelet donations.
27. Review the following reactions between donor cells and pt serum:

Cells	Reaction w/ Serum
Dce/Dce	+
Dce/DcE	+
DcE/ DcE	-

What percentage of RBC units will be compatible?

- a. 80%
 b. 70%
 c. 30%
 d. 20%
28. In pre-transfusion testing, the antibody screen and autocontrol are negative but the crossmatch is incompatible at the antiglobulin phase of testing. What is the most likely reason for this reaction?
- a. +DAT of donor units
 b. Rouleaux
 c. Antibody to high frequency antigen
 d. Daratumumab interference

Practice Questions BB Exam Continued

- 29. Which of the following donors is unacceptable for whole blood donation?**
- A 2-unit red cell apheresis donor who donated whole blood 8 weeks ago
 - A 29 y/o male athlete with a pulse 48 bpm
 - A 26 y/o female, 8 weeks after delivery of a healthy infant
 - A 35 y/o nurse who received Hepatitis B Immune Globulin 18 months ago
 - A 18 y/o female with an oral temperature of 37.6C
- 30. Aging RBCs are removed by spleen when they are no longer able to be permeable or deformable, which of the following can lead to decreased RBC viability?**
- Accumulation of Calcium in the RBC membrane
 - Accumulation of Carbohydrates on the RBC surface
 - High ATP
 - High NADH
- 31. During blood administration, if the IV rate has slowed which of the following actions is appropriate?**
- Discontinue the transfusion
 - Squeeze the unit
 - Elevate the unit
 - Add anticoagulant to the IV line
- 32. A unit of FFP contains 0.75 unit/ml of Factor VIII in 265ml. When the cryoprecipitate is made from the unit, it contains 12 units/ml in 15 ml. What is the Factor VIII yield as a percentage of the original Factor VIII?**
- 98.6%
 - 90.5%
 - 88.5%
 - 62.8%
- 33. An adult patient who weighs 156 lbs. requires plasma exchange. Her initial hematocrit is 37%. If a two-volume exchange is performed using 5% albumin as replacement, how much plasma will be processed?**
- 2684 ml of plasma
 - 3152 ml of plasma
 - 5368 ml of plasma
 - 5896 ml of plasma
- 34. How many ABO/D compatible donors would you need to screen to find 4 compatible units for a patient with anti-E, anti-K, and anti-S?**
- 11
 - 14
 - 32
 - 141
- 35. A patient has a pre-transfusion hematocrit of 18.4%. What would you expect the hemoglobin (g/dL) to be after transfusion of 3 units of packed RBCs?**
- 9
 - 12
 - 15
 - 21

Practice Questions BB Exam Continued

- 36. An acid elution stain on a post-partum specimen shows 1.8% fetal cells present in the maternal circulation. How many vials of Rhlg must be given?**
- a. 2
 - b. 4
 - c. 6
 - d. 8
- 37. What is the RCF of a centrifuge with a radius of 4.5 inches and a RPM of 3400?**
- a. 170 RCF
 - b. 434 RCF
 - c. 581 RCF
 - d. 1475 RCF
- 38. A frequent female donor arrives at the donor center for a scheduled appointment. She is 5'10" and 200lbs, normal temperature, blood pressure 115/80, Hct 45% with no donor questionnaire issues noted. What specifically qualifies her for a double red cell donation?**
- a. She is a dedicated donor
 - b. She is the correct height and weight
 - c. She has no donor questionnaire issues noted
 - d. She has a required blood pressure, Hct and body temperature
- 39. What test listed is a required donor test to ensure the safety of the blood supply?**
- a. Malaria
 - b. Parvovirus B19
 - c. West Nile Virus
 - d. SARS-2
- 40. Cryoprecipitate is prepared using a freeze-thaw method. This product is best used for the following indication**
- a. Anemia
 - b. Fibrinogen replacement
 - c. Thrombocytopenia
 - d. Factor V deficiency
- 41. A new staff member has started in your Blood Bank. They refuse to obtain the OSHA required Hepatitis Prophylaxis. What action should be taken by the Blood Bank management?**
- a. The staff member will have to be dismissed
 - b. The staff member will have to wear coat, gloves and facemask at all times
 - c. The staff member will have to document their refusal to participate in hepatitis prophylaxis
 - d. The staff member must provide a physician signed memo documenting the reason they must refuse for medical reasons
- 42. What percentage of group A and AB individuals are A1 positive?**
- a. 75%
 - b. 80%
 - c. 85%
 - d. 90%

Practice Questions BB Exam Continued

43. The panel below is from a woman in Labor and Delivery: Which of antibody specificities could be responsible for the reactivity in the panel?
- Anti-D
 - Anti-C
 - Anti-G
 - All of the above

	D	C	c	E	e	f	V	C _w	K	k	F _y a	F _y b	J _k a	J _k b	L _e a	L _e b	M	N	S	s	L _u a	L _u b	X _g a	R _T	37°C	AHG	
1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	0	+	0	+	0	0	0	0	2+
2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	+	0	+	0	0	0	+	+	0	0	2+
3	+	0	+	+	0	0	0	0	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	+	0	0	2+
4	0	0	+	0	+	+	0	0	+	+	+	+	+	0	+	0	+	+	+	+	0	+	0	0	0	0	0√
5	0	0	+	0	+	+	0	0	0	+	0	0	+	+	0	+	0	+	0	0	0	0	+	0	0	0	0√
6	0	0	+	0	+	+	0	0	0	+	0	0	+	0	+	0	0	+	0	0	+	0	+	0	0	0	0√
7	0	0	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	0	+	0	+	+	0	0	0√
8	0	0	+	+	+	+	+	0	0	+	0	+	0	+	0	+	+	0	+	+	0	+	0	+	0	0	0√
9	0	0	+	0	+	+	0	0	+	0	+	0	0	+	0	+	+	+	0	+	0	+	+	+	0	0	0√
10	0	+	+	0	+	+	0	0	0	+	+	+	+	0	0	0	0	+	0	+	0	+	+	+	0	0	2+
11	+	+	0	0	+	0	0	0	0	+	+	0	+	0	0	+	+	+	0	+	0	0	0	+	0	0	2+
AC																							0	0	0√		

44. The transferase _____ adds the sugar _____ to the precursor substance to make a red cell express the A antigen.
- α -2-L- fucosyltransferase and L-fucose
 - α -3-N-acetyl-galactosaminyltransferase and N-acetyl-galactosamine
 - α -3-D-galactosyltransferase and D-galactose
 - α -2-L- fucosyltransferase and N-acetyl-galactosamine
45. Which of the following best describes the Kleihauer-Betke test?
- Adult hemoglobin resists elution from red cells under acid conditions
 - Fetal hemoglobin resists elution from red cells under acid conditions
 - Fetal hemoglobin is leached out of the red cells during testing
 - It is the best test used to determine the degree of hemolysis in HDFN
46. Which of the following is the best choice for intrauterine transfusion?
- CMV negative, Irradiated, compatible with maternal serum, less than 7 days old
 - CMV negative, Irradiated, compatible with maternal serum, greater than 7 days old
 - CMV safe, Irradiated, compatible with father's phenotype, less than 7 days old
 - HLA tested to match both mother's and father's HLA typing

Practice Questions BB Exam Continued

47. **An RhD negative mother had 2 previous infants affected by RhD HDFN. One was mildly affected with a positive DAT, successfully treated with phototherapy, and her next child required intraperitoneal transfusion. The following child had no HDFN. The mother's anti-D titer on current pregnancy is now 128. What fetal middle cerebral artery peak systolic velocity (MCA-PSV) value would indicate moderate to severe anemia in the infant?**
- 0.5 Multiples of the Median
 - 0.8 Multiples of the Median
 - 1.0 Multiples of the Median
 - 1.5 Multiples of the Median
48. **Which of the following is the most common cause of a fatal hemolytic transfusion reaction?**
- Serologic error
 - Improper component storage temperature
 - Clerical error
 - Use of unvalidated procedures
49. **Which two transfusion reactions are most likely to present with the initial symptom of fever & chills?**
- Transfusion associated circulatory overload (TACO) & transfusion-related acute lung injury (TRALI)
 - Post transfusion Purpura & Neonatal Immune Thrombocytopenia
 - Graft-vs-host disease & Hypotension associated with ACE inhibition
 - Acute hemolytic transfusion reaction & transfusion associated sepsis due to bacterial contamination of platelet unit
50. **Which of the following is the most appropriate investigation of a suspected hemolytic transfusion reaction?**
- Inspect posttransfusion specimen for hemolysis, repeat ABO on posttransfusion specimen, perform DAT on posttransfusion specimen
 - Inspect posttransfusion specimen for hemolysis, repeat ABO on posttransfusion specimen, perform DAT on unit
 - Repeat pre and posttransfusion ABO, repeat antibody screen on pre and posttransfusion specimen, repeat ABO confirmation on unit, perform pre and posttransfusion DAT
 - Repeat pre and posttransfusion ABO, repeat antibody screen on pre and posttransfusion specimen, repeat ABO confirmation on unit, perform DAT on unit

