EXAMINATION FOR QUALIFIED MEDICAL LABORATORY TECHNICIAN

Subject:	**HAEMATOLOGY**
Examination Date:	**7 October 2023**
Time Allowed:	**3 hours – 9.30am – 12.40pm** **10 minutes extra time for reading the Paper**
Candidate name:	_____
Candidate No.:	_____

General Instructions

1. Total marks for paper = 100.

2. Marks for each question are as indicated,

3. The paper consists of:

	Common	*Discipline Specific*
Section A, questions 1-30 = Total Marks 15	*6 Marks*	*9 Marks*
Section B, questions 31-35 = Total Marks 10	*5 Marks*	*5 Marks*
Section C, questions 36-38 = Total Marks 10	*4 Marks*	*6 Marks*
Section D, questions 39-42 = Total Marks 05	*5 Marks*	*0*
Section E, questions 43-61 = Total Marks 40	*10 Marks*	*30 Marks*
Section F, questions 62-63 = Total Marks 20	*0*	*20 Marks*

4. All questions are to be attempted.

5. Use of calculator is permitted.

6. Put all answers into the examination booklet provided.

WORD DEFINITIONS	
Calculate	Perform a mathematical process to get the answer
Classify	Be able to designate to a group
Compare	Detail both the differences and the similarities
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
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
Interpret	Express the results of a test or series of tests in a meaningful format
Label	Give a name to
List	Headings only
Match	Find one that closely resembles another
Name	A word or group of words used to describe or evaluate
Outline	Write brief notes incorporating the essential facts
State	Give the relevant points briefly

SECTION A

Section A – Question 1 to Question 30 = Total Marks: 15

Multi choice questions

Multi choice questions – choose one answer for each question

(0.5mark per correct answer)

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 A synovial fluid is taken from

a. The eye
b. A vein
c. A joint
d. An artery

C.2 The cardiovascular system is also referred to as the:

a. Circulatory system
b. Endocrine system
c. Respiratory system
d. Lymphatic system

C.3 The Medical Sciences Council is responsible for:

a. Offering a CPD programme
b. Issuing an Annual Practicing Certificate
c. Providing QMLT examinations
d. Laboratory auditing

C.4 Leukemia is primarily diagnosed in which department in the laboratory?

a. Haematology
b. Histology
c. Microbiology
d. Biochemistry

C.5 The prefix “hypo” refers to:

a. Inflammation

b. Excessive

c. Increased

d. Decreased

C.6 Standard precautions refers to:

a. Cleaning the laboratory regularly with an appropriate disinfectant

b. Treating all blood and body fluids as potentially infectious

c. Following the rules set by the Health and Safety Officer

d. Compulsory use of Personal Protective Equipment

C.7 Which best describes confidential information?

a. Information given on the understanding that it will not be passed on to others.

b. Information that is stamped or marked as “Confidential”

c. Information that can only be passed on to a doctor or family member.

d. Clinical details written on a form

C.8 A pathologist is a:

a. Registered Medical Practitioner

b. An advanced Medical Laboratory Scientist

c. A specialised Scientific Officer

d. Registered Clinical Scientist

C.9 Within the complaints process of The Code of Health & Disability Services and Consumer Rights, the complaint must be acknowledged in writing within how many working days?

a. 7 days

b. 10 days

c. 5 days

d. 20 days

C.10 A method of representing data in a visual, machine-readable form describes:

a. A histogram

b. A cell scanner

c. A flow chart

d. A barcode

C.11 "It is the duty of Members to uphold the dignity and honour of the profession, to accept its ethical principles and not engage in any activity that would discredit the profession" is part of:

a. HPCA Act 2003

b. Health and Disabilities requirement of all staff

c. NZIMLS code of ethics

d. Medical Sciences Council of New Zealand practitioner requirement

C.12 Venesection, venipuncture, phlebotomy and blood collection all come under what scope of practice?

a. Medical Laboratory Scientist

b. Medical Laboratory Technician

c. Pre analytical Technician

d. Health Care Assistant

D.13 Factor XI deficient individuals are also known as:

a. Haemophilia A

b. Haemophilia B

c. Haemophilia C

d. Haemophilia D

D.14 Which mosquito transmits malaria to humans?

