EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Subject:	**Transfusion Science**
Examination Date:	**Saturday 6 November 2021**
Time Allowed:	**3 hours – 9.30am – 12.40pm** **10 minutes extra time for reading the paper**

Candidate Number: «Member_No»
Name: «First_Name» «Surname»

General Instructions	
1.	Total marks for paper = 100.
2.	Marks for each question are as indicated.
3.	The paper consists of common syllabus and discipline specific questions. The relevant breakdown of marks is indicated under each Section Heading.
	To pass the QMLT examination, candidates must gain a minimum of a C grade (50%) in the common syllabus examination component and a minimum of a C grade (50%) in the discipline specific component of the written examination.
4.	All questions to be attempted.
5.	Use of a calculator is permitted.
6.	Write all answers into this examination booklet. Extra pages are provided at the back of this examination paper booklet if you require more space to write answers. Ensure you indicate the answer is continued on an additional page and label these additional pages clearly with your candidate number and the number of the question you are answering.

WORD DEFINITIONS	
Calculate	Perform a mathematical process to get the answer
Classify	Be able to designate to a group
Complete	Finish, have all the necessary parts
Convert	Express in alternative units
Define	State meaning clearly and concisely
Describe	Give a complete account demonstrating a thorough practical knowledge
Differentiate	Briefly and concisely state the main differences
Discuss	Give details, explaining both the positives and negatives
Distinguish	To briefly point out the main differences
Expand	To express at length or in a greater detail
Identify	Recognise according to established criteria
Indicate	Briefly point out
Label	Give a name to
List	Headings only
Match	Find one that closely resembles another
Outline	Write brief notes incorporating the essential facts
Recognise	Be able to identify the main points

SECTION A

Multi Choice Questions - choose one answer for each question

Common Curriculum Questions C.1 - C.12 = 6 marks
Discipline Specific Questions D.13 - D.30 = 9 marks

(0.5 marks per correct answer)
Total Marks = 15 marks

Circle the letter for the correct answer

***Example**. Which of the below is a primary colour?*

a. Green
b. Purple
c. Red
d. Orange

C.1 Agreeing to something once provided with all the facts is an example of:

a. Confidential information
b. Work place ethics
c. Informed consent
d. Human resource management

C.2 Which organisation is responsible for issuing an Annual Practising Certificate?

a. Medical Sciences Council of New Zealand
b. New Zealand Institute of Medical Laboratory Science
c. New Zealand Ministry of Health
d. New Zealand Qualification Authority

C.3 Harmonisation is:

a. The process leading to the uniformity of test results from different methods
b. Where staff are encouraged to work happily together
c. The process of taking tests out of one laboratory and sending to another to save money
d. The process of review of laboratory procedure to make things run smoothly

C.4 Alveoli are found in which organ?

a. Heart
b. Brain
c. Lung
d. Kidney

C.5 Specimens transported throughout New Zealand must adhere to which industry standard?

a. IANZ guideline

b. NATA guidelines

c. CDC guidelines

d. IATA guidelines

C.6 Standard precautions refers to:

a. Treating all body fluids including blood as potentially infectious

b. Wearing gloves at all times when handling patient samples

c. Ensuring all staff are aware of all laboratory hazards and have read the Health and Safety manual

d. Keeping all samples in appropriate leak proof containers.

C.7 What is the UN number for labelling packages containing Diagnostic Specimens Category A for air transport?

a. UN 3373

b. UN 1845

c. UN 2814

d. UN 2900

C.8 A Class 2 biosafety cabinet offers protection to:

a. Personnel only

b. Personnel and products

c. Products only

d. Personnel and environment

C.9 What laboratory department is generally responsible for the diagnosis of diabetes?

a. Microbiology

b. Histology

c. Blood Transfusion

d. Biochemistry

C.10 Where on the body is the antecubital fossa?

a. The leg

b. The arm

c. The waist

d. The neck

C.11 Why is it important to use personalised logons when using laboratory computer systems?