Practice Questions BB Exam Continued

51. In a population of 5549 individuals, 1823 individuals reacted 3-4+ and 2811 individuals reacted 1+ with anti-Q. What is the percentage of individuals with the negative phenotype?
- 16.49%
 - 32.85%
 - 50.66%
 - 64.85%
52. An antibody to a RBC antigen is identified in a pregnant female. What immunoglobulin type would be a concern for hemolytic disease of the fetus and newborn?
- IgM
 - IgG₂
 - IgG₁
 - IgE
53. What can cause delayed wound healing but have a normal platelet count, normal PT and normal aPTT?
- Factor VII deficiency
 - Factor IX deficiency
 - Factor XIII deficiency
 - Warfarin overdose
54. What is the essential molecule needed for platelet adhesion to the damaged vascular endothelium?
- Fibrinogen
 - Von Willebrand factor
 - Factor VIII
 - Antithrombin
55. Which transfusion-associated parasite infection is screened for in the blood donation process with targeted donor questions rather than donor testing?
- Malaria
 - SARS-2
 - Trypanosoma Cruzi*
 - Hepatitis
56. Which transfusion reaction is caused by the engraftment of donor T-lymphocytes in a susceptible immunosuppressed patient which has a mortality rate as high as 90% when reported.
- Post-transfusion CMV infection
 - Post-transfusion purpura
 - Transfusion-associated graft-versus-host disease
 - HLA alloimmunization
57. Solid phase red cell adherence method may be used for what type(s) of testing in the Blood Bank
- Platelet antibody detection
 - Alloantibody identification
 - ABO/Rh
 - All of the above

Practice Questions BB Exam Continued

- 58. Which gene is deleted in a Caucasian D Negative individual?**
- a. *RHCE*
 - b. *FY*
 - c. *RHD*
 - d. *KEL*
- 59. A nurse calls the Blood Bank reporting her patient who is receiving a platelet product has demonstrated shortness of breath and change in blood pressure. What type of pulmonary transfusion reaction should be considered?**
- a. Febrile Non-Hemolytic
 - b. TRALI
 - c. Citrate Toxicity
 - d. Allergic
- 60. What type of donor deferral occurs when a prospective donor does not meet current regulatory requirements but these requirements may change in the future. For example, a donor who is deferred to do CJD risk for residing in the United Kingdom within 1980 to 1996.**
- a. Permanent
 - b. Partial
 - c. Temporary
 - d. Indefinite

Practice Questions for SBB Exam

1. Which of the following apheresis platelet products is acceptable for labeling as a leukocyte-reduced platelet for patient use?
- Platelet count 3.0×10^{10} , WBC 2.7×10^6
 - Platelet count 4.5×10^{10} , WBC 1.9×10^6
 - Platelet count 5.0×10^{11} , WBC 3.2×10^6
 - Platelet count 5.5×10^{11} , WBC 5.7×10^6

2. Two types of equipment are on the market that will perform the same test. The costs for installation and reagents differ as follows. How many years will it take to justify the increased up-front costs of type B?

	Type A	Type B
Installation Costs	\$6300	\$9600
Reagent costs/year	\$1600	\$1000

- 2 years
 - 4 years
 - 6 years
 - 8 years
3. A prenatal titer was done on two occasions with the following results:

Date	Cell	1	2	4	8	16	32	64	128	256	512
05/22	R2R2	2+	2+	2+	1+	1+	w+	w+	0	0	0
06/19	R1R2	3+	2+	2+	2+	1+	1+	1+	w+	w+	0

You should:

- Have another tech repeat the testing to confirm results.
 - Notify the physician of the increase in the titer since the last visit.
 - Report the results in the usual way as there is no problem evident.
 - Repeat the test with the 06/19 sample using R2R2 cells.
4. If a patient has anti-hr^B (RH31), which of the following RBC units would be compatible?
- R₁R₁
 - rr
 - R₂R₂
 - R₁R₂
5. A serum is suspected of containing an IgM antibody. The serum is treated with DTT and the following results are obtained:

DTT-treated serum = negative

Untreated serum = positive

- The serum contains an IgM antibody.
- The serum contains an IgG antibody.
- The serum contains both IgM and IgG antibodies.
- The serum contains neither IgM nor IgG antibodies.

Practice Questions SBB Exam Continued

6. A group B recipient receives a group O allogeneic HPC transplant. Which of the following would describe the best choices for transfusion support during the transplant?
- Group O red cells and O plasma/platelets
 - Group O red cells and B plasma/platelets
 - Group B red cells and A plasma/platelets
 - Group B red cells and AB plasma/platelets

7. For the Le^b antigen to be expressed, which of the following genes must be present?
- Se, Le, h
 - Se, le, H
 - se, Le, H
 - se, Le, h

8. Results of an antibody screen and crossmatch testing for a potential recipient are listed below. Which of the following tests would be the most logical next step?

Patient Plasma +	IS	IAT
SCI	0	0
SCII	0	0
SCIII	0	0
Unit #1	0	0
Unit #2	0	0
Unit #3	0	2+

- Screen donor cells with low frequency antisera
 - Screen recipient with low frequency antisera
 - Perform DAT on the unit
 - Repeat the screen using enzyme enhancement
 - Do an antibody panel
9. Which of the following is the correct interpretation of the results from the saliva testing for this person?

	A cells	B cells	O cells
Saliva + anti-A	0	0	0
Saliva + anti-B	0	+	0
Saliva + anti-H	0	0	0
Neg Control + anti-A	+	+	+
Neg Control + anti-B	+	+	+
Neg Control + anti-H	+	+	+

- Group A secretor
- Group B secretor
- Group AB secretor
- Group O secretor
- Test is Invalid

Practice Questions SBB Exam Continued

10. A patient's serum reacts microscopically to 1+ with 8 of 11 cells tested with no apparent specificity. The antibody was non-reactive with the same panel of cells that were ficin treated. This antibody was titered and tested with one of the incompatible cells. The titer was 64 with a score of 15. Which of the following specificities should be considered?
- Anti-Yk^a and anti-Rg
 - Anti-Ch and anti-JMH
 - Anti-Kn^a and anti-Cs^a
 - Anti-Ch, -Rg, and -Cs^a
11. A patient's serum reacted with cells I and II of a three cell screen and three group O, Rh-negative cord cells. When the cells were DTT treated, the serum was negative. The most likely specificity is:
- Anti-Cs^a
 - Anti-Dj^b
 - Anti-JMH
 - Anti-LW
12. A Native American woman (group A, Rh positive) delivered a group O, Rh positive infant. The baby was noted to be jaundiced 6 hours after birth and had a 3+ DAT. The mother's antibody screen had been negative before delivery, and an eluate prepared from the infant's cells was also non-reactive with a routine antibody identification panel and A1 and B cells. Which of the following cells should be tested to possibly assist in identification?
- Dj^a
 - Do^a
 - Ch^a
 - Co^a
13. Examine the following panel. Determine which cell is most likely to have the strongest expression of Fy^a.

	D	C	c	E	e	f	V	C _w	K	k	F _y ^a	F _y ^b	J _k ^a	J _k ^b	L _e ^a	L _e ^b	M	N	S	s	L _u ^a	L _u ^b	X _g ^a
1	+	+	0	0	+	0	0	0	0	+	+	0	+	0	0	0	0	+	0	+	0	+	0
2	+	+	0	0	+	0	0	0	+	+	+	0	+	+	0	+	+	+	0	+	0	+	+
3	+	0	+	0	+	+	+	0	0	+	+	0	0	+	0	0	+	+	+	+	0	+	+
4	0	+	0	+	+	+	0	0	+	+	+	0	+	+	+	0	+	0	0	0	0	+	0
5	+	0	+	0	+	+	0	0	0	+	+	+	0	+	0	+	0	+	+	0	0	+	0

- Cell 1
- Cell 2
- Cell 3
- Cell 4
- Cell 5

Practice Questions SBB Exam Continued

14. A two-volume plasma exchange is performed on a patient with a protein abnormality. At the beginning of the procedure, the amount of the protein in the plasma is 1000 mg/dL. How much of the original plasma is left at the end of the procedure?
- 350 mg/dL
 - 250 mg/dL
 - 120 mg/dL
 - 80 mg/dL

15. A 35 year old healthy female presents with easy bruising over the past month. There is no prior history of bleeding episodes or bruising. Laboratory data revealed the following:

PT	11 sec
aPTT	30 sec
TT	15 sec
Bleeding time	10 minutes
Platelets	22,000/ μ l
Blood smear	Normal RBCs & WBCs, Large platelets

What is the probable cause of her bleeding problem?

- Idiopathic Thrombocytopenia Purpura (ITP)
 - Von Willebrand's Disease (vWD)
 - Dysfibrinogenemia
 - Hemolysis Elevated Liver enzymes Low Platelets (HELLP)
 - Wiskott-Aldrich Syndrome
16. An eluate prepared from serum containing anti-D, anti-C and anti-G was adsorbed onto red cells, they will yield:
- Anti-G
 - Anti-G + Anti-D
 - Anti-C
 - Anti-C + anti-G
17. Refer to the family below. Which child's haplotype demonstrates an occurrence of crossover?

Father	A1, A9, B5, B8, Cw2, Cw7, DR3, DR7
Mother	A2, A3, B7, B12, Cw2, Cw7, DR2, DR5
Child #1	A1, A3, B7, B8, Cw7, DR2, DR3
Child #2	A3, A9, B5, B7, Cw2, Cw7, DR2, DR7
Child #3	A1, A2, B8, B12, Cw2, Cw7, DR3, DR5
Child #4	A2, A9, B5, B12, Cw2, DR5, DR7
Child #5	A2, A9, B5, B12, Cw2, DR5, DR7
Child #6	A2, A9, B5, B12, Cw2, DR3, DR5
Child #7	A2, A11, B12, B17, Cw2, Cw3, DR1, DR5

- #1
- #2
- #4
- #5
- #6

Practice Questions SBB Exam Continued

18. An adult female arrives in the ER. She is lightheaded, pale, and seems to have neurologic impairment. Based on the following lab results, what is the patient's most likely diagnosis?

