



Australian and New Zealand College of  
Veterinary Scientists

**Fellowship Examination**  
June 2022

**Veterinary Emergency Medicine and  
Critical Care  
Paper 1**

Perusal time: **Twenty (20)** minutes

Time allowed: **Four (4)** hours after perusal

**Section A:** Answer **ONE (1)** question

**Section B:** Answer **ALL FIVE (5)** questions

**Section C:** Answer **ALL TEN (10)** questions

Section A: Answer **ONE (1)** essay-style question, worth 60 marks.....total 60 marks

Section B: Answer **FIVE (5)** short-answer questions, each worth 24 marks.....total 120 marks

Section C: Answer **TEN (10)** short-answer questions, each worth 6 marks total 60 marks

**Section A: Answer one (1) question 1. (60 marks total)**

1. Answer **all** sub-parts of this question:

- a) Define shock and provide a detailed explanation of the mechanisms of shock in critical illness. *(20 marks)*
- b) Explain the physiologic considerations and clinical data that should be considered in determining **whether** to administer intravenous fluid therapy to treat shock. Include a discussion of how these considerations change during the phases of treatment of critical illness. *(15 marks)*
- c) Explain the physiologic considerations and clinical data that should be considered in determining **what type** of intravenous fluid to administer to treat shock

*(25 marks)*

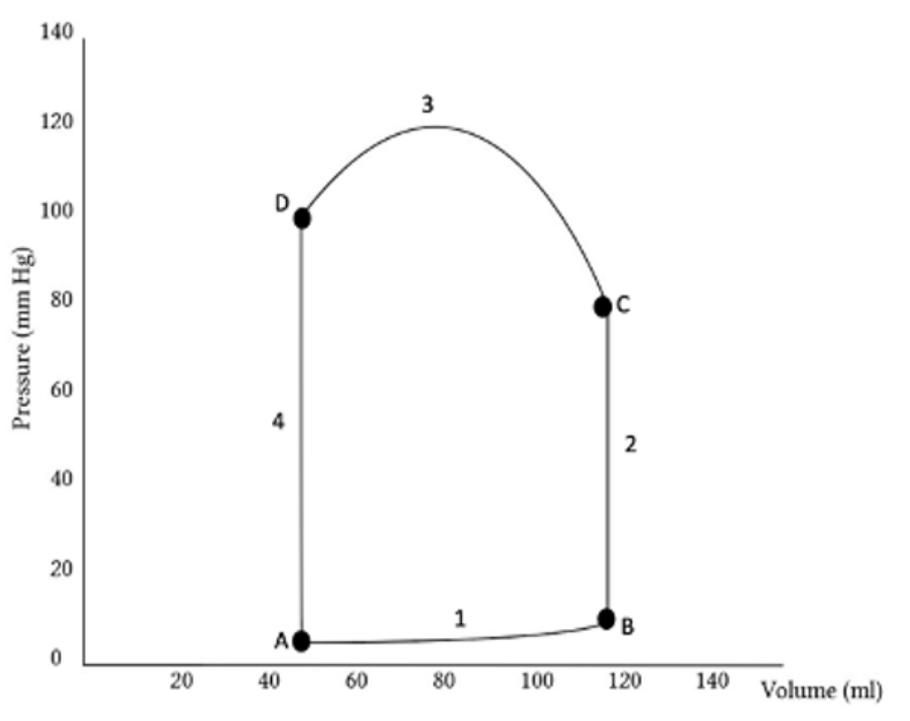
**Section B: Answer ALL five (5) short-answer questions (120 marks total)**

1. Answer **all** parts of this question:

- a) Explain the pathogenesis of feline asthma with respect to its effects on respiratory system resistance and flow, emphasising differences between inspiration and expiration. *(12 marks)*
- b) Mechanistically explain the effects of each of the following systemic medications on respiratory system resistance in feline asthma. *(8 marks)*
  - a. Prednisolone
  - b. Terbutaline
  - c. Theophylline
- c) For each of prednisolone and terbutaline: justify whether it (or an inhaled equivalent) should be administered on a regular ongoing basis, or only to treat active clinical signs. *(4 marks)*