a. So management know which staff has achieved their KPIs.

b. So all entries in the computer are appropriately tracked in accordance with Total Quality Management

c. So HR know when staff are working and they can be paid the correct amount.

d. So you don't get the blame for other people's errors

C.12 Belonging to and achieving appropriate Continuing Professional Development is a legal requirement from which Government Act?

a. Health Practitioners Competency Assurance Act (2003)

b. Health and Disability Commissioner Act (1994)

c. Health and Safety at Work Act (2015)

d. Employment Relations Act (2000)

D.13 Which ABO/D antibodies would you typically find in the plasma of a group A RhD Negative male who has never received a blood transfusion?

a. Anti-A

b. Anti-A and Anti-D

c. Anti-B

d. Anti-B and Anti-D

D.14 Which red cell ABO/D blood group would you provide to a female patient requiring an emergency red blood cell transfusion without a valid pre-transfusion sample?

a. O RhD Positive

b. O RhD Negative

c. A RhD Negative

d. B RhD Positive

D.15 Which of the following blood group systems is considered clinically significant for the purposes of a red blood cell transfusion?

a. P1

b. Kell

c. Chido/Rodgers

d. Lewis

D.16 The minimum time required for a patient to typically create a new allo-antibody following a red blood cell transfusion is?

a. 72 hrs

b. 7 days

c. 21 days

d. 3 months

D.17 Which additional component or product should be offered to a group A RhD Negative female under the age of 55 years following an O Positive platelet transfusion?

a. Hepatitis B Immunoglobulin

b. Fresh Frozen Plasma

c. Cryoprecipitate

d. RhD Immunoglobulin

D.18 Which of the following blood group systems is enhanced using a proteolytic enzyme?

a. Kidd

b. Duffy

c. Kell

d. MNS

D.19 A group AB patient may receive fresh frozen plasma from donors of which Blood Group?

a. Group A

b. Group AB

c. Group B

d. Group O

D.20 Commercial red cell antibody screen reagents contain red blood cells of which ABO blood group?

a. Group A

b. Group AB

c. Group B

d. Group O

D.21 Which of the following phenotypes reflects homozygote gene expression?

a. Jk (a+b+)

b. M+N+

c. K+k+

d. Fy (a-b+)

D.22 A pre-transfusion sample for a pregnant patient, not recently transfused in the last 3 months, with placenta praevia remains valid for which length of time?

a. 72hrs

b. 7 days

c. 21 Days

d. For the current admission

D.23 Which of the following antibodies is commonly implicated in significant haemolytic disease of the fetus and newborn (HDFN)?

a. Anti-P1

b. Anti-N

c. Anti-c

d. Anti-M not reactive at 37˚C

D.24 Some red cell antibodies have the ability to show dosage. Which phrase below best describes an antibody showing dosage?

a. An antibody which only reacts when tested against an antigen in its homozygote expression

b. An antibody which only reacts when tested against an antigen in its heterozygote expression

c. An antibody that reacts with all expressions of a given antigen

d. An antibody which does not react with its antigen using IAT methods

D.25 Prothrombinex is used as a reversal agent for which anticoagulant?

a. Heparin

b. Warfarin

c. Dabigatran

d. Riviroxiban

D.26 When selecting a red blood cell unit for transfusion, wherever possible a female under the age of 55 years old should receive which of the following regardless of their ABO/D blood group?

a. D Negative

b. K Negative

c. C Negative

d. O Negative

D.27 For which of the following red cell antibodies can you rely exclusively on the use of random IAT crossmatching to find compatible red cell units for transfusion without confirmation antigen typing?

a. Anti-E

b. Anti-Kpa

c. Anti -C

d. Anti-K

D.28 What is the maximum shelf life for a unit of Fresh Frozen Plasma (FFP) that has been stored correctly after being thawed?

a. 24hrs

b. 48hrs

c. 72hrs

d. 120hrs

D.29 Following a transfusion reaction investigation, which of the following blood components must always be sent for a microbiology blood culture if it is implicated?