a. Anopheles mosquito

b. Asian Tiger mosquito

c. *Aedes vexans* mosquito

d. *Opifex fuscus* mosquito

D.15 Which of the following factors is part of the extrinsic pathway?

a. FV

b. FVII

c. FX

d. FXI

D.16 A red blood cell exhibiting hypochromia would be best described as:

a. Variable in shape

b. Packed with haemoglobin

c. Bluish in colour

d. Pale in central colour

D.17 Which organ is responsible for the storage of platelets?

a. Spleen
b. Liver
c. Bladder
d. Kidney

D.18 Howell-Jolly bodies are made up of:

a. RNA
b. DNA
c. Iron
d. Haemoglobin

D.19 Megaloblastic anaemia's red cell characteristics include:

a. Microcytic hypochromic
b. Macrocytic normochromic
c. Microcytic normochromic
d. Macrocytic hypochromic

D.20 Haemoglobin is comprised of how many subunits?

a. 2
b. 6
c. 4
d. 8

D.21 What does ferritin represent?

a. Stored iron
b. Free iron
c. Decomposed iron
d. Saturated iron

D.22 What is the life span of red cells?

a. 130 days
b. 110 days
c. 100 days
d. 120 days

D.23 Malaria is classified under which infection?

a. Parasite infection
b. Bacterial infection
c. Viral infection
d. Protozoa infection

D.24 What is the average size of a red blood cell?

a. 6-8 micrometres
b. 9-10 micrometres
c. 10-12 micrometres
d. 12-14 micrometres

D.25 What does AML stand for?

a. Acute myeloid leukaemia
b. Acute mega Leukaemia
c. Acute mail Leukaemia
d. Acute male Leukaemia

D.26 What does INR stand for?

a. Identical normalised ratio
b. Ideal normalised ratio
c. International normalised ratio
d. Inter-analyser normalised ratio

D.27 Where are coagulations factors produced?

a. Lungs
b. Liver
c. Spleen
d. Heart

D.28 Which tube is required for Erythrocyte Sedimentation Rate?

a. Heparin
b. Trisodium citrate
c. Ethylenediaminetetra-acetic acid
d. Sodium fluoride

D.29 Which of the conditions will have blast cells?

a. Leukaemia

b. Infectious mononucleosis

c. Influenza A

d. Malaria infection

D.30 Which is the largest white cell with convoluted bi-lobed nuclei with abundant cytoplasm?

a. Monocyte

b. Lymphocyte

c. Eosinophil

d. Neutrophil

Total: 15 marks

END OF SECTION

SECTION B

Labelling of diagrams e.g. anatomy, hazard identification, instrument

Section B – Question C.31 to Question D34 = Total Marks: 10

(Answer all questions)

C.31 Name the following hazard symbols **(1 mark)**

(*0.5 marks per correct answer*)

a.		b.	

a. _____ b. _____

C.32 Name the instruments and describe their use **(2 marks)**

(*1 mark per correct answer*)

a.		b.	