2. Answer **all** parts of this question:

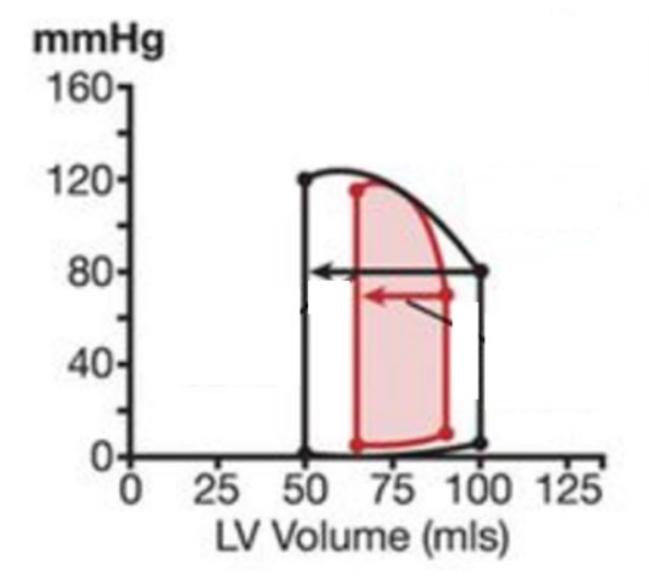
Figure 1. Normal left ventricular pressure-volume loop



**Question 2 is continued over the page**

- a. Regarding Figure 1, list the events that occur at:
- (i) the points labelled A, B, C and D. (2 marks)
  - (ii) the segments labelled 1, 2, 3, and 4. (2 marks)

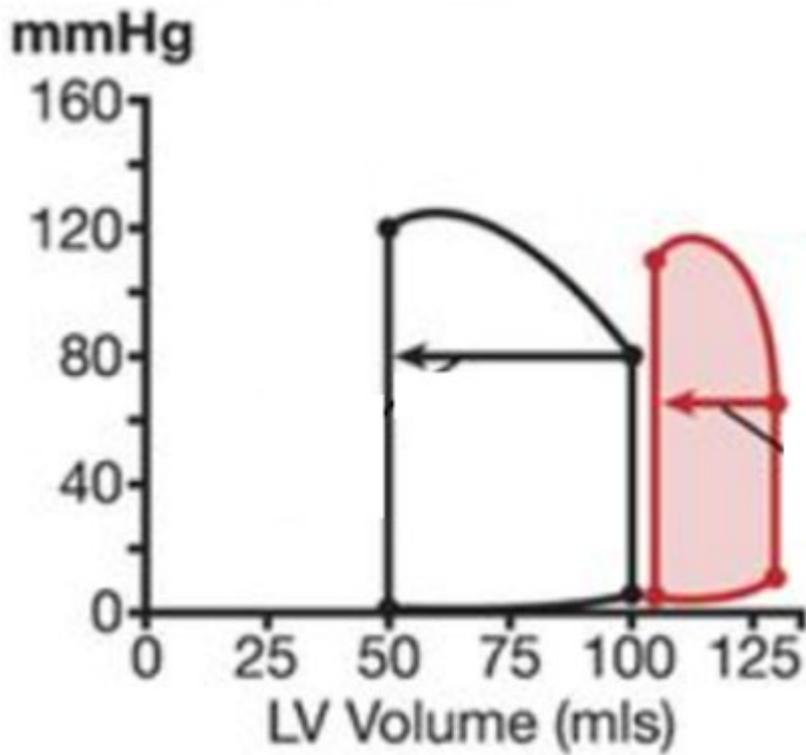
Figure 2. Normal left ventricular pressure-volume loop (black) compared to a left ventricular pressure-volume loop associated with myocardial disease (red).



- b. Regarding Figure 2
- (i) List the myocardial disease that best explains the change in the pressure-volume loop denoted in red. (1 mark)
  - (ii) Explain the pathophysiology of the disease in (i) in relationship to cardiac function. (3 marks)

