


MEMBERSHIP CAI EXAMINATION CHANGES DUE TO COVID-19

College of Anaesthesiologists



MCAI

To commence from September 2020

COLLEGE OF ANAESTHESIOLOGISTS OF IRELAND Examinations department

Monitor Data:

Parameter	Value
SpO2	97
SpO2	83
PCCI	9.00
PCCI	1200
PCCI	10
SpO2	106
SpO2	15
SpO2	21
SpO2	106
SpO2	15
SpO2	21

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College of Anaesthesiologists of Ireland

CAI
SALUS DUM VIGILAMUS



1 Introduction

The COVID-19 pandemic has presented **significant challenges** for Medical Schools and Postgraduate Medical Colleges. The requirements for social distancing, restricted travelling and avoidance of large gatherings have made running face-to-face examinations highly undesirable.

The College of Anaesthesiologists of Ireland (CAI) endorses patient care, patient safety and maintaining a healthy workforce as our fundamental priorities at this time. Trainee and examiner **wellbeing** is also paramount. Given the uncertainty over future restrictions, the CAI formed an **examination working group** to review our examinations, and make appropriate changes that will still allow the correct assessment domain to be tested, but utilising a different format and construct to comply with the COVID-19 restrictions and regulations.

We have made **numerous adjustments** to our examinations to ensure the validity and reliability of such high-stakes assessments, whilst protecting the safety of all candidates, minimising risk and maintaining defensibility to key stakeholders.

The **purpose** of this document is to describe and explain the evidence-based changes which have been made to the membership of the College of Anaesthesiologists examinations to facilitate their conduct on a digital platform. These changes have been reviewed and approved by the Irish Medical Council.

The College of Anaesthesiologists totally appreciates the anxiety that examinations can place on doctors, especially given the number of changes outlined below. Let us reassure you that these changes will make the new examination as safe, fair and consistent as prior to COVID-19.

The major changes to the Membership (MCAI) Examination include:

- Candidates will sit **all components** of the MCAI examinations online at a place of their choosing, such as their home or workplace, using their own hardware.
- The CAI will use online remote invigilation which essentially recreates the examination hall experience online.
- The **multiple-choice questions** (multiple true/false (MTF) and single best answer (SBA) questions) will continue to be used in their current format. However, the number of MTF questions will be reduced and the number of SBAs will increase.
- The **structured oral examinations** (SOEs) will be replaced by constructed response questions (CRQs)

- The **objectively structured clinical examination** (OSCE) will be replaced by constructed response questions (CRQs) and very short answer questions (VSAQs).

Changes to each examination component due to COVID-19

Membership Examination components:

2.1 MCAI Multiple/true false (MTF) examination

- The number of MTF questions will be **reduced** from 90 to 60.
- Therefore, the total number of marks will reduce from 450 to 300.
- The time will also reduce from 180 to 120 minutes.
- The split of basic sciences which underpin anaesthesiology will be as follows:

Pharmacology	Physiology and biochemistry	Physics, clinical measurement and equipment
20 questions	20 questions	20 questions

Example MCAI MTF

The effects of pregnancy include:

- A. Respiratory alkalosis during second trimester
- B. Increased red cell mass
- C. Increased functional residual capacity
- D. Increased insulin requirements
- E. Increased glomerular filtration rate

Answers: A. True, B. True, C. False, D. True, E. True

2.2 MCAI Single Best Answer (SBA) examination

- The number of SBA questions will **increase** from 50 to 60.
- The time allowed will be 120 minutes.
- The split of basic sciences which underpin anaesthesiology will be as shown:

Anatomy	Pharmacology	Physiology and biochemistry	Physics, clinical measurement and equipment	Statistics
3 questions	18 questions	18 questions	18 questions	3 questions

Example MCAI SBA

A 45-year-old woman presents for an open reduction and internal fixation of a fractured humerus. You perform an interscalene nerve block under ultrasound guidance with levobupivacaine local anaesthesia.

What is the order of nerve blockade of the different types of nerve fibres?