a. Red cells

b. Platelets

c. Fresh Frozen Plasma

d. Cryoprecipitate

D.30 Which test must be performed on a patient sample following a new IgG positive, C3d negative Direct Antiglobulin Test (DAT) result following a recent red cell transfusion?

a. Auto-adsorption

b. Allo-adsorption

c. Elution

d. Pre-warm antibody screen

Section A: Total 15 marks

SECTION B

Labelling of Diagrams, e.g., Anatomy, Hazard Identification, Instrument

Common Curriculum Questions C.31 - C.33 = 5 marks
Discipline Specific Questions D.34 – D.35 = 5 marks

(Answer all questions)
Total Marks = 10 marks

C.31 Name the following hazard symbols: *0.5 marks per correct answer)*
(C.31: 1.5 marks)

a. 

b. 

c. 

a. _____ b._____ c. _____

C.32 Name the equipment pictured below. *(0.5 marks per correct answer)*
(C.32: 1.5 marks)

a. 

b. 

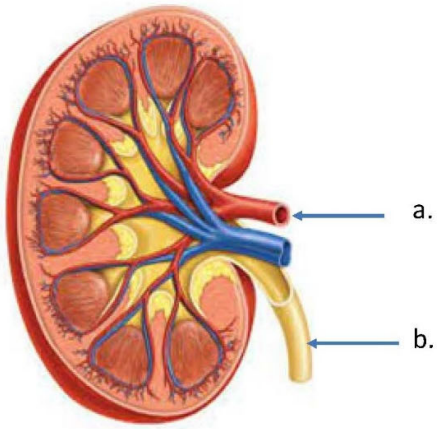
c 

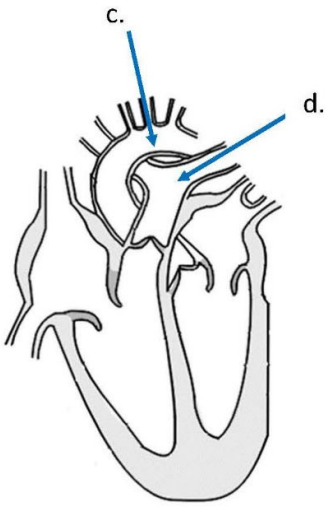
a. _____ b._____ c. _____

C.33 Name the anatomical features pictured below indicated by a, b, c and d.

(0.5 marks per correct answer)

(C.33: 2 marks)





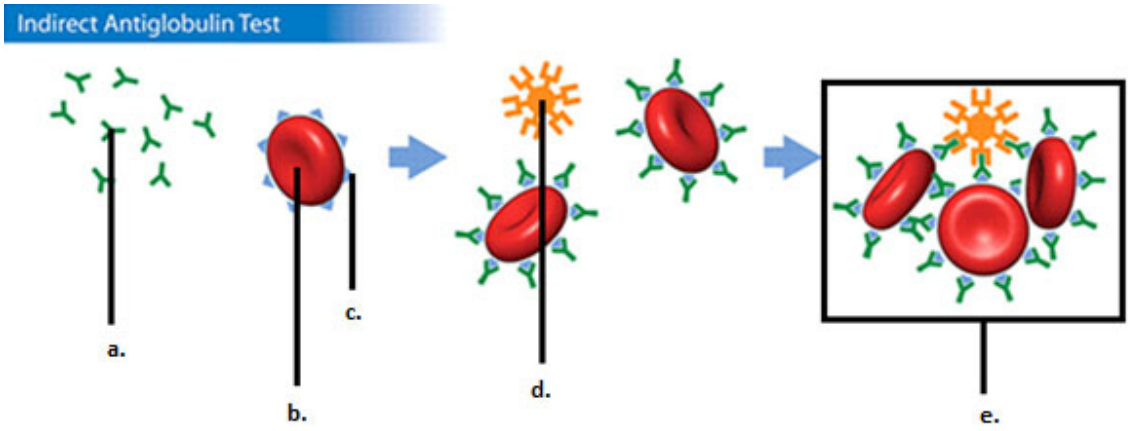
a. _____ c. _____

b. _____ d. _____

D.34 The diagram below outlines the process of the Indirect Antiglobulin Test. Label the components.