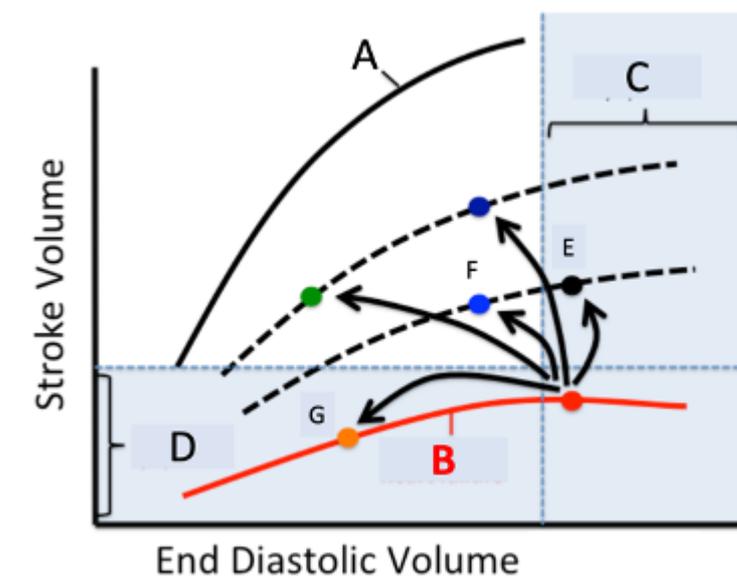
Figure 3. Normal left ventricular pressure-volume loop (black) compared to a left ventricular pressure-volume loop associated with myocardial disease (red).

**Question 2 is continued over the page**



- c. Regarding Figure 3
- (i) List the myocardial disease that best explains the change in the pressure-volume loop denoted in red. (1 mark)
  - (ii) Explain the pathophysiology of the disease in (i) in relationship to cardiac function. (3 marks)

Figure 4.



Question 2 is continued over the page

- d. Answer the following questions with regard to Figure 4
- (i) Name and explain the relationship the curve labelled A in Figure 4 depicts. *(3 marks)*
  - (ii) Explain the pathology represented in the curve labelled B in Figure 4, including the clinical syndrome represented by the segments of curve labelled C and D. *(3 marks)*
  - (iii) List the drugs and their mechanisms of action that would shift the patient's physiology to the positions labelled E, F and G as depicted by the arrows. *(6 marks)*

3. Answer **all** parts of this question:

- a) List and briefly explain differential diagnoses for measured hypoglycemia in dogs, using a mechanistic classification. *(12 marks)*
- b) Explain the role of glucagon in the treatment of hypoglycemia suspected secondary to an insulin producing neoplasm. *(6 marks)*
- c) Describe the pathophysiology of acute tumour lysis syndrome, risk factors, and the classic diagnostic findings. *(6 marks)*

4. Explain the alterations in plasma sodium concentration, plasma antidiuretic hormone concentration, and blood volume seen with the following diseases

*(6 marks each, total 24 marks)*

- a) Central diabetes insipidus
- b) Congenital adipsia
- c) Large volume saltwater ingestion
- d) Hypoadrenocorticism

5. Answer **all** parts of this question:

- a) Describe the mechanisms of toxicosis of organophosphate and carbamate compounds and the clinical signs attributable to effects at different sites within the nervous system. *(10 marks)*
- b) With regard to organophosphate (OP) toxicosis, describe what is meant by the terms aging, intermediate syndrome, and OP-induced delayed neuropathy.

*(6 marks)*

**Question 5 is continued over the page**

- c) Describe the mechanisms of action and appropriate indications for the use of atropine, pralidoxime and diphenhydramine for the treatment of organophosphate toxicosis. (8 marks)

**Section C – Answer ALL ten (10) short answer questions (60 marks total)**

- 1, Describe the **three (3)** hypothesised mechanisms of action of intravenous lipid emulsion (IVLE) for the treatment of toxicoses AND for each give **one (1)** example a toxicosis amenable to that mechanism. (6 marks)
2. Name AND describe the anatomy of the **3 (three)** types of brain herniation that may occur with increased intracranial pressure, denoting which is the most life-threatening. (6 marks)
3. Describe the **four (4)** basic process involved in the generation of pain in response to tissue injury, and the concepts of peripheral and central sensitisation. (6 marks)
4. Explain the mechanism of venom induced consumptive coagulopathy secondary to *Notechis scutatus* and *Pseudonaja spp.* envenomation and how this syndrome aids in diagnosis of envenomation. (6 marks)
5. Explain key considerations in the decision to recommend surgical versus conservative management of traumatic pelvic fractures in a dog. (6 marks)
6. Describe the **three (3)** different types of complex corneal ulcers (excluding a ruptured ulcer) and how these can be differentiated clinically. (6 marks)
7. Explain indications for primary closure versus delayed primary closure of a wound. (6 marks)
8. Explain mechanistically how each of the following treatments may be beneficial in a patient with methemoglobinemia (oxygen, methylene blue, and transfusion), and their limitations. (6 marks)
9. In the surgical management of a 25 kg dog with gastric dilatation and volvulus (GDV) list **three (3)** different suture materials that are indicated, one each for the gastropexy, closure of the body wall, and skin. Include suture size as well as the name of the material, and justify your choices. (6 marks)