- A. $A_\gamma > A_\delta > A_\beta = B > A_\alpha > C$
- B. $B > A_\delta = C > A_\gamma > A_\beta > A_\alpha$
- C. $B > A_\delta > A_\gamma > A_\beta > A_\alpha > C$
- D. $C > B > A_\delta > A_\gamma > A_\beta > A_\alpha$
- E. $C = A_\delta > B > A_\gamma > A_\beta > A_\alpha$

Answer: B. $B > A_\delta = C > A_\gamma > A_\beta > A_\alpha$

2.3 Standard setting

For both examinations, the cut score (pass mark) will be determined using **Angoff referencing**. This is an internationally recognised method for setting stakes exam pass marks.

2.4 MCAI MTF and SBA format

Both these examinations will be completed **online** using **remote proctoring** on the same day.



Proctoring or a **Proctored examination** is defined as a mechanism to ensure the authenticity of the assessment taker and prevent them from cheating as a proctor is present during the duration of the exam. A proctor is a person who is trained and qualified to undertake candidate authentication and prevent them from doing any form of cheating.

Remote proctoring enables candidates to complete an examination online in a remote location, while maintaining the **integrity of the assessment**. Candidates must confirm their identity and they will be monitored through video. This video is then used to flag any irregular candidate behaviour.

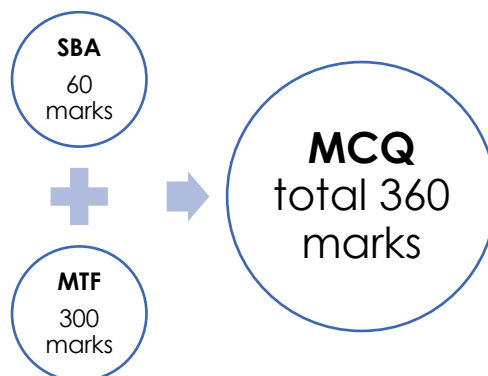
This avoids the need for a cohort of candidates to come together in an examination hall, as the examination can be taken at home, in the workplace etc.

Since some candidates may find the idea of being watched by a proctor off putting, the **proctor is not visible to candidates**.

2.5 Outcome

Candidates will not find out their result on the same day following completion of the online examination. A rigorous quality assurance process will take place prior to the issue of results.

The **MTF** and **SBA** are **added together** giving a total score out of 360 marks. This allows for a degree of compensation – a poor performance in one paper, may be negated by a better performance in the other paper.



You will be notified by the CAI examinations department of the issue of results date, which will be available on the CAI website → Examinations → Recent results.

If you are successful, you will be eligible to apply for MCAI written components which are replacing the SOE and OSCE components.

3. MCAI Written Paper (Replacing the Structured Oral Examination)

The SOEs will change to an **online proctored written examination**.

- This will be composed predominantly of constructed response questions (CRQs) and some very short answer questions (VSAQs).
- Data, diagrams etc. will be included.
- There will be a focus on **candidates being able to apply knowledge and understanding** of the **basic sciences** which underpin the practice of anaesthesiology.
- The content split will be equal between pharmacology, physiology, and physics, clinical measurement and equipment.
- This will mirror the current MCAI SOE, but the questions will be in a written format.
- With such a structured and precise mark scheme, the objectivity of this examination will be increased.

Pharmacology	Physiology and biochemistry	Physics, clinical measurement and equipment
4 questions	4 questions	4 questions

Each question will be marked out of **20**, and the total length of the examination will be 180 minutes (three hours) = (15 minutes per question). Therefore, the paper will attract **240** marks.

3.1 What if I am slow at typing?

The **Membership CRQ** examination only **requires short answers** therefore candidates should not anticipate an issue with timing. Typing will also remove the legibility issues associated with handwriting. You will not be penalised for poor spelling but should ensure that the answer you wish to put is recognisable. If you require adjustments for a computer-based exam such as additional time, you will need an educational psychologist assessment with recommendations for adjustments to support your request. This should be submitted to the College on application.

3.2 What are Constructed Response Questions (CRQs) / Very Short Answer Questions (VSAQs)?

CRQs are open-ended short answer questions with precise answer templates which are most commonly used to measure **knowledge, reasoning** and **application-level** cognitive skills. We will be able to include “real world” artefacts (graphs, images, scenarios, cases) in them. They typically consist of 5+ sub-sections often including a clinical scenario. The Sub-sections increase in complexity and difficulty as the question progresses. They will be graded

against a mark scheme with guidance as to specifically how marks are gained or lost.