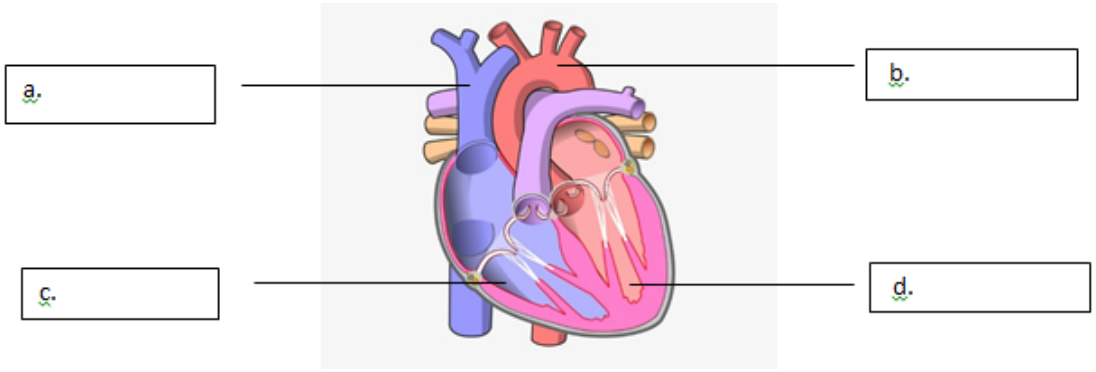
a. _____

_____

b. _____

_____

C.33 Label the following diagram: **(2 marks)**



a. _____

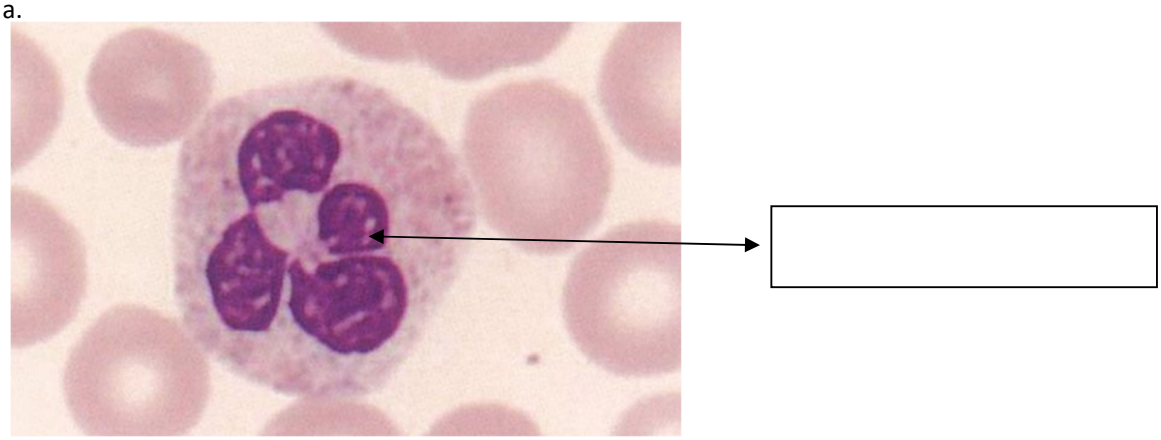
b. _____

c. _____

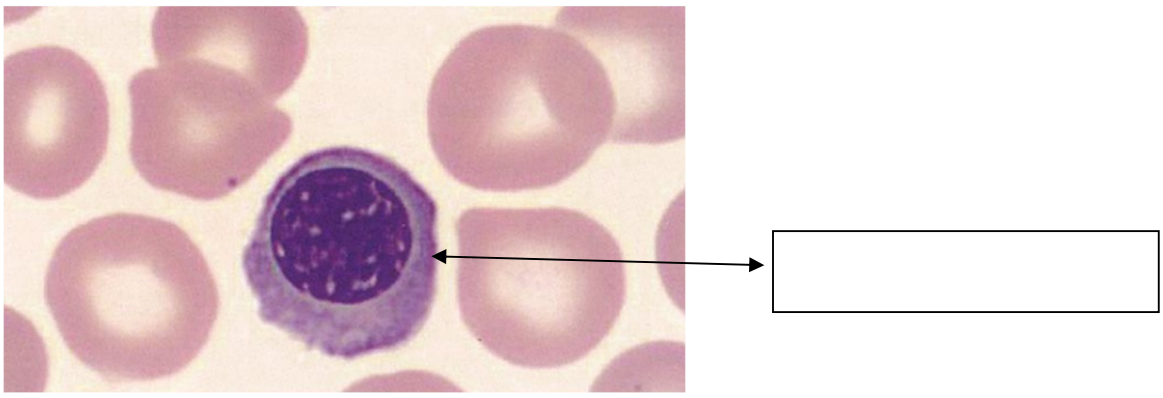
d. _____

D.34 Label the blood film images below (a-j) using standard reporting terminologies. **(5 marks)**