(0.5 mark per correct answer)

(D.34: 2.5 marks)



a. _____

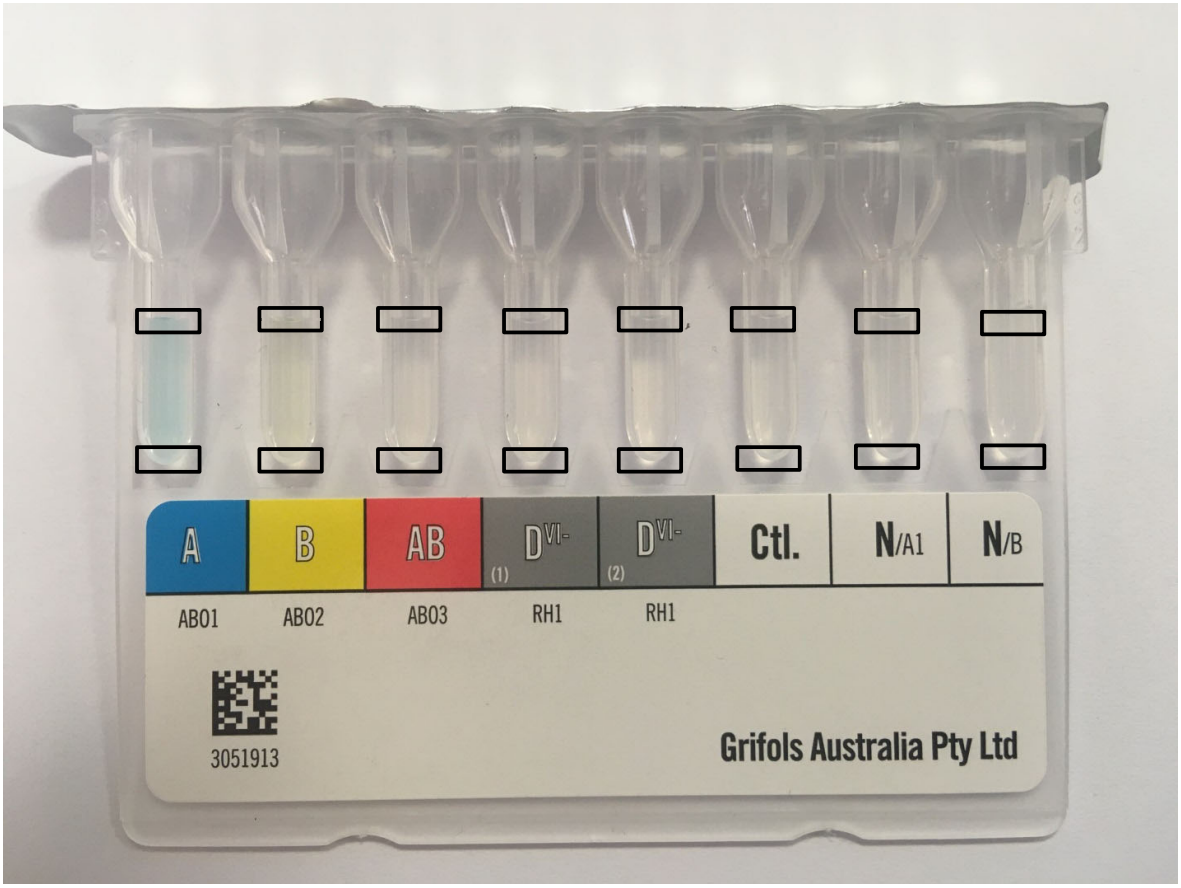
b. _____

c. _____

d. _____

e. _____

D.35 Using the CAT card below, shade the appropriate box of each well to show the expected reactions for an individual with blood group B Rh(D) Negative. **(D.35: 2.5 marks)**