Hgb =	10 g/dL	LDH =	380 U/L
Hct =	29%	Retic =	5.1%
Platelet count =	10 K/ μ L	DAT =	Negative
PT =	12 sec	Creatinine =	0.3 mg/dL
aPTT =	29 sec		
TT =	16 sec	Indirect bilirubin =	3.5 mg/dL
Fibrinogen =	2 50 mg/dL	Haptoglobin =	20 mg/dL
FDP =	2.1 mg/		
Aerobic Blood Culture =	No growth at 48 hours		

- Hemolytic Uremic Syndrome
 - Thrombotic Thrombocytopenic Purpura
 - Auto Immune Hemolytic Anemia
 - Disseminated Intravascular Coagulation
19. You are performing quality control on a random selection of Whole Blood Platelet Products. The following are the Platelets counts for the Whole Blood and the Random Donor platelet pair. Your institution requires that your random platelets must have a platelet yield greater than 65% to be acceptable. What would you do next based on the results?

Unit Number	Technologist Performing Component Preparation	Centrifuge	Platelet count for Whole Blood	Platelet count for Platelet Rich Plasma
W061218569841	#1	A	10×10^{10}	5.6×10^{10}
W061218569842	#1	B	6.1×10^{10}	5.5×10^{10}
W061218569843	#1	C	8.7×10^{10}	5.9×10^{10}
W061218569844	#1	D	7.9×10^{10}	5.8×10^{10}
W061218569845	#2	A	12.9×10^{10}	6.4×10^{10}
W061218569846	#2	B	9.9×10^{10}	6.7×10^{10}
W061218569847	#2	C	8.2×10^{10}	6.9×10^{10}
W061218569848	#2	D	9.9×10^{10}	6.6×10^{10}
W061218569849	#3	A	5.6×10^{10}	3.5×10^{10}
W061218569850	#3	B	12.1×10^{10}	8.9×10^{10}
W061218569851	#3	C	7.2×10^{10}	6.5×10^{10}
W061218569852	#3	D	6.0×10^{10}	5.6×10^{10}

- All are acceptable for labeling and release
- None can be labeled due to being below acceptability for random donor platelet counts
- Retraining of Technologist #1 should be performed
- Recalibration of Centrifuge A should be performed

Practice Questions SBB Exam Continued

20. A 1 hour post platelet count was taken on a patient for each platelet transfusion over the past three days.

BSA = 2.0 m ²			Starting Platelet Count = 7,000/ μ l		
Date & Time	Unit #	HLA Match Degree	Platelets Count of Unit	Pre transfusion platelet count	1 hour post transfusion platelet count
T-2 noon	W061213786512	R	4 x 10 ¹¹	7,000/ μ l	32,000/ μ l
T-2 10pm	W055513421891	R	8 x 10 ¹¹	25,000/ μ l	70,000/ μ l
T-1 8am	W221513854163	R	10.1 x 10 ¹¹	10,000/ μ l	20,000/ μ l
T-1 noon	W061213786519	R	7.3 x 10 ¹¹	6,000/ μ l	14,000/ μ l
T-1 2pm	W052613854159	R	12 x 10 ¹¹	10,000/ μ l	40,000/ μ l
T 10am	W055513421996	R	6.8 x 10 ¹¹	31,000/ μ l	47,000/ μ l
T 9pm	W22151385419	R	5.2 x 10 ¹¹	42,000/ μ l	74,000/ μ l

What is the corrected count increment for unit # W055513421891?

- a. 6250
 - b. 11250
 - c. 15750
 - d. 30500
21. You treat the following reagent RBCs with ficin by the two stage enzyme treatment procedure. You run Quality Control using reagent anti-Fy^a and anti-K antisera and get the following results. What would be your next step?

	D	C	c	E	e	f	V	C	K	k	F	F	J	J	L	L	M	N	S	s	L	L	X	Anti-K	Anti-Fy ^a AHG
	D	C	c	E	e	f	V	w	K	k	y	y	k	k	e	e					u	u	g		
											a	a	a	a	a	a					a	a	a		
1	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	0	+	0	+	0	+	0	+		
2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	+	+		
3	+	0	+	+	0	0	0	0	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+		1+
4	0	0	+	0	+	+	0	0	+	+	+	+	+	0	+	0	+	+	+	+	0	+	0	4+	1+
5	+	0	+	0	+	+	0	0	0	+	0	0	+	+	0	+	0	+	0	0	0	0	+	0	
6	0	0	+	0	+	+	0	0	0	+	0	0	+	0	+	0	0	+	0	+	0	+	0		
7	0	0	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	0	+	+	0		2+
8	0	0	+	+	+	+	0	0	0	+	0	+	0	+	0	+	+	0	+	+	0	+	0		
9	0	0	+	0	+	+	0	0	+	+	+	0	0	+	0	+	+	0	+	0	+	+	+	4+	2+
10	0	+	+	0	+	+	0	0	0	+	+	+	+	0	0	0	0	+	0	+	0	+	+		1+
11	+	+	0	0	+	0	0	0	0	+	+	0	+	0	0	+	+	0	+	0	0	0	+		2+

Key: AHG – antihuman globulin phase

- a. Test patient plasma with these ficin treated cells
- b. Test ficin treated cells with anti-Fy^b
- c. Repeat ficin treatment
- d. Treat cells with DTT

Practice Questions SBB Exam Continued

22. Based on the following results, what additional testing would you recommend?

Hgb = 8 g/dL

Hct = 23%

Platelet count = 100 K/ μ L

PT = 12 sec

aPTT = 32 sec

FDP = 0.5 mg/L

Fibrinogen = 200 mg/dL

Urine appearance = clear, red

Urine Hemoglobin = Positive

Urine Microscopic evaluation = No intact RBCs

DAT:

Polyspecific: Positive

anti-IgG: Negative

anti-C3: Positive

Antibody Screen:

Negative at 37C and AHG

- a. Elution
 - b. Test I+ cells
 - c. Donath Landsteiner
 - d. Cold Agglutinin titer
 - e. Thermal amplitude studies
- 23. An obstetric patient has a high antibody titer. The decision is made to perform fetal middle cerebral artery (MCA) Doppler flow studies to detect if the fetus is anemic. What would indicate that the fetus is anemic?**
- a. Increase flow rate
 - b. Decreased flow rate
 - c. Normal flow rate
 - d. Variable or changing flow rate
- 24. What coagulation factor may be deficient based on the following lab values:**
- Platelet count: 250 K
 PT: 40 sec
 aPTT: 30 sec
- a. Factor V
 - b. Factor VII
 - c. Factor VIII
 - d. Factor XIII
- 25. If 9% of an African population is born with a severe form of sickle-cell anemia (ss), what percentage of the population will be more resistant to malaria because they are heterozygous(Ss) for the sickle-cell gene?**
- a. 30%
 - b. 42%
 - c. 58%
 - d. 70%

Practice Questions SBB Exam Continued

26. A family presents to a physician office with unexplained symptoms. The doctor orders genetic testing to identify that the third male child in the third generation of a family is affected with a genetic disorder. The doctor requests all living family members also get tested. The family arrives with the maternal grandparents, mother and father, 2 maternal aunts and spouses, 1 maternal uncle and spouse, 2 older brothers, 1 younger sister, 5 first cousins (2 (male & female) from 1 aunt, 2 (identical twin males) from the uncle, and 1 (female) from the other aunt). What type of inheritance is this disorder?

Relationship to Proband	Affected/ Not affected
Maternal GrandFather	Not affected
Maternal GrandMother	Affected
Father	Not affected
Mother	Not affected
Brother #1	Not affected
Brother #2	Not affected
Sister #1	Not affected
Maternal Aunt #1	Not affected
Husband of Maternal Aunt #1	Not affected
Son of Maternal Aunt #1	Not affected
Daughter of Maternal Aunt #1	Affected
Maternal Aunt #2	Not affected
Husband of Maternal Aunt #2	Not affected
Daughter of Maternal Aunt #2	Not affected
Maternal Uncle #1	Not affected
Wife of Maternal Uncle #1	Not affected
Son #1 of Maternal Uncle #1	Affected
Son #2 of Maternal Uncle #1	Affected

- Autosomal Recessive
- X-linked Recessive
- Autosomal Dominant
- Is not a genetic disorder

Practice Questions SBB Exam Continued

27. A 40 year old, untransfused male has been admitted to the hospital for evaluation of a persistent mild anemia and thrombocytopenia. Pretransfusion testing shows the following results:

ABO & Rh:

Patient's Cells + Polyclonal antisera				Patient's Serum +		
Anti-A	anti-B	Anti-D	Control	A ₁ cells	A ₂ cells	B cells
1+mf	0	4+	0	3+	2+	3+

Antibody Screen:

Patient Plasma	RT	37C	AHG	CC
+				
SCI	0	0	0	2+
SCII	0	0	0	2+
SCIII	0	0	0	2+

AB and Cord Serum Testing:

	Adult AB Sera #1	Adult AB Sera #2	Adult AB Sera #3	Cord AB Sera #1	Cord AB Sera #2
Patient Cells	+	+	+	0	0
Negative Control	0	0	0	0	0
Positive Control	+	+	+	+	+

Lectins:

	<i>Dolichos biflorus</i>	<i>Salvia sclarea</i>	<i>Salvia horminum</i>	<i>Glycine soja</i>	<i>Arachis hypogaea</i>
Patient Cells	+	+	+	+	0
Negative Control	0	0	0	0	0
Positive Control	+	+	+	+	+

What is the most likely explanation for the reactions?