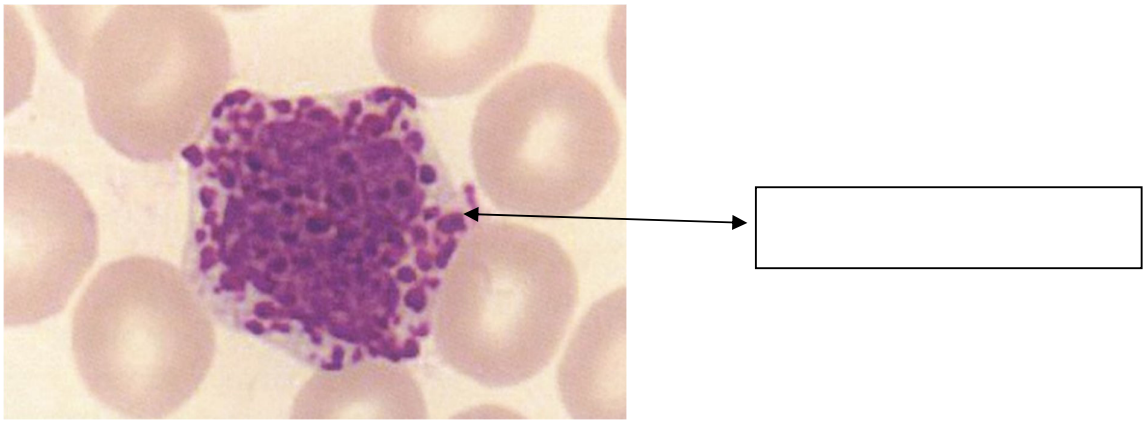
a.



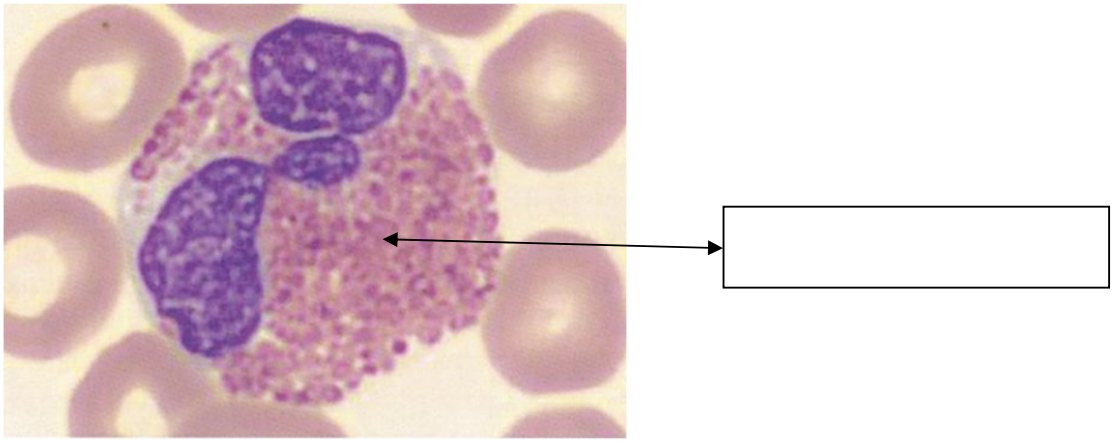
b.



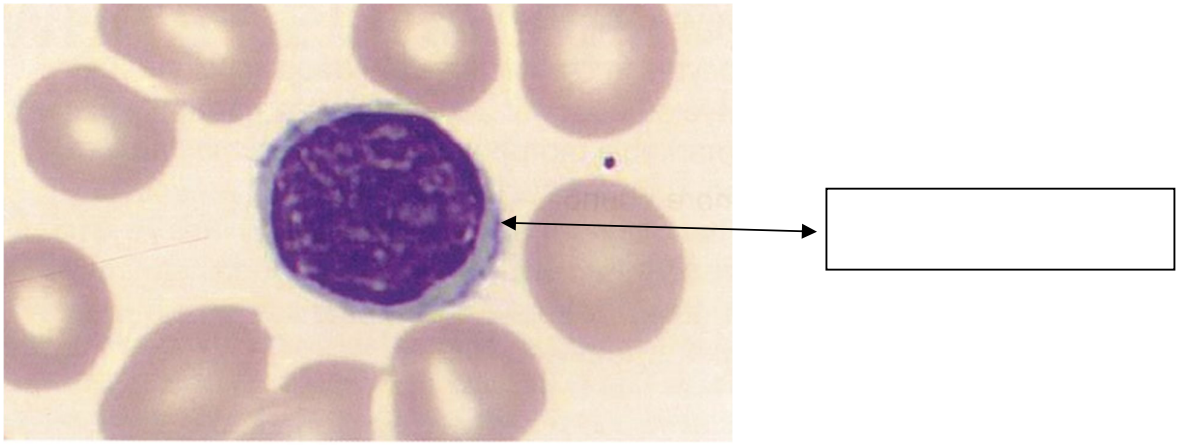
c.