Section B: Total 10 marks

SECTION C

Tables, Match Column Definition

Common Curriculum Questions C.36 - C.37 = 4 marks
Discipline Specific Questions D.38 = 6 marks

(Answer all questions)
Total Marks = 10 marks

C.36 Match the definition in column (A) with the correct description in column (B). Write your answers in the table below. (Roman numeral only required.) **(C.36: 2 marks)**

A	B
Accuracy	(i) Nose bleed
Morphology	(ii) Inflammation of the Kidney
Epistaxis	(iii) The science of organic forms and structure
Nephritis	(iv) The ability of a measurement to match the actual value of the quantity being measured

A	B (enter Roman numeral only)
Accuracy	
Morphology	
Epistaxis	
Nephritis	

C.37 Expand the following commonly used laboratory abbreviations. There are both laboratory tests and clinical conditions/details. **(C.37: 2 marks)**

MI _____

UTI _____

PPE _____

PCR _____

D.38 **(D.38: 6 marks)**

a. Match the Rh Wiener nomenclature in column (A) to the corresponding Fisher-Race nomenclature in column (B). Write your answers in the table below. (Roman numeral only required). *(4 marks)*

Wiener (A.)	Fisher-Race (B.)
a. R_1R_1	i. dce/dce
b. rr	ii. dCe/dce
c. R_0r	iii. DCe/DCe
d. r'r	iv. DCe/DcE
e. r''r	v. dCE/dce
f. $R\backslash R_2$	vi. DCE/DcE
g. R_1R_2	vii. Dce/dce
h. r^yr	viii. dcE/dce

Wiener (A.)	Fisher-Race (B.) (enter Roman numeral only)
a. R_1R_1	
b. rr	
c. R_0r	
d. r'r	
e. r''r	
f. $R\backslash R_2$	
g. R_1R_2	
h. r^yr	

b. Match the component in column (A.) to the correct storage temperature in column (B.) Write your answers in the table below. (Roman numeral only required). *(2 marks)*

Component (A.)	Storage temperature (B.)
a. Resuspended Red Cell	i. Room Temperature
b. Apheresis Platelets	ii. -25 ˚C or below
c. Frozen Cryoprecipitate	iii. 2 – 6 ˚C
d. Thawed Cryoprecipitate	iv. 20 – 24 ˚C

Component (A.)	Storage temperature (B.) (enter Roman numeral only)
a. Resuspended Red Cell	
b. Apheresis Platelets	
c. Frozen Cryoprecipitate	
d. Thawed Cryoprecipitate	

Section C: Total 10 marks

SECTION D

Calculations

Common Curriculum Questions C.39 - C.42 = 5 marks
Discipline Specific Questions D.43 - D.46 = 5 marks

(Answer all questions)
(Use of a calculator is permitted)

Total Marks = 10 marks

C.39 A patient needs a specimen taken within 36 hours of flying to meet with travel requirements. They fly at 2130 hr on the 10TH of November.

When is the earliest they can have the specimen collected? Give the date and time.

(C.39: 1 mark)

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_____

_____

C.40 A department needs to demonstrate an increase in workload and is asked to calculate the average number of specimens received for the week.

Day of the week	Monday	Tuesday	Wednesday	Thursday	Friday
Specimens per day	227	243	217	209	186

What is the mean number of samples per day? (*Show calculations)* **(C.40: 1 mark)**

_____

_____

_____

_____

C.41 Convert the following: **(C.41: 2 marks)**

0.75 L	to	_____ mL
1/4	to	_____ %
142ug	to	_____ g
185cm	to	_____ mm

C.42 Solve the following equation. *(0.5 mark per correct answer)*
(C.42: 1 mark)

1/3 + 5/8 = _____

Express the above result as a percentage.