Examiners will receive **detailed guidance** on the construction of these questions, and all will be reviewed by the Lead examiner and a medical educationalist.

VSAQs consist of a **clinical vignette** followed by a question (usually about diagnosis or management), which requires candidates to generate a short response, typically one to four words long. The advantage of this is that candidates must demonstrate their knowledge, which is more representative of **real-life scenarios**. VSAs are not subject to cueing or guessing in the same way that SBAs and true/false MCQs are.

3.3 Sample MCAI CRQs / VSAQs

Please see the appendix for sample questions.

3.3 MCAI Written Paper pass mark determination

The cut score (pass mark) will be determined using **Angoff referencing**, which is an internationally recognised method for setting the pass mark for high-stakes examinations.

4. MCAI Objectively Structured Clinical Examination (OSCE)

As this component assesses how a candidate '**shows how**' they do something, it is difficult to develop an examination which will allow candidates to demonstrate this skill using other assessment tools.

The CAI have decided to use an examination composed of **written components**. Again, **CRQs** and **VSAQs** will be the main question types. These questions will also include video and audio media. The focus will be on testing candidates using a what/when/how approach.

This will be **completed online** using **remote proctoring** on the same day.

Below illustrates the **content structure** and **blueprint** of the MCAI OSCE.

Station	Skill(s) being tested
Resuscitation	Tests knowledge and skills in dealing with peri-arrest or arrest scenarios
ECG	ECG interpretation, risk assessment, ability to calibrate
Physical signs	Ability to undertake a detailed examination of major body systems
Critical incident	Management of common critical incidents
Simulation	Ability to interpret clinical monitoring and relate to clinical context
Communication	Ability to listen to, understand and explain (2 questions)
Technical skills	Practical anaesthesia skills (2 questions)
Equipment	Identify, describe and/or perform a basic safety check of the equipment used in routine anaesthetic practice
Anatomy	Knowledge of anatomy relevant to anaesthesiology / ICM
Airway	Airway management including equipment
Radiology	Ability to interpret common radiological investigations
Data	Ability to interpret test results, and how the results may impact on anaesthesiology care
Clinical	Apply clinical knowledge to perioperative care of a patient. Strong focus on perioperative medicine.

Please note, certain skills will not be possible to test with this method such as oral communication skills, ability to perform chest compressions and so on.

The **communication skills** questions in the new written format will focus on:

- What information would you provide the patient/relative such as risks associated with a procedure.
- How would you break bad news?
- What questions would you ask during a preoperative assessment?
- Explaining procedures.

4.1 Examination format

The examination will consist of 15 questions, each composed of at least 5 sub parts. Each question will be marked out of 20.

Time: 180 minutes

4.2 Example questions

See appendix 1.

4.3 Standard setting

The cut score (pass mark) will be determined using **Angoff referencing**. This is an internationally recognised method for setting stakes examination pass marks.

4.4 Outcome

Candidates will not find out their result on the same day following completion of the online examination. The questions have to be marked and a rigorous quality assurance process will take place prior to the issue of results.

You will be notified by the CAI examinations department of the issue of results date, which will be available on the CAI website → Examinations → Recent results.

If you are successful, you will be admitted a Member of The College of Anaesthesiologists of Ireland.

Membership by Examination

Candidates who are successful in the written components (replacing the SOE and OSCE), and who has complied with such provisions as determined by the Council shall be entitled to be **admitted a Member of The College of Anaesthesiologists of Ireland**. On conferring the Member shall be entitled to use the post-nominal letters **MCAI**.

5 Summary of the new MCAI Examination

	MTF	SBA	MCAI Written examination	OSCE
Number of questions	60 questions (300 in total individual MTFs)	75 questions	12 questions (each with 5 - 8 subparts)	15
Timing (minutes)	120	120	180	180
Number of marks	300	60	240	300
Format	Written	Written	Written	Written
Test administration	Online	Online	Online	Online
Standard setting method	Angoff method	Angoff method	Angoff method	Angoff method

6 Psychometric and Quality Assurance Issues

The College of Anaesthesiologists are fully aware of the anxiety that this new examination process might create for candidates. Let us reassure you that no one will be disadvantaged by these changes.