10. With reference to antimicrobial pharmacodynamics, explain the approach to optimising efficacy of ampicillin and enrofloxacin. (6 marks)

**End of paper**



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**Veterinary Emergency Medicine and  
Critical Care**

**Paper 2**

Perusal time: **Twenty (20)** minutes

Time allowed: **Four (4)** hours after perusal

Answer **ALL FIVE (5)** questions

All **FIVE (5)** questions are of equal value.

Answer **ALL FIVE (5)** questions, each worth 48 marks .....total 240 marks

1. A **seven (7)** year old, female neutered Jack Russell terrier presents for 48 hours of anorexia, lethargy, and vomiting. The dog has vomited approximately **five (5)** times, which initially included ingesta and progressed to bilious fluid. Normal diet is a commercial adult dry dog food. There is no history of recent diet change or dietary indiscretion.

Physical examination at presentation showed:

Body weight: 7.4 kg

Body condition score: 6/9

Quiet, alert, responsive mentation

Oral mucuous membranes: pink, tacky, with a 1.5 second capillary refill time

Heart rate: 140 beats per minute

Femoral pulses: normodynamic

RR: 36 breaths per minute with normal respiratory effort

Temperature: 39.2 C

Moderate cranial pain with no palpable mass or organomegaly

Brown diarrhoea on rectal examination

Peripheral lymph nodes were palpably normal

Initial diagnostics are displayed below:

**Haematology:**

<b>Parameter (units)</b>	<b>Measured value</b>	<b>Reference interval</b>
Haemoglobin (g/L)	118	120-180
Hct (L/L)	0.33	0.37-0.55
RBC ( $\times 10^{12}/L$ )	5.0	5.5-8.5
MCHC (g/L)	356	320-360
MCH (pg)	24	20-25
MCV (fL)	66	60-77
Retics (%)	.37	
Retics Abs ( $\times 10^9/L$ )	19	<95
WBC ( $\times 10^9/L$ )	10.7	6.0-17.0
Corr WBC	10.5	
Neuts ( $\times 10^9/L$ )	8.60	3.0-11.5
Bands ( $\times 10^9/L$ )	0	0-0.3
Lymphos ( $\times 10^9/L$ )	0.73	1.0-4.8
Monos ( $\times 10^9/L$ )	0.63	0.15-1.35
Eos ( $\times 10^9/L$ )	0.52	0.1-1.25
Basos ( $\times 10^9/L$ )	0	
Nuc RBC/100 WBC	2	
Platelets ( $\times 10^9/L$ )	128	200-900

**Question 1 is continued over the page**

WBC morphology: Mild to moderate neutrophil toxic changes

RBC morphology: Normal

Platelets: 1+ shift platelets; numbers appear mildly decreased on smear

Estimated manual platelet count on smear:  $180 \times 10^9/L$ .

**Biochemistry:**

Parameter (units)	Measured value	Reference interval
CK (U/L)	330	47-228
AST (U/L)	97	10-60
ALT (U/L)	146	21-142
ALP (U/L)	223	20-184
GGT (U/L)	5	1-8
Bilirubin (umol/L)	38	2-17
DGGR lipase (U/L)	145	0-90
Amylase (U/L)	1423	340-1400
Urea (mmol/L)	1.6	3.6-10.0
Chol (mmol/L)	5.1	3.3-6.9
Creat (umol/L)	64	44-132
Na (mmol/L)	152	139-154
K (mmol/L)	3.4	3.4-5.3
Cl (mmol/L)	112	99-120
Glucose (mmol/L)	5.6	3.6-6.8
Total protein (g/L)	49	56-80
Albumin (g/L)	21	24-38
Globulin (g/L)	28	28-44
CRP (mg/L)	154	<10.0
Ca (mmol/L)	2.25	2.2-2.8
Phos (mmol/L)	1.12	0.8-2.2

**Answer all sub-parts of this question**

- a) Based on the above clinical and laboratory findings, state and justify an evidence-based assessment of the likelihood that this dog has acute pancreatitis. Explain and justify if this assessment would differ if an elevated quantitative canine pancreas-specific lipase (cPLI) concentration had been reported rather than an elevated DRRG lipase activity. (6 marks)
  
- b) A full abdominal ultrasound shows diffuse enlargement and hypoechogenicity of the entire pancreas with surrounding hyperechoic mesentery and small volume peritoneal effusion. The ultrasound abnormalities are graded as severe.