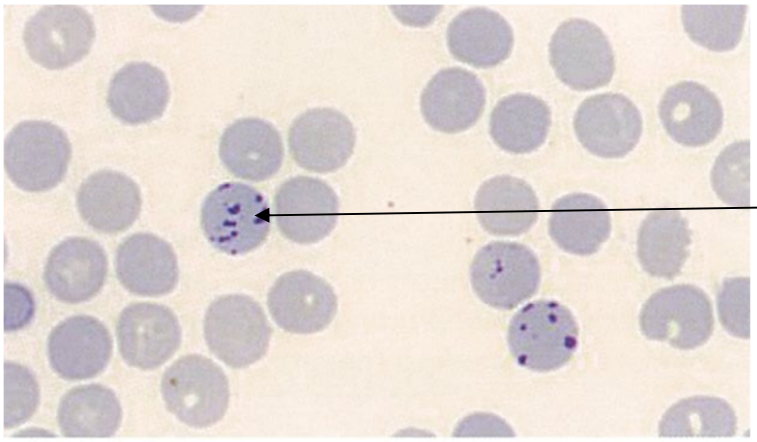
d.



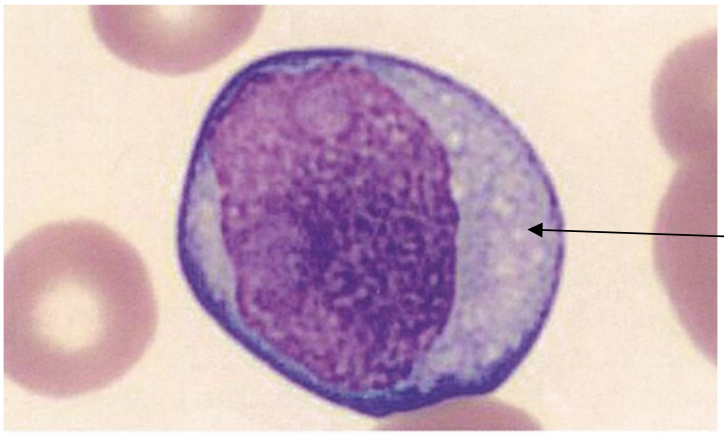
e.



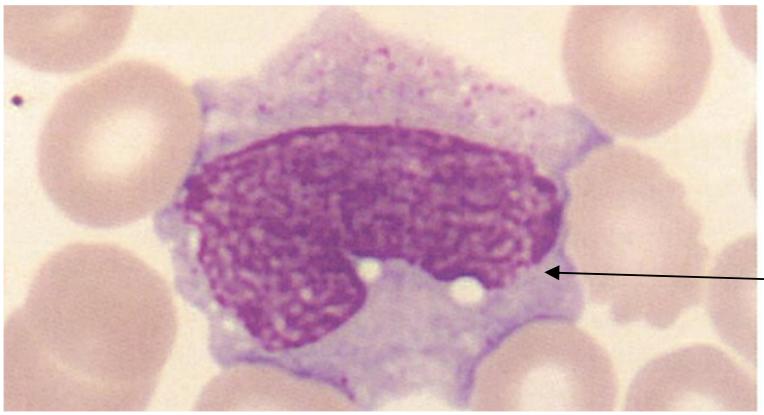
f.