A detailed **psychometric analysis** will take place after each examination and the quality of questions reviewed in detail.

As there are many changes to our examinations, the CAI will carry out a **sense check** on the outcomes. A sense check is necessary to ensure that the standard was set appropriately.

This will be done by:

- Triangulating the pass rate and pass marks to previous diets
- How do the pass/fail decisions compare to other information available about the candidate?

The ultimate responsibility for setting the pass mark will reside with the Chairman of the Examinations Committee and Lead Examiners of membership and fellowship. In all cases it will be essential that the process is transparent and clearly recorded.

7 Disability

All requests from candidates with a disability must include a written statement of support from the employer's Occupational Health Department (OHD) and/or College Tutor confirming that the candidate's difficulties warrant special examination arrangements. Each request will be considered individually.

7.1 Dyslexia

The following provisions will normally be made:

MTF Paper: Additional time 15 minutes per hour.

SBA Paper: Additional time 15 minutes per hour.

CRQ/VSAQ Papers replacing SOEs and OSCE: an additional 15 minutes per hour

Candidates must supply:

A written assessment within the last 12 months from an educational psychologist which includes a statement confirming that the candidate's difficulties warrant special examination arrangements.

Such an application will be considered by the Chairman of the relevant examination. If a candidate is not able to supply the above documents before the commencement of the examination, the candidate may choose to: (a) withdraw without penalty as per the standard procedure, or (b) proceed without special arrangements.

Guidance from Examiners on how to answer written questions

The constructed response and very short answer questions will be new to many of you. We are aware that typing your answer rather than writing them may be daunting for those who type perhaps more slowly. The questions have been designed not to require extensive essay type answers.

Please take note of the following guidance:

A. Mark allocation of questions

Where examiners have indicated the way marks are allocated in brackets [marks], candidates are advised to spend their time accordingly.

For example, all CRQ/VSAQ questions carry equal marks [20 marks], and these will be distributed amongst the subparts. So, in total, the MCAI written paper replacing the SOE will attract 240 marks. The written examination replacing the OSCE will total 300 marks.

The pass mark for each question will vary and takes into account the level of difficulty.

B. How to answer the questions

Type your answers in the space provided.

Read the question carefully, it is useful to identify key words in the question. The examiners may have underlined key words in the question.

Take note of the proportion of marks allocated to each section of a question – this indicates how much time should be spent on each section. For example, a question worth [5 marks] should be answered in approximately 3.7 minutes for the MCAI written component and 3 minutes for the written OSCE.

Pay attention to the **verbs** in the question e.g. name, state, explain, outline, describe, list. Decide what exactly you are being asked to do to answer this question.

Below is a **glossary** of some commonly used verbs in the MCAI CRQ/VSAQ papers:

Critically evaluate: Evaluate the evidence available to support the hypothesis

Outline: Provide a summary of the important points

List: Provide a list

Compare and contrast: Provide a description of similarities and differences (e.g. in table format). This type of question will likely have a table for you to complete.

Management: Generic term that implies overall plan. Where appropriate, may include diagnosis as well as treatment

Discuss: Explain the underlying key principles. Where appropriate, this may include controversies and/or pros and cons.

Be concise – essays are not required for each answer; use single words or short phrases in response to 'state, name or list' questions and a short paragraph (several sentences) for 'briefly describe, explain or outline' questions.

Bullet points are acceptable and encouraged as long as sufficient information is provided and that you demonstrate an understanding of the topic.

Resist the temptation to elaborate if it's not relevant to the question – in doing this, candidates often demonstrate a lack of understanding and lose marks.

When asked to list for example investigations of anaemia, look at the marks awarded. If there are [3 marks], the examiner will expect you to list three investigations.