**Question 1 is continued over the page**

State and justify the type of feeding tube you would place in this patient. Describe the technique for placement, including a description of risks and contraindications.

*(6 marks)*

- c) Provide and justify an enteral feeding plan for the next **three (3)** days. Include calculation of the quantity of enteral diet to administer. Justify diet selection with reference to the underlying disease process. *(6 marks)*
- d) Provide and justify an evidence-based recommendation for whether to use a proton pump inhibitor in this dog. *(6 marks)*
- e) Abdominal pain is persistent, with a pain score of 6/10 despite treatment with methadone at 0.2 mg/kg IV.

Provide and justify a multimodal analgesic plan for this dog. *(6 marks)*

- f) Abdominal pain is persistently severe despite aggressive medical management. An epidural catheter is placed to provide additional analgesia.

Describe the technique for epidural catheter placement, including a description of risks and contraindications. *(6 marks)*

- g) Additional diagnostic testing is performed:

**Question 1 is continued over the page**

**Rotational thromboelastometry:**

Parameter (units)	Measured value	Reference interval
<b>INTEM</b>		
CT (sec)	302	113-270
CFT (sec)	52	68-272
$\alpha$ (°)	82	53-76
A10 (mm)	69	29-58
A20 (mm)	75	38-64
MCF (mm)	78	42-67
ML (%)	0	0-10
<b>EXTEM</b>		
CT (sec)	88	30-94
CFT (sec)	61	69-249
$\alpha$ (°)	82	59-77
A10 (mm)	69	31-61
A20 (mm)	76	39-67
MCF (mm)	80	42-70
ML (%)	0	0-10

Interpret the additional test results. (6 marks)

State and justify an evidence-based recommendation for thromboprophylaxis in this patient, including mechanisms of action for any treatments that you would prescribe. (6 marks)

2. A **six (6)** year old, female spayed Shih Tzu presents with a 3-week history of haemorrhagic diarrhoea. Treatment at a local veterinarian has included oral amoxicillin-clavulanic acid, and metronidazole, which failed to resolve the clinical signs. Physical examination reveals the following:

**Question 2 is continued over the page**

Body weight: 8.5kg. BCS 4/9  
 Mentation: obtunded  
 Oral mucous membranes: white, tacky  
 Occasional cutaneous and gingival petechia and ecchymoses  
 Heart rate: 160 bpm  
 Cardiac auscultation: Grade II/VI left apical systolic murmur  
 Femoral pulses: hyperdynamic  
 Respiratory rate: =20 breaths per minute with mild increase in respiratory effort  
 Temperature: 38.6°C  
 Peripheral lymph nodes: palpably normal  
 No abnormalities on abdominal palpation  
 Rectal examination prompts large volume of black, tarry diarrhoea

Blood lactate = 6.5 mmol/L (0.5-2.0 mmol/L)

**Haematology:**

Parameter (units)	Measured value	Reference interval
Haemoglobin (g/L)	28	120-180
Hct (L/L)	0.10	0.37-0.55
RBC ( $\times 10^{12}/L$ )	1.1	5.5-8.5
MCHC (g/L)	280	320-360
MCH (pg)	26	20-25
MCV (fL)	92	60-77
Retics (%)	35.22	
Retics Abs ( $\times 10^9/L$ )	384	<95
WBC ( $\times 10^9/L$ )	72.9	6.0-17.0
Corr WBC	62.3	
Neuts ( $\times 10^9/L$ )	48.57	3.0-11.5
Bands ( $\times 10^9/L$ )	6.85	0-0.3
Lymphos ( $\times 10^9/L$ )	0.62	1.0-4.8
Monos ( $\times 10^9/L$ )	6.23	0.15-1.35
Eos ( $\times 10^9/L$ )	0	0.1-1.25
Basos ( $\times 10^9/L$ )	0	
Nuc RBC/100 WBC	17	
Platelets ( $\times 10^9/L$ )	10	200-900

Question 2 is continued over the page

WBC morphology: Neutrophils show mild toxic changes, few metamyelocytes, occasional reactive lymphocytes

RBC morphology: aniso 2+, poly 3+, NRBC 3+, occ rubricytes, mild hypochromasia

Platelets: numbers appear severely decreased on smear.