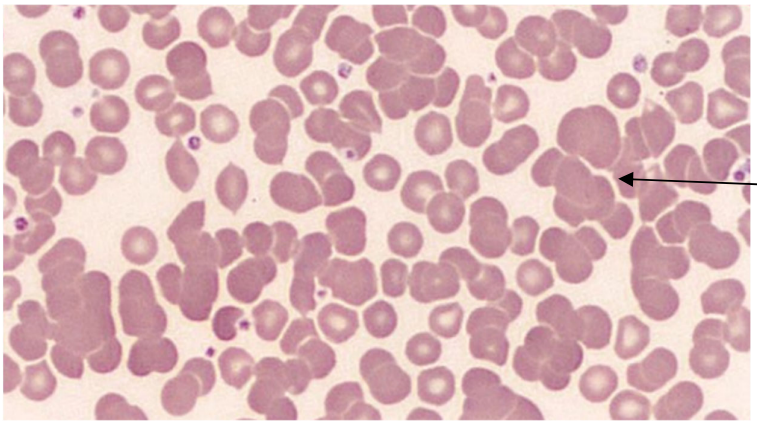
g.



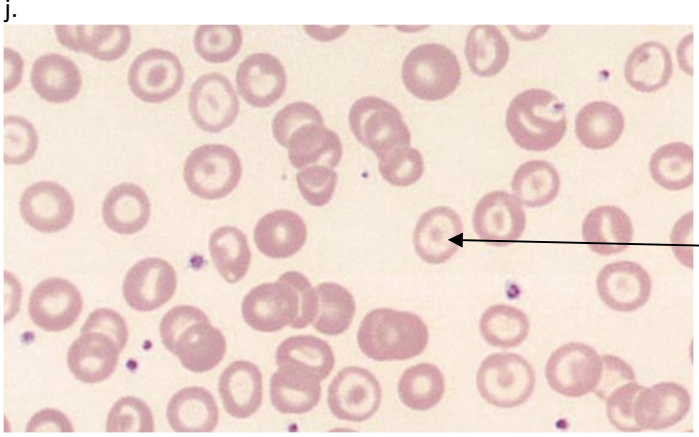
h.



i.



j.



(Total: 10 marks)

END OF SECTION

SECTION C

Tables, match column definition

Section C – Question C35 to Question D38 = Total Marks: 10

(Answer all questions)

C.35 Match the columns by **writing the Roman numeral from list B** against the correct match in Column A **(2 marks)**

Column A	Column B
A. Hepatic	i. Knee
B. Nephritis	ii. Liver
C. Patella	iii. Molecular
D. PCR	iv. Kidney

Column A	Column B
A. Hepatic	
B. Nephritis	
C. Patella	
D. PCR	

C.36 Expand the common abbreviations: **(2 marks)**

A.	B.
a. ACF	
b. CML	
c. COPD	
d. NAAT	

D.37 Match the names of tests or analytes in column A with their correct reporting units in column B by **writing the Roman numeral from list B** against the correct match in Column A.

(3 marks)

Column A	Column B
a. Dimer	i. Seconds
b. APTT	ii. g/L
c. Platelet	iii. Ratio
d. MCHC	iv. x10E9/L
e. RBC	v. ng/L
f. HCT	vi. x10E12/L

Column A	Column B
a. Dimer	
b. APTT	
c. Platelet	
d. MCHC	
e. RBC	
f. HCT	

D.38 Match Haematological disorders in list A (a-e) with their typical blood film findings in list B (i-vi) by **writing the Roman numeral from list B** against the correct match in Column A.

(3 marks)

Column A	Column B
a. Infectious mononucleosis	i. Basophilic stippling
b. Haemolytic anaemias	ii. Lymphoblasts
c. Acute lymphocytic leukaemia	iii. Target cells
d. Liver disease	iv. Reactive lymphocytes
e. Heavy metal poisoning	v. Echinocytes
f. Kidney Failure	vi. Red cell fragments

Column A	Column B
a. Infectious mononucleosis	
b. Haemolytic anaemias	
c. Acute lymphocytic leukaemia	
d. Liver disease	
e. Heavy metal poisoning	
f. Kidney Failure	

(Total: 10 marks)