- Subgroup of A with anti-A1 in the serum
 - T polyagglutination
 - Tn polyagglutination
 - Nor polyagglutination
28. A patient is diagnosed with Paroxysmal Nocturnal Hemoglobinuria, this patient cannot bind which complement regulator protein?
- Decay accelerating factor
 - Complement receptor 1
 - Factor H
 - S protein

Practice Questions SBB Exam Continued

29. A 40 year-old-male donor has been deferred by the Blood Center. Based on the history for this patient provided, what is the length of deferral for whole blood donation?

Lives with partner who currently has Hepatitis A
History of Syphilis which was treated and recovered in High School
History of Babesiosis with full recovery in College
Received a Hep A and Hep B Vaccine due to Partner's illness
Received the HPV vaccine as a teenager

- a. Indefinite due to Babesia history
 b. 12 months due to Hep A and Hep B vaccines
 c. 12 months due to living with an individual with Hepatitis A
 d. 3 years for history of syphilis with completed treatment
30. A 30-year-old male would like to donate today. He has a history of residing in a malarial area from 1997-2005. At that time, he received a vaccine for malaria. He would like to donate a red cell unit today since he is a group O Negative and the blood supply is low. Passing all other criteria, is this donor eligible today?
- a. Acceptable to donate since it's been more than 10 years out of malarial area
 b. Not acceptable since his has lived in a malarial area
 c. Acceptable since it's been more than 12 months out of malarial area
 d. Not acceptable since he must be deferred by the donor center for a year and then return to donate successfully
31. When performing a neutralization using pooled plasma, you notice that both your neutralized plasma and your control plasma are negative. What is your interpretation?
- a. Antibody has an anti-Ch or anti-Rg specificity
 b. Antibody has an anti-Sd^a specificity
 c. Antibody has an anti-Le^b specificity
 d. The test is invalid
32. You have a panel that looks like anti-e with strongest reactivity on the f+ cells, but the untransfused patient is e+ and has a negative DAT. Which of the following antibodies could this possibly be?
- a. Anti-G
 b. Anti-hr^s
 c. Anti-Hr^B
 d. Anti-RH29

Practice Questions SBB Exam Continued

33. What is this phenotype?

Anti-P ₁	Anti-P	Anti-P ^k	Anti-PP ₁ P ^k	Antibodies in Plasma
0	0	+	+	Anti-P ₁ and anti-P

- a. P₁
 b. P₂
 c. P₁^k
 d. P₂^k
34. A male patient weighing 220 lbs. has lost an estimated 2000 mL of blood following a motorcycle accident. What percentage of his total blood volume has been lost?
 a. 15%
 b. 25%
 c. 30%
 d. 40%
35. A patient has a congenital hypofibrinogenemia, with a fibrinogen level of 1.65 g/dL. How much cryoprecipitate must be given to this patient, who weighs 110 lbs and has a hematocrit of 32%, to achieve 1.80 g/dL of fibrinogen?
 a. 6 bags
 b. 13 bags
 c. 17 bags
 d. 29 bags
36. A 3 kg full-term infant requires an exchange transfusion. The pediatrician has ordered RBCs reconstituted with FFP to a hematocrit of 55%. You have a unit of appropriate RBCs with a volume of 235 mL and a hematocrit of 70%. How much volume of plasma will you need to add to get the proper hematocrit for the exchange?
 a. 64 ml
 b. 126 ml
 c. 184 ml
 d. 299 ml
37. Given the following information, determine the number of FTEs required for the workload:
 Ave. Vacation/year: 3 weeks
 Ave. sick leave/year: 5 days
 Holidays/ year: 5 days
 Productivity: 75%
 Annual Workload: 950,000 units
 a. 6.74 FTEs
 b. 10.77 FTEs
 c. 11.23 FTEs
 d. 13.62 FTEs

Practice Questions SBB Exam Continued

38. A patient with a body surface area of 1.9 m² is being evaluated for platelet refractoriness after his previous platelet transfusion corrected count increment was 4,500. His pre-transfusion count was 12,000 and he received an apheresis platelet with 4.4×10^{11} platelets. The post-transfusion platelet count was 45,000. What is the corrected count increment from this most current transfusion?
- 7,500
 - 14,250
 - 19,431
 - 34,654
39. Of 128 individuals with a certain disease, 51 share a common HLA antigen. Only 18 of 183 normal individuals have the same HLA antigen. What is the Relative Risk that this HLA antigen is associated with this disease process?
- 0.16
 - 0.37
 - 2.70
 - 6.08
40. You test a population for ABO types and find the following:
895 O's
566 A's
370 B's
55 AB's
What percentage of the population is genetically BO?
- 12%
 - 18%
 - 20%
 - 44%
41. A donor arrives for a scheduled appointment in October of this year. She completes the donor history questionnaire and mini-physical. She is escorted to the donation room and as she reclines in the comfy donation chair she realizes she went on a cruise in May of this year which stopped in Belize, Honduras, Mexico and Costa Maya. She tells the donation tech. What should the donation tech do?
- Go ahead with the donation since the documentation and mini physical were acceptable
 - Add a note on the donor history questionnaire for QA review and collect the donor
 - Discuss with the donor what she did in these areas to determine if she was in a malarial area, like a jungle or swampland and if so then defer the donor
 - Refer to the procedure if these locations are a malarial risk, and if so defer the donor.
42. A 50 year old female donor last donated in 1997. At that time she received notification at that time that she was deferred due to a positive HCV test. She has arrived at her company's blood donor drive for her scheduled appointment. What is the reason she will not be allowed to donate?
- The HCV deferral was within the last 10 years
 - HCV is a transient viral infection and she will be eligible after physician approval
 - HCV is a permanent deferral due to the risk to the blood supply
 - Due to her age and the positive HCV test

Practice Questions SBB Exam Continued

- 43. An X-Ray Irradiator was moved from the old blood bank to the new hospital. After the instrument is moved, what verification is required to ensure the dose delivery to the products are adequate?**
- a. Dose Verficiation
 - b. All staff must be re-trained to use the instrument in the new location
 - c. Vendor approval of the environment the X-Ray Irradiator is located
 - d. Irradiate up to 20 platelets and 20 red cells to verify the irradiation sensitive labels change appropriately
- 44. What is the most common CH/RG phenotype?**
- a. CH/RG: 1,2,3
 - b. CH/RG: -1,2,-3
 - c. CH/RG: 1,2,-3
 - d. CH/RG: -1,-2,-3
- 45. A child with a viral infection has recently experienced hemolysis. The child has a negative DAT and a negative antibody screen. What test would be appropriate for the child?**
- a. Antigen typing for I/i antigens
 - b. Donath-Landsteiner Test
 - c. Eluate
 - d. Auto Adsorption
- 46. The null phenotype for the Knops Blood Group System is:**
- a. Ko
 - b. Sl(a-)
 - c. Hegleson Phenotype
 - d. McLeod Phenotype

Practice Questions SBB Exam Continued

47. These are the results of a cord blood sample from a baby suspected to have ABO HDFN:
Forward type:

Anti-A	Anti-B	Anti-D	Monoclonal control
0	3+	0	0

Repeat forward type:

Anti-A	Anti-B	Anti-D	Monoclonal control
0	3+	0	0

Weak D:

	Anti-IgG	Check Cells
Anti-D	1+	Not tested
Monoclonal Control	1+	Not tested

DAT:

	Anti-IgG	Control
Immediate Spin	1+	0
Check Cells	Not tested	Not tested

What is the baby's blood type?

- B positive
 - B negative
 - B weak D positive
 - B Rh indeterminate
48. An OB patient with anti-Vel (titer 64) delivered a healthy infant with no signs of HDFN. What is the most likely explanation?
- The Vel antibody was IgG subclass 3
 - The Vel antigen was weakly expressed or not present on the infant's RBCs.
 - The Vel antibody was adsorbed onto Lewis blood group substances in the infant
 - Efficiency of placental transfer
49. Which antibodies have been reported to cause extravascular hemolysis and attack bone marrow precursor cells thereby suppressing erythropoiesis causing severe anemia in HDFN?
- Anti-Le^a, Anti-Le^b
 - Anti-I, Anti-Ch^a
 - Anti-Xg^a, Anti-P1
 - Anti-Ge3, Anti-Kp^a
50. Which of the following are major sequela of an acute hemolytic transfusion reaction?
- Urticaria, pruritis, flushing
 - Erythroderma, tetany, pancytopenia
 - Hypotension, Renal failure, DIC
 - Pulmonary edema, cardiomegaly, distended pulmonary artery