Estimated manual platelet count on smear:  $<10 \times 10^9/L$ .

Saline agglutination test: Negative

Coombs test: Negative

Blood type: DEA 1 positive

### Biochemistry:

Parameter (units)	Measured value	Reference interval
CK (U/L)	105	47-228
AST (U/L)	29	10-60
ALT (U/L)	26	21-142
ALP (U/L)	16	20-184
GGT (U/L)	4	1-8
Bilirubin (umol/L)	5	2-17
DGGR lipase (U/L)	126	0-90
Amylase (U/L)	766	340-1400
Urea (mmol/L)	20.0	3.6-10.0
Creat (umol/L)	56	44-132
Na (mmol/L)	146	139-154
K (mmol/L)	3.1	3.4-5.3
Cl (mmol/L)	114	99-120
Glucose (mmol/L)	9.9	3.6-6.8
Total protein (g/L)	37	56-80
Albumin (g/L)	17	24-38
Globulin (g/L)	20	28-44
CRP (mg/L)	97.9	<10.0
Ca (mmol/L)	1.76	2.2-2.8
Phos (mmol/L)	1.42	0.8-2.2

Answer all sub-parts of this question.

- a) Based on the clinical and laboratory findings, thoroughly interpret the data provided.

(6 marks)

Question 2 is continued over the page

- b) List and explain **two (2)** appropriate immunosuppressive drug choices for this case that could be commenced in-hospital and continued for chronic treatment. Include immunosuppressive mechanisms of action, and potential adverse effects of each drug. *(6 marks)*
- c) Describe the proposed mechanisms of action of intravenous immunoglobulin for the treatment of ITP, and the evidence for its use in dogs. *(6 marks)*
- d) Describe the proposed mechanisms of action of intravenous vincristine for the treatment of ITP, the evidence for its use in dogs, and potential adverse effects. *(6 marks)*
- e) Justify the administration of a 200 mL packed red blood cell transfusion in this case. *(6 marks)*
- f) Explain the process of leukoreduction and justify the use of leukoreduced or non-leukoreduced packed red blood cells in this case. *(6 marks)*
- g) Explain the processing and storage of fresh platelets from whole blood for transfusion and justify the use of a platelet transfusion in this case. *(6 marks)*
- h) After **five (5)** days of immunosuppression, marked thrombocytopenia and persistent haemorrhage continues, necessitating ongoing blood products transfusion.

Explain in detail the technique for providing therapeutic plasma exchange for this case. *(6 marks)*

3. A **six (6)** year old female neutered Rottweiler (body weight 47kg) is referred for evaluation of an abdominal mass and abdominal fluid wave. Her owners noted an acute onset of abdominal distention, and abdominal radiographs prior to referral identified a large abdominal mass. No drugs or treatments were administered prior to referral.

As she was brought back to the treatment room she lost consciousness, lost pulses, and had agonal breaths.

**Question 3 is continued over the page**

**Answer all sub-parts of this question.**

- a) Describe the recommended approach to basic life support (BLS) as it applies to this dog. *(9 marks)*
- b) Describe the recommended approach to monitoring and advanced life support (ALS) as it applies to this dog. Do not include fluid therapy in your answer. *(9 marks)*
- c) Describe, with reference to pathophysiology, the recommended approach to fluid resuscitation during cardiopulmonary resuscitation, as it applies to this dog. *(6 marks)*
- d) Cardiopulmonary resuscitation is performed as recommended, and return of spontaneous circulation is achieved after **3 (three)** minutes. Shortly thereafter, while still intubated, blood is collected from the jugular vein and a venous blood gas performed. Results are displayed:

Parameter (units)	Measured value	Reference interval
Na (mmol/L)	150	140-150
K (mmol/L)	5.3	3.9-4.9
Cl (mmol/L)	117	109-120
iCa (mmol/L)	1.49	1.25-1.5
Gluc (mmol/L)	18.6	3.6-6.2
Lact (mmol/L)	24	<2
pH	6.695	7.34-7.38
PvCO <sub>2</sub> (mmHg)	91.7	40-46
HCO <sub>3</sub> (mmol/L)	10.3	22-24
SBE (mmol/L)	-22.7	-2 – 0
AG (mmol/L)	28	8-21
Hgb (g/dL)	10.5	12.3-18.3

Interpret the blood gas. *(6 marks)*

- e) A large, ruptured splenic mass is diagnosed on abdominal computed tomography and the owner elects to have splenectomy performed.