_____

D.43 Using the formula $C_1V_1 = C_2V_2$ calculate the final volume required (V_2) to dilute a 0.5 IU/mL (C_1) vial of Anti-D reference reagent in a 0.5mL suspension (V_1) down to 0.1 IU/mL (C_2) concentration.
(D.43: 1 mark)

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D.44 The APT Downey test requires a 0.2M working solution of sodium hydroxide (NaOH). If 8g of sodium hydroxide (NaOH) dissolved in 1L of distilled water makes a 0.2M solution, how many grams of NaOH will you require to make a 250mL solution of 0.2M NaOH? Express your answer in grams (g). **(D.44: 1 mark)**

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D.45 The Gamma Elu-Kit II requires you to dilute a concentrated wash solution with distilled water down to a 10% working solution before use. How much concentrated wash solution and how much distilled water should you use if you are making 250 mL of the 10% wash solution? Express your answers in mL. **(D.45: 2 marks)**

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D.46 Using Column Agglutination Technology (CAT) you are required to perform an 11-cell antibody identification panel (including auto control) and IAT cross match 3 red cell units for a patient with a positive antibody screen. If each reaction well requires 0.025 mL of plasma, what is the minimum amount of patient plasma you would require to this testing? Express your answer in µL.

(D.46: 1 mark)

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Section D: Total 10 marks

SECTION E

Short Answer Questions

Common Curriculum Questions C.47 - C.51 = 10 marks
Discipline Specific Questions D.52 - D.61 = 25 marks

(Answer all questions)
Total Marks = 35 marks

C.47 Define Quality Assurance **(C.47: 1.5 marks)**

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C.48 Describe the "Duty of Care" in relation to patient samples *(0.5 marks per point. Max 2 marks)*
(C.48: 2 marks)

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C.49 List 3 routes of infection from biological material *(0.5 marks per point. Max 2 marks)*
(C.49: 1.5 marks)

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C.50 Outline the prevention of a sharps injury. *(0.5 marks per point. Max 2 marks)*
(C.50: 2 marks)

C.51 Describe Cultural Competence. **(C.51: 3 marks)**

D.52 List 4 different reasons that might cause an adult to have a positive DAT. **(D.52: 2 marks)**

D.53 Outline the basic principle of an IAT crossmatch using Column Agglutination Technology (CAT).
(D.53: 4 marks)

D.54 Briefly describe Coombs Control Positive cells (CC+ cells) and their use when performing an antibody screen in a tube technique. **(D.54: 2 marks)**

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_____

_____

D.55 During red cell phenotyping techniques, heterozygous red cells are used as a positive control. Define what a heterozygous cell is and outline why it is used as a positive control instead of a homozygous cell. **(D.55: 2 marks)**

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_____

_____

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_____

_____

D.56 Describe the differences between IgG antisera and IgM antisera in the context of commercial phenotyping antisera. **(D.56: 1 mark)**

_____

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_____

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D.57 Identify the tests required to investigate a moderate transfusion reaction to a red cell component. **(D.57: 3 marks)**

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D.58 List the requirements for a valid pre-transfusion sample and form. **(D.58: 3.5 marks)**

D.59 List the criteria for preparation of a paediatric emergency/desperate unit. **(D.59: 2 marks)**

D.60 List all blood components along with the correct number of units contained within "Box 2" of an adult Massive Transfusion Protocol (MTP). **(D.60: 3 marks)**

D.61 Outline the purpose and features of a Blood Management System such as e-Traceline. **(D.61: 2.5 marks)**

Section E: Total 35 marks

SECTION F

Essay Questions

Discipline Specific Questions D.62 to D.63 = 20 marks

(Answer all questions)

Total Marks = 20 marks

D.62 In essay format describe the role of RhD Immunoglobulin in prevention of Haemolytic Disease of the Fetus and Newborn (HDFN). Include in your answer the possible consequences if RhD Immunoglobulin is not given. **(D.62: 10 marks)**

D.63 In essay format, describe the principles, the process and the purpose of the red cell antibody screen used in Pre-Transfusion Testing.

(D.63: 10 marks)

Section F: Total 20 marks

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	

Candidate No.: _____

Question No:	