Practice Questions SBB Exam Continued

- 51. Which of the following is the best course of action for an urticarial transfusion reaction involving pruritis and flushing?**
- Stop the transfusion and order a transfusion reaction work up
 - Stop the transfusion and order washed RBCs
 - Stop the transfusion, readjust pump rate for slower infusion rate and continue transfusion
 - Stop the transfusion, administer antihistamines, and restart the unit slowly if symptoms resolve
- 52. A never-before transfused patient is given one unit of thawed plasma. Shortly after the start of transfusion, the patient experienced angioedema, wheezing, hypotension and severe anaphylaxis. Which of the following would you suspect as the cause of the reaction?**
- IgE deficient patient with a lack of mast cells
 - IgA deficient patient with an absolute IgA value <0.05 mg/dL
 - IgA deficient patient with an absolute IgA value <5 mg/dL
 - Donor lymphocyte reaction with patient's lung endothelium
- 53. You are evaluating a new NAT for donor screening. You had 500 patients with the disease tested with 425 having positive NAT results. Of the 1000 control samples, tested 65 had positive NAT results. What is the sensitivity of this new NAT method?**
- 93.5%
 - 85.0%
 - 42.5%
 - 28.3%
- 54. If a deficiency of antiplasmin is identified, what is the risk to the patient?**
- Increased fibrinolysis
 - Vitamin K deficiency
 - Disseminated intravascular coagulation
 - Becoming hypercoagulable
- 55. A young child has been diagnosed with chronic granulomatous disease and has the McLeod phenotype, who is the most likely person that he inherited it from?**
- Father
 - Mother
 - Paternal grandfather
 - Maternal aunt
- 56. A 6-month-old presents to the emergency department with bacterial meningitis that did not improve with four days of antibiotics. Review of the patient's history reveals that patient has gotten several infections in his short life that have been difficult to treat. After resolution of the current infection, what further treatment should be considered for this patient?**
- Chronic red cell exchange
 - Coagulation factor replacement
 - Hematopoietic stem cell transplant
 - Transfuse irradiated RBCs

Practice Questions SBB Exam Continued

57. A patient presented with a *M. pneumoniae* infection. Her antibody detection test was non-reactive tested by a LISS-AHG method. Further studies were requested demonstrated a cold autoantibody. Which result is most consistent with a pathologic cold autoantibody.

	D	C	c	E	e	f	V	C	K	k	F	F	J	J	L	L	M	N	S	s	L	L	X	IS	RT	4C
								w			y	y	a	a	e	e					u	u	a			
1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	0	+	0	+	0	1+	2+	3+
2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	0	+	1+	2+	3+
3	+	0	+	+	0	0	0	0	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	1+	2+	3+
Auto Control																							1+	2+	3+	
Cord Blood																							0	0	0	
Anti-C3b,D DAT																							3+			
DAT Control																							0			
Titer with I+ cell																							4096			

- a. Negative antibody detection test
- b. Titer result
- c. Positive Complement DAT
- d. Positive autocontrol at IS, RT and 4C

58. A patient's antibody detection test was panreactive. The antibody panel testing is below. What additional testing could be pursued to enhance the IgG-reactivity of the antibody detected?

	D	C	c	E	e	f	V	C	K	k	F	F	J	J	L	L	M	N	S	s	L	L	X	IS	PEG-AHG
								w			y	y	a	a	e	e					u	u	a		
1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	0	+	0	+	0	0	0√
2	+	+	0	0	+	0	0	0	0	+	0	+	0	+	0	+	0	+	0	+	0	0	+	1+	2+
3	+	0	+	+	0	0	0	0	0	+	+	+	+	0	0	+	0	+	0	+	0	+	+	0	0√
4	0	0	+	0	+	+	0	0	+	+	+	+	+	0	+	0	+	+	+	+	0	+	0	1+	0√
5	+	0	+	0	+	+	0	0	0	+	0	0	+	+	0	+	0	+	0	0	0	0	+	0	0√
6	0	0	+	0	+	+	0	0	0	+	0	0	+	0	+	0	0	+	0	+	0	+	0	0	0√
7	0	0	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	0	+	+	0	1+	1+
8	0	0	+	+	+	+	+	0	0	+	0	+	0	+	0	+	+	0	+	+	0	+	0	1+	1+
9	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	+	+	0	+	0	+	+	1+	1+
10	0	+	+	0	+	+	0	0	+	+	+	+	+	0	0	0	0	+	0	+	0	+	+	0	0√
11	+	+	0	0	+	0	0	0	0	+	+	0	0	+	0	+	+	+	+	0	0	0	+	1+	0√

- a. Ficin
- b. DTT
- c. CDP
- d. Acidified Serum

59. A bone marrow transplant patient requires irradiated red blood cell products to prevent GVHD. What is the FDA and AABB recommended minimum dose of gamma irradiation and what is the common source of gamma irradiation?

- a. 10 Gy / Cobalt-100
- b. 25 Gy / Cesium-137
- c. 5 Gy / Cobalt-60
- d. 25 Gy / Cesium-100

Practice Questions SBB Exam Continued

- 60.** A donor gives apheresis platelets twice a month. While on the pheresis instrument for this week's donation, she began to feel numbness and tingling around her mouth and fingers. What should be provided to the donor to alleviate her symptoms?
- a. Nasal canula of oxygen
 - b. Tylenol
 - c. Calcium (chews or tablet)
 - d. Antihistamine

Answers for Practice Questions for BB Exam:

1. D
2. B
3. C
4. D
5. B
6. A
7. C
8. A
9. B
10. A
11. C
12. B
13. D
14. C
15. A
16. B
17. D
18. B
19. B
20. D
21. C
22. B

$$V_1 \times 0.22 = 50 \text{ ml} \times 0.06$$

$$V_1 = 3.0/0.22 = 13.6\text{ml of 22\% albumin}$$

23. C
24. D
25. B
26. A
27. D
28. A
29. E
30. A

Answers for Practice Questions for BB Exam:

31. C

32. B

$$12 \text{ units/ml} \times 15 \text{ ml} / 0.75 \text{ units/ml} \times 265 \text{ ml} = 180 \text{ units} / 198.75 \text{ units} = 0.905$$

33. C

$$156 \text{ lb} / 2.2 \text{ lb/kg} = 71 \text{ kg}$$

$$71 \text{ kg} \times 60 \text{ ml/kg} = 4260 \text{ ml}$$

$$4260 \text{ ml} \times (1 - 0.37) = 2684 \text{ ml}$$

$$\text{Two volume exchange} = 2 \times 2684 \text{ ml} = 5368 \text{ ml}$$

34. B

$$0.7 \times 0.91 \times 0.45 = 0.28665$$

$$4 / 0.28665 = 13.95 \text{ or } 14 \text{ units}$$

35. A

$$18.4\% \text{ hematocrit} \sim 6.2 \text{ g/dl Hgb}$$

$$3 \text{ units RBCs expected to raise HgB } 3 \text{ g/dl} \quad 6.2 + 3 = 9$$

36. B

$$1.8 \times 50 = 90 \text{ ml}, 90 / 30 = 3 + 1 \text{ vial} = 4 \text{ vials}$$

37. D

$$4.5 \text{ in} = 11.43 \text{ cm}$$

$$11.17 \times 11.43 \times (3400 / 1000)^2 = 1475 \text{ RCF}$$

38. B

39. C

Answers for Practice Questions for BB Exam:

- 40. B
- 41. C
- 42. B
- 43. D
- 44. B
- 45. B
- 46. A
- 47. D
- 48. C
- 49. D
- 50. A
- 51. A

Q positive = $1823 + 2811 = 4634$

Q negative = $5549 - 4634 = 915$

% Q negative = $915/5549 = 0.1649$

- 52. C
- 53. C
- 54. B
- 55. A
- 56. C
- 57. D
- 58. C
- 59. B
- 60. D

Answers for the Practice Questions for SBB Exam:

1. C
2. C
3. D
4. C
5. A
6. B
7. A
8. C
9. A
10. B
11. D
12. A
13. B
14. C
15. A
16. D
17. E
18. B
19. D
20. B

$$\frac{2.0 \text{ m}^2 \times 45,000 \times 10^{11}}{8 \times 10^{11}} = 11250$$

21. C
22. C
23. A
24. B

25. B

$$9\% = .09 = ss = q^2$$

$$s = q = \text{Square root of } .09 = .3$$

$$p = 1 - .3 = .7$$

$$2pq = 2 (.7 \times .3) = .42 = 42\%$$

26. A
27. C
28. A
29. A
30. A
31. D
32. B
33. D

Answers for the Practice Questions for SBB Exam - Continued

34. C

$$220 \text{ lb} / 2.2 \text{ lb/kg} = 100 \text{ kg}$$

$$100 \text{ kg} \times 66 \text{ ml/kg} = 6600 \text{ ml}$$

$$2000 \text{ ml} / 6600 \text{ ml} = 0.30$$

35. B

$$110 \text{ lb} / 2.2 \text{ lb/kg} = 50 \text{ kg}$$

$$50 \text{ kg} \times 65 \text{ ml/kg} = 3250 \text{ ml}$$

$$3250 \text{ ml} \times (1 - 0.32) = 2210 \text{ ml}$$

$$1800 \text{ mg/dl} - 1650 \text{ mg/dl} = 150 \text{ mg/dl increase}$$

$$150 \text{ mg/dl} \times 2210 \text{ ml} / 100 \text{ ml/dl} = 3315 \text{ mg}$$