Describe the technique for splenectomy via the hilar ligation technique. *(6 marks)*

- f) Systematically describe in detail the recommended approach to post-arrest care outlined in the RECOVER guidelines (not specific to this case). *(12 marks)*

4. An **eight (8)** year old, male neutered Cavalier King Charles Spaniel presents for respiratory distress. The dog was playing at the river **one (1)** hour prior and was witnessed to be submerged underwater. He collapsed after returning to shore and has had progressively worsening respiratory effort since. He had no prior relevant medical history.

Initial examination shows a respiratory rate of 80 breaths per minute, with severe inspiratory effort and bilateral inspiratory crackles. Thoracic focussed assessment with sonography for trauma/triage (TFAST) shows diffuse bilateral B lines with areas of shred sign. An arterial blood gas is obtained on room air, prior to initiating oxygen therapy.

Parameter (units)	Measured value	Reference interval
pH	7.184	7.34-7.38
PaO <sub>2</sub> (mmHg)	43	80-100
PaCO <sub>2</sub> (mmHg)	54	36-44
HCO <sub>3</sub> (mmol/L)	20.5	22-24
SBE (mmol/L)	-4.2	-2 – 0
SaO <sub>2</sub> (%)	83	98-100

- a) Interpret the blood gas data and assess the degree of venous admixture, including any relevant calculations. (6 marks)
- b) Describe the criteria for the diagnosis of acute respiratory distress syndrome (ARDS) using the *veterinary* definition. Does this dog meet these criteria for ARDS? (6 marks)
- c) The dog continues to have marked respiratory effort despite oxygen therapy, so is anaesthetised for mechanical ventilation.

State and justify your anaesthetic plan for this patient, including drug names and dose ranges. (6 marks)

- d) Describe and justify your initial ventilator strategy and settings for *pressure-controlled* ventilation in this patient. (6 marks)
- e) The following arterial blood gas is obtained 30 minutes after instituting mechanical ventilation. The F<sub>i</sub>O<sub>2</sub> is 0.7 at this time

**Question 4 is continued over the page**

Parameter (units)	Measured value	Reference interval
pH	7.123	7.34-7.38
PaO <sub>2</sub> (mmHg)	62	80-100
PaCO <sub>2</sub> (mmHg)	57	36-44
HCO <sub>3</sub> (mmol/L)	22	22-24
SBE (mmol/L)	-2.8	-2 – 0
SaO <sub>2</sub> (%)	90	98-100

Describe the criteria for the diagnosis of acute respiratory distress syndrome (ARDS) using the *Berlin* definition. Does this dog meet these criteria for ARDS? (6 marks)

- f) Despite an adequate plane of anaesthesia, the dog continues to trigger frequent spontaneous breaths, at a rate of 60 per minute. Dynamic compliance is 0.4 mL/kg/cmH<sub>2</sub>O.

State an appropriate neuromuscular blocker to use in this patient and explain the potential benefits and disadvantages of neuromuscular blockade. (6 marks)

- g) 24 hours after the institution of mechanical ventilation the following arterial blood gas and electrolyte panel is obtained. The dog is assessed to be euvolaemic and normally hydrated at the time. The F<sub>i</sub>O<sub>2</sub> is 1 at this time

Parameter (units)	Measured value	Reference interval
Na (mmol/L)	132	140-150
K (mmol/L)	3.2	3.9-4.9
Cl (mmol/L)	107	109-120
iCa (mmol/L)	1.11	1.25-1.5
pH	7.122	7.34-7.38
PaO <sub>2</sub> (mmHg)	49	80-100
PaCO <sub>2</sub> (mmHg)	58	36-44
HCO <sub>3</sub> (mmol/L)	19.2	22-24
SBE (mmol/L)	-5.1	-2 – 0
SaO <sub>2</sub> (%)	85	98-100