END OF SECTION

SECTION D

Calculations

Section D – Question C.39 to Question C.42 = Total Marks: 5

Calculations

C.39 A patient has had daily Sodium and Potassium tests done for one week, the results are as follows:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Sodium	135.7	135.9	136.3	136.9	137.2	136.5	135.4
Potassium	3.9	4.2	4.8	4.1	3.8	4.0	3.6

Calculate the mean Sodium and Potassium for the week. (Show all workings) **(2 marks)**

_____

_____

_____

_____

C.40 Convert: **(1.5 marks)**

32.7 mg to _____ kg

$^{5}/_{8}$ to _____ %

200 uL to _____ mL

C.41 A test has been set up at 1730hrs and has an incubation time of 18 hours, the requester is asking what time they could expect the result (assume the result can be given as soon as the incubation period is complete). **(0.5 marks)**

_____

C.42 A colleague accidentally made one litre of 20% solution of Trigene, you have been asked to use that solution and make one litre of 2% Trigene.

Explain your process and show any calculations or workings. **(1.0 marks)**

_____

_____

(Total: 5 marks)

END OF SECTION

SECTION E

Short answer questions (answers = one or more words, short sentences)

Section E – Question C.43 to Question D.61 = Total Marks: 40

Short Answer Questions

C.43 Define document control. **(2 marks)**

_____

_____

_____

_____

C.44 Outline the First Aid and Treatment for fainting or unconscious episode of a staff member or patient you are working with. **(1.5 marks)**

_____

_____

_____

C.45 When referring to laboratory results the term “accuracy” is best described as: **(0.5 marks)**

_____

C.46 Outline the principle purpose of the Health Practitioners Competency Assurance Act 2003. **(1.5 marks)**

_____

_____

_____

C.47 Describe why user specific passwords are important when using a Laboratory Information System (Computer System) **(1.5 marks)**

_____

_____

_____

C.48 Describe why it is important for the laboratory to have a robust specimen labelling policy.

(1.5 marks)

_____

_____

_____

C.49 Define Patient/Donor confidentiality: **(1.5 marks)**

_____

_____

_____

D.50 a. Outline the principle of malaria antigen testing: **(4 marks)**
(2 marks)

_____

_____

_____

_____

b. List specimen requirements for the malaria antigen test *(1 mark)*

_____

_____

c. List **TWO** (2) pre-analytical variables that may interfere with the malaria antigen test
(1 mark)

_____

_____

D.51 Describe the structure and function of haemoglobin. **(2 marks)**

_____

_____

_____

_____

D.52 Outline the role of haemoglobin in carbon dioxide transport **(1 mark)**

D.53 Discuss the effect of liver disease on the coagulation system **(5 marks)**

D.54 Describe the principle of Romanowsky stains. **(2 marks)**

D.55 Distinguish between Acute and Chronic Leukaemia. **(2 marks)**

D.56 List a clinical cause for an increase in the absolute numbers of neutrophils, eosinophils, basophils, lymphocytes and monocytes. **(5 marks)**

White cell	Clinical cause
Neutrophils	
Lymphocytes	
Basophils	
Eosinophils	
Monocytes	

D.57 Briefly describe the following white cell morphological changes in a Romanowsky stained blood film. **(3 marks)**

a. Neutrophil toxic changes

_____

_____

b. Hypersegmented neutrophils

_____

_____

c. Smear cells

_____

_____

D.58 List **THREE** (3) clinical causes of thrombocytopenia **(1.5 marks)**

_____

_____

_____

D.59 List **THREE** (3) clinical causes of thrombocytosis **(1.5 marks)**

_____

_____

_____

D.60 Distinguish between primary and secondary thrombocytosis. **(2 marks)**

_____

_____

_____

_____

D.61 Identify the morphology of Romanowsky stained platelets. **(1 mark)**

_____

_____

(Total: 40 marks)

END OF SECTION

ESSAY

Section F – Question D.62 to Question D.63 = Total Marks: 20

Essay Questions

D.62 In essay format, discuss the role of oral anticoagulants including warfarin, dabigatran, and rivaroxaban. **(10 marks)**

D.63 In essay format, discuss the role of iron, vitamin B12 and folate in cell production and growth, including the consequence of deficiencies. **(10 marks)**

Total: 20 marks

END OF SECTION