$$3315 \text{ mg} / 250 \text{ mg/bag} = 13.26$$

36. A

$$235 \text{ ml} \times 0.7 = V_2 \times 0.55$$

$$V_2 = 164.5 / 0.55 = 299 \text{ ml}$$

$$299 \text{ ml} - 235 \text{ ml} = 64 \text{ ml}$$

37. C

$$3 \text{ wk} + 1 \text{ wk} + 1 \text{ wk} = 5 \text{ wks off}$$

$$52 \text{ wks/year} - 5 \text{ wks} = 47 \text{ wks work}$$

$$47 \text{ wks/year} \times 40 \text{ hrs/wk} = 1880 \text{ hrs/yr}$$

$$60 \text{ min/hr} \times 0.75 = 45 \text{ min/hr}$$

$$1880 \text{ hrs/yr} \times 45 \text{ min/hr} = 84,600 \text{ min/yr}$$

$$950,000 \text{ units} / 84,600 \text{ min/yr} = 11.23 \text{ FTEs}$$

38. B

$$45,000 - 12,000 = 33,000$$

$$1.9 \text{ m}^2 \times 33,000 / 4.4 = 14,250$$

39. D

$$\text{Patient with HLA} = 51 / 128 = 39.8\%$$

$$\text{Control with HLA} = 18 / 183 = 9.8\%$$

$$\text{Patient without HLA} = 128 - 51 = 77, 77 / 128 = 60.2\%$$

$$\text{Control without HLA} = 183 - 18 = 165, 165 / 183 = 90.2\%$$

$$39.8 \times 90.2 / 9.8 \times 60.2 = 3589.86 / 589.96 = 6.08$$

40. B

$$AA = p^2, AB = 2pq, BB = q^2, AO = 2pr, \text{BO} = 2qr, OO = r^2$$

$$O = 895 / 1886 = 0.47$$

$$A = 566 / 1886 = 0.30$$

$$B = 370 / 1886 = 0.20$$

$$AB = 55 / 1886 = 0.03$$

$$r^2 = 0.47 \quad r = 0.69$$

$$\text{all B's \& O's} = 0.67 = q^2 + 2qr + r^2$$

$$(q + r)^2 = 0.67$$

$$q + r = \sqrt{0.67} = 0.82$$

$$q = 0.82 - 0.69 = 0.13$$

$$\text{2qr} = 2(0.13)(0.69) = 0.18$$

Answers for the Practice Questions for SBB Exam - Continued

41. D

42. C

43. A

44. A

45. B

46. C

47. D

48. B

49. D

50. C

51. D

52. B

53. B

TP = 425, FN = 75, TP/TP+FN = 425/500 = 0.85

54. D

55. C

CGD & McLeod are linked, X-linked recessive ; mother/carrier to the male child.

56. C

Pt. immunodeficient with recurrent infections. HSCT treatment best to cure him.

57. B

58. D

59. B

60. C

LAB MATH FOR BB AND SBB EXAM PREPARATION

SAMPLE PROBLEMS

1. You need 50 mL of 6% bovine albumin. You have only 22% albumin available. How much 22% albumin must be diluted to make 50 mL of 6% albumin?
2. A unit of FFP contains 0.7 units/mL of Factor VIII in 225 mL. When the cryoprecipitate is made from this unit, it contains 8 units/mL in 14 mL. What is the Factor VIII yield as a percentage of the original Factor VIII?
3. How many compatible donors would you find among 100 Caucasian donors for a patient with anti-E, K, and Jk^a?
4. A technologist received a gamma globulin shot following a needle stick on August 15. How much of the original IgG would remain on October 17?
5. An adult patient who weighs 152 lbs. requires plasma exchange. Her initial hematocrit is 37%. If a two-volume exchange is performed using 5% albumin as replacement, how much plasma will be processed?
6. If the concentration of the plasma constituent being removed from the above patient was 320 mg/dL before the plasma exchange procedure, what would the expected concentration be following the procedure?

LAB MATH FOR BB AND SBB EXAM PREPARATION (CONTINUED)

11. Given the following information, determine the number of FTEs required for the workload:

Vacation/year:	3 weeks
Ave. sick leave/year:	3 days
Holidays/ year:	7 days
Productivity:	75% (45 min/hr)
Annual Workload:	760,000 units

12. A new blood group antibody (anti-Yg) has been found that reacts with 64% of the random population. What is the frequency of the Yg gene and what is the percentage of the population that is heterozygous?

13. An 18-year old female pediatric patient has a congenital hypofibrinogenemia, with a fibrinogen level of 20 mg/dL. How much cryoprecipitate must be given to this patient, who weighs 112 lbs and has a hematocrit of 32%, to achieve 100 mg/dL of fibrinogen?

LAB MATH FOR BB AND SBB EXAM PREPARATION (CONTINUED)

14. Determine which of the following methods is most cost effective:

Test volume/month:	750
Productivity:	75%
Worked hours/year:	1920
Average salary:	\$35,000
Benefits:	22%

	Current Method	Proposed Method
Workload unit value:	25	20
Test cost (each):	\$1.25	\$1.50

15. Of 113 individuals with a certain disease, 34 share a common HLA antigen. Only 15 of 187 normal individuals have the same HLA antigen. What is the Relative Risk that this HLA antigen is associated with this disease process?

LAB MATH FOR BB AND SBB EXAM PREPARATION

SAMPLE PROBLEM ANSWERS

1.	$V_1 \times 0.22 = 50 \text{ mL} \times 0.06$ $V_1 = \frac{3.0}{0.22}$	$V_1 = \mathbf{13.6 \text{ mL of 22 \% albumin}}$ in 36.4 mL of saline
2.	$\frac{8 \text{ units/mL} \times 14 \text{ mL}}{0.7 \text{ units/mL} \times 225 \text{ mL}}$	$= \frac{112 \text{ units}}{157.5 \text{ units}} = \mathbf{71.1\%}$
3.	E negative = 0.70 K negative = 0.91 Jk ^a negative = 0.23	$0.70 \times 0.91 \times 0.23 = 0.14651$ or 14.7% or 14-15 of 100
4.	Assuming a half-life of about 3 weeks, the interval would be 9 weeks or 3 half-lives. 50% would remain after 3 weeks, 25% after 6 weeks and 12.5% after 9 weeks.	
5.	$\frac{152 \text{ lb}}{2.2 \text{ lb/kg}} = 69.1 \text{ kg}$	Total blood volume = $69.1 \text{ kg} \times 60 \text{ mL/kg} = 4145.5 \text{ mL}$ Percentage of plasma = $1 - \text{hematocrit (0.37)} = 0.63$ Plasma volume = $4145.5 \text{ mL} \times 0.63 = 2611.6 \text{ mL}$
Two-volume exchange will process approximately 5223 mL of plasma.		
6.	Two-volume exchange removes approximately 80-85% of the original plasma. Assuming that the replacement fluid contained none of the constituent, approximately 48-64 mg/dL would remain.	
7.	$1.2 \times 50 = 60 \text{ mL WB FMH}$ (50 is used to represent the average maternal blood volume of 5000 mL.)	$\frac{60}{30} = 2 + \text{add 1 vial} = \mathbf{3 \text{ vials Rhlg}}$
8.	$\frac{226 \text{ lb}}{2.2 \text{ lb/kg}} = 102.7 \text{ kg}$	$102.7 \text{ kg} \times 66 \text{ mL/kg} = 6780 \text{ mL total blood volume}$
$\frac{1900 \text{ mL}}{6780 \text{ mL}} = \mathbf{28\% \text{ of total blood volume}}$		
9.	$5000 \text{ mL} \times 0.9\% \text{ (or 0.009)} = \mathbf{45 \text{ g NaCl}}$	
10.	$495 \text{ mL} \times 0.43 = \text{Vol} \times 0.77$	$\frac{212.9 \text{ mL RBC}}{0.77} = 276 \text{ mL total volume}$
$495 \text{ mL} - 276 \text{ mL} = \mathbf{219 \text{ mL of plasma to remove}}$		
11.	# weeks worked/year: $52 - 5 = 47 \text{ weeks}$ # hours worked/year: $47 \text{ weeks/year} \times 40 \text{ hours/week} = 1880 \text{ hrs/year}$	# productive minutes/year: $1880 \text{ hours/year} \times 45 \text{ min/hour} = 84,600 \text{ min/year}$
$\# \text{ FTEs} = \frac{760,000 \text{ units}}{84,600 \text{ min/year}} = \mathbf{8.98 \text{ or } 9 \text{ FTEs}}$		
12.	Anti-Yg reacts with both Yg/Yg and Yg/yg; $p^2 + 2pq = 0.64$	Therefore, $q^2 = 0.36$ or $q = 0.6$ and $p = 0.4$. The frequency of the Yg gene is 40% and the yg gene is 60%.
The heterozygous population is $2pq$ or $2(0.6)(0.4) = \mathbf{0.48 \text{ or } 48\%}$		

LAB MATH FOR BB AND SBB EXAM PREPARATION (CONTINUED)

<p>13. $\frac{112 \text{ lbs.}}{2.2 \text{ lb/kg}} = 50.9 \text{ kg}$</p> <p>3055 mL x (1 – 0.32) = 2077 mL plasma volume</p> <p>Want to raise fibrinogen by 80 mg/dL:</p> <p>Each bag of cryo contains ~ 250 mg of fibrinogen:</p>	<p>$50.9 \text{ kg} \times 60 \text{ mL/kg} = 3055 \text{ mL total blood volume}$</p> <p>$80 \text{ mg/dL} \times \frac{2077 \text{ mL}}{100 \text{ mL/dL}} = 1662 \text{ mg fibrinogen}$</p> <p>thus $\frac{1662 \text{ mg}}{250 \text{ mg/bag}} = \mathbf{6.65 \text{ or } 7 \text{ bags}}$</p>
<p>14. # tests/year: 750 tests/month x 12 months = 9000 tests/year</p> <p>Workload: 9000 tests/year x 25 units/test = 225,000 units/year (current) 9000 tests/year x 20 units/test = 180,000 units/year (prop)</p> <p>Worked minutes/year: 1920 hr/yr x 45 min/hr = 86,400 min/yr</p> <p># FTEs: (current) $\frac{225,000 \text{ units/year}}{86,400 \text{ min/year}} = 2.60 \text{ FTE}$</p> <p>2.60 FTE – 2.08 FTE = 0.52 FTE Proposed method saves 0.52 FTE/year</p> <p>Cost of tests:</p> <p>Additional cost of new method: Net saving with new method:</p>	<p>9000 tests/year</p> <p>$\frac{180,000 \text{ units/year}}{86,400 \text{ min/year}} = 2.08 \text{ FTE}$</p> <p>Savings in salary: $[\\$35,000 + 0.22(35,000)] \times 0.52 = \\$22,204$</p> <p>$\\$1.25 \times 9000 = \\$11,250$ (current) $\\$1.50 \times 9000 = \\$13,500$ (proposed) $\\$13,500 - 11,250 = \\2250 Saving in salary - Add'l cost $\\$22,204 - 2250 = \mathbf{\\$19,954}$</p>
<p>15. $RR = \frac{\% \text{ of patients with HLA ag} \times \% \text{ controls without HLA ag}}{\% \text{ of controls with HLA ag} \times \% \text{ of patients without HLA ag}}$</p> <p>$RR = \frac{30.1 \times 92.0}{8.0 \times 69.9} = \frac{2769.2}{559.2} = \mathbf{4.95}$</p>	<p>This indicates that a person with this HLA antigen is 4.95 times as likely to have the disease that a person without the HLA antigen.</p>