Explain the most likely mechanism of hyponatraemia in this patient, justifying why it is more likely than other differential diagnoses. (6 marks)

- h) Explain airway pressure release ventilation (APRV), stating the potential benefits and risks for APRV in this patient. (6 marks)

5. A **6 (six)** year old female neutered Jack Russel Terrier, weighing 6.5 kg, presents with a 5-day history of lethargy, anorexia, vomiting and intermittent diarrhoea. Physical findings are as follows:

Mentation: obtunded  
 Heart rate: 60-90bpm  
 Doppler blood pressure: 90-128 mmHg  
 Femoral pulses: fair  
 Oral mucous membranes pink, dry, capillary refill time 2 seconds  
 Skin: Mildly delayed skin tent  
 Respiratory rate: 34 breaths per minute. Normal respiratory effort. Lungs clear  
 Temperature: 34.5°C  
 Comfortable abdomen; no palpable abnormalities.

### Laboratory results

#### Haematology:

Parameter (units)	Measured value	Reference interval
Haemoglobin (g/L)	194	120-180
Hct (L/L)	0.53	0.37-0.55
RBC ( $\times 10^{12}/L$ )	18.1	5.5-8.5
MCHC (g/L)	366	320-360
MCH (pg)	24	20-25
MCV (fL)	64	60-77
Retics (%)	0.93	
Retics Abs ( $\times 10^9/L$ )	75	<95
WBC ( $\times 10^9/L$ )	34.6	6.0-17.0
Corr WBC	33.9	
Neuts ( $\times 10^9/L$ )	25.10	3.0-11.5
Bands ( $\times 10^9/L$ )	0	0-0.3
Lymphos ( $\times 10^9/L$ )	3.05	1.0-4.8
Monos ( $\times 10^9/L$ )	5.77	0.15-1.35
Eos ( $\times 10^9/L$ )	0	0.1-1.25
Basos ( $\times 10^9/L$ )	0	
Nuc RBC/100 WBC	2	
Platelets ( $\times 10^9/L$ )	503	200-900

WBC morphology: Normal

RBC morphology: Occ poly

Platelets: Adequate

**Question 5 is continued over the page**

**Biochemistry:**

Parameter (units)	Measured value	Reference interval
CK (U/L)	261	47-228
AST (U/L)	28	10-60
ALT (U/L)	38	21-142
ALP (U/L)	143	20-184
GGT (U/L)	6	1-8
Bilirubin (umol/L)	5	2-17
DGGR lipase (U/L)	27	0-90
Amylase (U/L)	336	340-1400
Urea (mmol/L)	113	3.6-10.0
Creat (umol/L)	709	44-132
Na (mmol/L)	125	139-154
K (mmol/L)	7.1	3.4-5.3
Cl (mmol/L)	78	99-120
Glucose (mmol/L)	7.3	3.6-6.8
Total protein (g/L)	78	56-80
Albumin (g/L)	39	24-38
Globulin (g/L)	39	28-44
CRP (mg/L)	40	<10.0
Ca (mmol/L)	2.05	2.2-2.8
Phos (mmol/L)	9.29	0.8-2.2

## USG 1.008

- Based on the clinical and laboratory information provided, thoroughly interpret the data provided. (6 marks)
- Describe an appropriate treatment approach to hyperkalemia in this dog, including mechanisms of action and dosing of specific drugs. (6 marks)
- List and briefly justify appropriate differential diagnoses for the acute kidney injury identified in this patient. (6 marks)
- Describe **three (3)** methods by which a definitive diagnosis of Leptospirosis can be made. (6 marks)

**Question 5 is continued over the page**

- e) Over the first 12 hours of hospitalisation the dog is treated with intravenous fluid therapy, using lactated Ringer's solution as follows. Firstly a 10 mL/kg bolus, followed by 67mL/hr for correction of dehydration and provision of maintenance. Repeated physical examination reveals a body weight of 7.1 kg, chemosis OU, bilateral serous nasal discharge, intermandibular oedema, and gelatinous skin turgor.

Explain the effects of positive fluid balance in acute kidney injury. *(6 marks)*

- f) Describe a thorough plan to correct the dog's fluid balance including the role of at least **one (1)** extracorporeal therapy. *(12 marks)*

- g) Explain the role of antimicrobial treatment in this dog. *(6 marks)*

**End of paper**