List of CAAHEP Accredited SBB Programs

- <https://www.caahep.org/Students/Program-Info/Specialist-in-Blood-Bank-Technology-Transfusion-Me.aspx>
- Directory of United States SBB Education Programs (aabb.org)

Program name	Website
American Red Cross Blood Services	https://www.redcrossblood.org/biomedical-services/specialist-in-blood-bank-technology-and-transfusion-medicine-pro.html
Rush University	https://www.rushu.rush.edu/college-health-sciences/academic-programs/specialist-blood-bank-technology-certificate
LifeShare Blood Center	http://www.lifeshare.org/sbb-program
University Medical Center New Orleans	https://www.umcno.org/physicians-and-staff/specialist-in-blood-bank-technology-program/
National Institutes of Health Clinical Center	https://www.cc.nih.gov/dtm/research/sbb.html
The Johns Hopkins Hospital	http://pathology.jhu.edu/department/divisions/transfusion/sbb.cfm
Walter Reed National Military Medical Center	Email contact: William.L.Turcan.civ@mail.mil *The program is open to active-duty military officers only. **The Master of Science in Health Sciences degree is offered through the George Washington University.
University Health System and Affiliates School of Blood Bank Technology	biobridgeglobal.org/SBB
University of Texas Medical Branch	https://shp.utmb.edu/ClinicalLaboratorySciences/sbb/default.asp
Versiti Wisconsin, Inc.	https://www.versiti.org/medical-professionals/education/specialist-in-blood-banking-program
LifeSouth Community Blood Centers	https://lifesouthsbb.org
One Blood Blood, Inc.	https://www.oneblood.org/BBTSBB/sbbprogram.shtml

TECHNOLOGIST AND INTERNATIONAL TECHNOLOGIST IN BLOOD BANKING, BB(ASCP) AND BB(ASCPⁱ) SPECIALIST AND INTERNATIONAL SPECIALIST IN BLOOD BANKING, SBB(ASCP) AND SBB(ASCPⁱ) EXAMINATION CONTENT GUIDELINE

EXAMINATION MODEL

The BB(ASCP), BB(ASCPⁱ), SBB(ASCP), and SBB(ASCPⁱ) certification examinations are composed of 100 questions given in a 2 hour 30 minute time frame. All exam questions are multiple-choice with one best answer. The certification exams are administered using the format of computer adaptive testing (CAT).

With CAT, when a person answers a question correctly, the next test question has a slightly higher level of difficulty. The difficulty level of the questions presented to the examinee continues to increase until a question is answered incorrectly. Then a slightly easier question is presented. In this way, the test is tailored to the individual's ability level.

Each question in the test bank is calibrated for level of difficulty and is classified by content area. The content area aligns with the examination specific content outline. The examinee must answer enough questions correctly to achieve a measure above the pass point in order to successfully pass the certification examination. There is no set number of questions one must answer to pass, nor is there a set percentage one must achieve to pass. If at the end of the exam the examinee's score is above the pass point, then he or she passes the exam.

EXAMINATION CONTENT AREAS

The BB and SBB exam questions encompass the following content areas within Blood Banking: Blood Products, Blood Group Systems, Immunology and Physiology, Serologic and Molecular Testing, Transfusion Practice, and Laboratory Operations. Each of these content areas comprises a specific percentage of the overall 100-question exam. The content areas and percentages are described below:

CONTENT AREA	DESCRIPTION	EXAM PERCENTAGE
BLOOD PRODUCTS	Donors, Processing, Storage, Blood Components, Blood Component Quality Control	BB: 15 – 20% SBB: 10 – 15%
BLOOD GROUP SYSTEMS	Genetics, Biochemistry/Antigens, Role of Blood Groups in Transfusion	BB: 15 – 20% SBB: 15 – 20%
IMMUNOLOGY AND PHYSIOLOGY	Immunology, Physiology and Pathophysiology	BB: 10 – 20% SBB: 15 – 25%
SEROLOGIC AND MOLECULAR TESTING	Routine Tests, Reagents, Application of Special Tests and Reagents, Leukocyte/Platelet Testing, Quality Assurance	BB: 20 – 25% SBB: 20 – 25%
TRANSFUSION PRACTICE	Indications for Transfusion, Component Therapy, Adverse Effects of Transfusion, Apheresis and Extracorporeal Circulation, Blood Administration and Patient Blood Management	BB: 15 – 20% SBB: 15 – 20%
LABORATORY OPERATIONS	Quality Assessment/Troubleshooting, Safety, Laboratory Mathematics, Instrumentation, Laboratory Administration (SBB ONLY)	BB: 5 – 10% SBB: 10 – 15%

For a more specific overview of the BB and SBB exams, please refer to the [CONTENT OUTLINE](#) starting on page 2.

TECHNOLOGIST AND INTERNATIONAL TECHNOLOGIST IN BLOOD BANKING, BB(ASCP) AND BB(ASCP)ⁱ

SPECIALIST AND INTERNATIONAL SPECIALIST IN BLOOD BANKING, SBB(ASCP) AND SBB(ASCP)ⁱ

EXAMINATION CONTENT OUTLINE

Examination questions, which are related to the subtest areas outlined below, may be both theoretical and/or procedural. Theoretical questions measure skills necessary to apply knowledge, calculate results, and correlate patient results to disease states. Procedural questions measure skills necessary to perform laboratory techniques and follow quality assurance protocols. Additionally, regulatory questions are based on U.S. sources (e.g., AABB, FDA, CLIA, etc.).

IMPORTANT NOTE ABOUT COVID-19: FDA guidance for changes in donor eligibility during the COVID-19 pandemic are to ensure an adequate blood supply and only apply for the duration of the pandemic. Donor eligibility questions are based on pre-pandemic requirements and will not reflect temporary changes.

- I
- I. BLOOD PRODUCTS**
(BB: 15 – 20% of total exam)
(SBB: 10 – 15% of total exam)
- A. Donors**
1. Qualification
 2. Collection methods
 3. Adverse reactions
 4. Special donations (e.g., autologous)
- B. Processing**
1. FDA, AABB requirements
 2. Testing
 3. Labeling
- C. Storage**
1. Anticoagulants/additives
 2. Temperature requirements
 3. Transportation
 4. Properties of stored products
 5. Expiration
- D. Blood Components**
1. Red blood cells
 2. Cryoprecipitated AHF
 3. Platelets
 4. Plasma
 5. Leukocyte-reduced components
 6. Frozen/deglycerolized red blood cells
 7. Apheresis products
 8. Fractionation products
 9. Whole blood
 10. Washed red blood cells
 11. Rejuvenated red blood cells
 12. Irradiated components
- E. Blood Component Quality Control**
13. Hematopoietic progenitors
- II. BLOOD GROUP SYSTEMS**
(BB AND SBB: 15% – 20% of total exam)
- A. Genetics**
1. Basic
 2. Molecular
 3. Inheritance of blood groups
- B. Biochemistry/Antigens**
1. ABO
 2. Lewis
 3. Rh
 4. MNS
 5. P1PK/Globoside(P)
 6. Ii
 7. Kell
 8. Kidd
 9. Duffy
 10. Lutheran
 11. Other
 12. Antigens of high prevalence
 13. Antigens of low prevalence
 14. HLA
 15. Platelet-specific
 16. Granulocyte-specific
- C. Role of Blood Groups in Transfusion**
1. Immunogenicity
 2. Antigen frequency

III. IMMUNOLOGY AND PHYSIOLOGY**(BB: 10 – 20% of total exam)****(SBB: 15 – 25% of total exam)****A. Immunology**

1. Immune response
 - a. Primary and secondary response
 - b. B and T cells, macrophages
 - c. Genetics
 2. Immunoglobulins
 - a. Classes and subclasses
 - b. Structure
 - c. Biologic and physical properties
 3. Antigen-antibody interactions
 - a. Principles
 - b. Testing
 - 1) Principles
 - 2) Methods
 4. Complement
 - a. Classical and alternative pathway mechanisms
 - b. Biologic properties
- B. Physiology and Pathophysiology**
1. Physiology of blood
 - a. Circulation and blood volume
 - b. Composition and function of blood
 - 1) Normal function
 - 2) Abnormal physiology
 - c. Cell survival
 - d. Cell metabolism
 2. Hemostasis and coagulation
 - a. Coagulation factors and disorders
 - b. Platelet functions and disorders
 3. Hemolytic disease of the fetus and newborn
 - a. Pathophysiology
 - b. Detection
 - c. Treatment
 - d. Prevention
 4. Anemias
 - a. Congenital and acquired
 - 1) Pathophysiology
 - 2) Detection
 - 3) Treatment
 - b. Immune hemolytic anemias: warm, cold, drug-induced
 - 1) Pathophysiology
 - 2) Detection
 - 3) Treatment

5. Transplantation
 - a. Solid organ
 - b. Hematopoietic progenitor cell (HPC)

IV. SEROLOGIC AND MOLECULAR TESTING (BB AND SBB: 20 – 25% of total exam)**A. Routine Tests**

1. Blood grouping tests
2. Compatibility tests
 - a. Antibody detection
 - b. Crossmatch
3. Antibody identification/clinical significance
4. Direct antiglobulin testing

B. Reagents

1. Antiglobulin sera
2. Blood grouping sera
3. Reagent red cells

C. Application of Special Tests and Reagents

1. Enzymes
2. Enhancement media
3. Lectins
4. Adsorptions
5. Elutions
6. Titrations
7. Cell separations
8. ELISA
9. Molecular techniques
10. Neutralization/inhibition
11. Use of thiol reagents
12. Immunofluorescence
13. Solid phase
14. Column agglutination test
15. Chloroquine diphosphate
16. EDTA glycine-acid

D. Leukocyte/Platelet Testing

1. Cytotoxicity
2. Platelet testing
3. Granulocyte testing
4. Molecular techniques **(SBB ONLY)**

E. Quality Assurance

1. Blood samples
2. Reagents
3. Test procedures

V. TRANSFUSION PRACTICE**(BB AND SBB: 15 – 20% of total exam)**

- A. Indications for Transfusion
- B. Component Therapy
- C. Adverse Effects of Transfusion
 - 1. Immunologic reactions
 - 2. Nonimmunologic reactions
 - 3. Transfusion-transmitted diseases
- D. Apheresis and Extracorporeal Circulation E.
- E. Blood Administration and Patient Blood Management

VI. LABORATORY OPERATIONS**(BB: 5 – 10% of total exam)****(SBB: 10 – 15% of total exam)**

- A. Quality Assessment/Troubleshooting
 - 1. Preanalytical, analytical, postanalytical
 - 2. Quality control
 - 3. Compliance
 - 4. Regulation (e.g., proficiency testing, competency assessment, accreditation standards)
- B. Safety
 - 1. Safety programs and practices
 - a. Prevention of infection with bloodborne pathogens
 - b. Use of personal protective equipment (PPE)
 - c. Safe work practices
 - d. Safety data sheets (SDS) for chemicals and reagents
 - 2. Emergency procedures (e.g., needlesticks, splashes to mucous membranes, fire)
- C. Laboratory Mathematics
- D. Instrumentation
 - 1. Microscope
 - 2. Centrifuge
 - 3. Cell washer
 - 4. Irradiator
 - 5. Automated analyzer
- E. Laboratory Administration (SBB ONLY)
 - 1. Financial
 - a. Budgets
 - b. Capital equipment acquisition
 - c. Cost analysis and reimbursement
 - d. Purchasing and inventory

- 2. Operations
 - a. Customer service
 - b. Facility management (e.g., laboratory design, utilities)
 - c. Information technology
 - d. Data management (e.g., research, outcomes)
 - e. Test verification/validation
- 3. Personnel
 - a. Staffing and productivity
 - b. Performance standards (e.g., training, competency assessment)
 - c. Counseling, disciplinary action, and conflict resolution
 - d. Education and training
- 4. Quality management
 - a. Continuous quality improvement
 - b. Individualized Quality Control Plan (IQCP)
 - c. Risk management/medical-legal issues
- 5. Tissue management storage and distribution

Examples provided (as indicated by e.g.) are not limited to those listed.
All Board of Certification examinations use conventional and SI units for results and reference ranges.

END OF CONTENT GUIDELINE

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TECHNOLOGIST AND INTERNATIONAL TECHNOLOGIST IN BLOOD BANKING, BB(ASCP) AND BB(ASCP)ⁱ SPECIALIST AND INTERNATIONAL SPECIALIST IN BLOOD BANKING, SBB(ASCP) AND SBB(ASCP)ⁱ

SUGGESTED READING FOR EXAMINATION PREPARATION

This list is intended only as a partial reference source. Its distribution does not indicate endorsement by the American Society for Clinical Pathology Board of Certification (ASCP BOC), nor does the BOC wish to imply that the content of the examination will be drawn solely from these publications. Please refer to the *AABB Publications Catalog* for additional pertinent reading material.

JOURNALS

Immunohematology. Published by the American Red Cross. [Link to View *Journal of Clinical Apheresis*](#). Published by Wiley-Blackwell, Inc. [Link to View *Transfusion*](#). Published by the American Association of Blood Banks. [Link to View *Transfusion Medicine*](#). Published Wiley-Blackwell, Inc. [Link to View *Transfusion Medicine Reviews*](#). Published by Elsevier, Inc. [Link to View *Vox Sanguinis*](#). Published by Wiley-Blackwell, Inc. [Link to View](#)

TEXTS

REGULATIONS AABB. (2018). *Standards for Blood Banks and Transfusion Services* (31st ed.). Bethesda, MD: AABB Publications.

[Link to Purchase](#)

AABB. (2019). *Standards for Immunohematology Reference Laboratories* (11th ed.). Bethesda, MD: AABB Publications.

[Link to Purchase](#)

Code of Federal Regulations (CFR):

Code of Federal Regulations, Title 21, Food and Drugs, Parts 600, 601,606, 607, 610, 660, 680. Washington D.C.: U.S. Government Publishing Office. [Link to View](#)

Code of Federal Regulations, Title 42.493.Public Health—Laboratory Requirements. Washington D.C.: U.S. Government Publishing Office. [Link to View](#)

Code of Federal Regulations , Title 29, Section 1910.1450 Occupational Safety and Health Standards Subpart Z - Toxic and Hazardous Substances, Occupational exposure to hazardous chemicals in laboratories. Washington D.C.: U.S. Government Publishing Office. [Link to View](#)

Code of Federal Regulations , Title 29, Section 1910.1030. Occupational Safety and Health Standards Subpart Z - Toxic and Hazardous Substances, Bloodborne pathogens. Washington D.C.: U.S. Government Publishing Office. [Link to View](#)

GENERAL IMMUNOHEMATOLOGY Daniels, G. (2013). *Human Blood Groups* (3rd ed.). Oxford, UK: Wiley-Blackwell, Inc. [Link to Purchase](#)

Fung, M.K. et al. (Eds.). (2017). *Technical Manual* (19th ed.). Bethesda, MD: AABB Publications. [Link to Purchase](#)

Hamilton, J. et al. (Eds.). (2013). *Antibody Identification: Art or Science? A Case Study Approach* (1st ed.). Bethesda, MD:

AABB Publications. [Link to Purchase](#)

Harmening, D.M. (2018). *Modern Blood Banking and Transfusion Practices* (7th ed.). Philadelphia: F.A. Davis Company. [Link to Purchase](#)

Klein, H.G. & Anstee, D.J. (2014). *Mollison's Blood Transfusion in Clinical Medicine* (12th ed.). West Sussex, UK: John Wiley & Sons, Ltd. [Link to Purchase](#)
Moulds, J.M., Ness, P. M., & Sloan, S. R. (Eds.). (2010). *BeadChip Molecular Immunohematology: Toward Routine Donor and Patient Antigen Profiling by DNA Analysis*. New York: Springer. [Link to Purchase](#)
Reid, M.E., Lomas-Francis, C., & Olsson, M.L. (2012). *The Blood Group Antigen Facts Book* (3rd ed.). San Diego, CA: Elsevier, Academic Press. [Link to Purchase](#)

For current blood group antigen nomenclature, refer to this website:

International Society of Blood Transfusion: www.isbtweb.org

HEMATOLOGY AND HEMOSTASIS

Keohane, E.M., Otto, C.N., and Walenga, J.M. (2019). *Rodak's Hematology: Clinical Principles & Applications* (6th ed.). Philadelphia: Elsevier Saunders Company. [Link to Purchase](#)
McKenzie, S.B. & Williams, L. (2015). *Clinical Laboratory Hematology* (3rd ed.). New Jersey: Prentice Hall. [Link to Purchase](#)

MANAGEMENT AND EDUCATION

Fung, M.K. et al. (Eds.). (2017). *Technical Manual* (19th ed.). Bethesda, MD: AABB Publications. [Link to Purchase](#)
Harmening, D.M. (2013). *Laboratory Management: Principles and Processes* (3rd ed.). St. Petersburg: D.H. Pub. & Consulting, Inc. [Link to Purchase](#)

TRANSFUSION PRACTICE

Marquez, M., Schwartz, J., & Wu, Y. (2019). *Transfusion Therapy: Clinical Principles and Practice* (4th ed.). Bethesda, MD: AABB Press. [Link to Purchase](#)
Simon, T.S. et al. (Eds.). (2016). *Rossi's Principles of Transfusion Medicine* (5th ed.). West Sussex, UK: John Wiley & Sons, Ltd. [Link to Purchase](#)

ONLINE

[AABB Link to View](#)
[Blood Bank Guy – Transfusion Medicine Education Link to View](#)
[CAP Accreditation Checklists Link to Purchase](#)
[Indian Immunohematology Initiative Link to View](#)

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