For example:

With respect to nociceptive pathways:

a) Name the TWO types of nerve fibres that transduce noxious stimuli in action potentials? [2 marks]

Answer:

- A δ fibre
- C fibre

b) Name THREE types of stimuli that activate primary afferent neurons? [3 marks]

Answer:

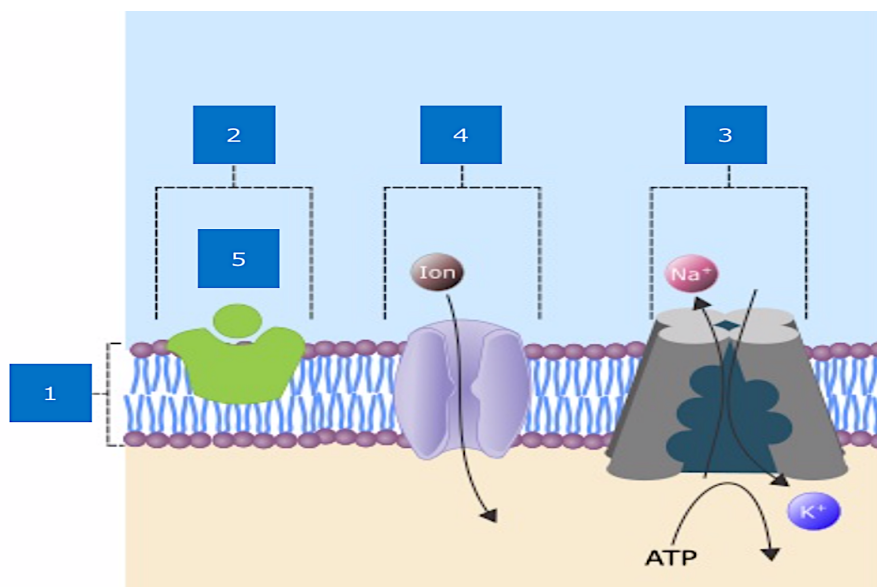
- Thermal
- Mechanical
- Chemical

Appendix 1: Sample MCAI Written Question

Pharmacology CRQ: Local anaesthetic pharmacology

A 76-year-old man presents for a hemiarthroplasty of his femur due a fracture. You decide to perform a femoral nerve block for post-operative analgesia.

A. What do the labels 1 – 5 represent in the diagram below of a neuronal axon? [5 marks]



- | | |
|-------------------------|----------|
| 1. Phospholipid bilayer | (1 mark) |
| 2. Receptor protein | (1 mark) |
| 3. Na-K pump protein | (1 mark) |
| 4. Channel protein | (1 mark) |
| 5. Neurotransmitter | (1 mark) |

B. Using the diagram above, briefly outline the mechanism of action of local anaesthetics? [7 marks]

- Local anaesthetic agents block the sodium channels of the phospholipid membrane in order to stop propagation of the action potential. (1 mark)
- The local anaesthetic agent must cross intracellularly in order to exert its effect hence the uncharged proportion enters the cell. (1 mark)
- Once intracellular, the local anaesthetic becomes ionized in order to bind to specific proteins within the sodium channel, rendering them in their inactive state and preventing further depolarization. (1 mark)

- The degree of action is thought to be due to the number of 'open' sodium channels to which the anaesthetic is able to bind, and thereby bring about a conformational change. (1 mark)

As the local anaesthetics bind, there is a failure to generate an action potential through:

- Increases in the threshold for excitation (1 mark)
- A slowing of impulse conduction (1 mark)
- Decreases in the rate of rise and amplitude of the action potential (1 mark)

C. How might the physical properties of the nerve affect speed of local anaesthetic blockade onset? [2 marks]

- Smaller-diameter neurones are affected prior to larger-diameter neurones (1 mark)
- Myelinated fibres are blocked before unmyelinated fibres of the same diameter (1 mark)

D. What is levobupivacaine? [2 marks]

- Amide LA
- S-enantiomer of bupivacaine

E. What would be the maximum volume of levobupivacaine 0.25% that you could use to perform the femoral nerve block on this patient, assuming he weighs 70kg? Show your calculations. [3 marks]

Levobupivacaine 0.25% = 2.5mg/ml (1 mark)

Maximum safe dose = 2mg/kg = 2 × 70 = 140mg (1 mark)

Volume = 140mg ÷ 2.5 = 56 ml levobupivacaine 0.25% (1 mark)

F. State what influence the following additives have on the effect of local anaesthetics and describe the mechanism of the effect for each additive. [6 marks]

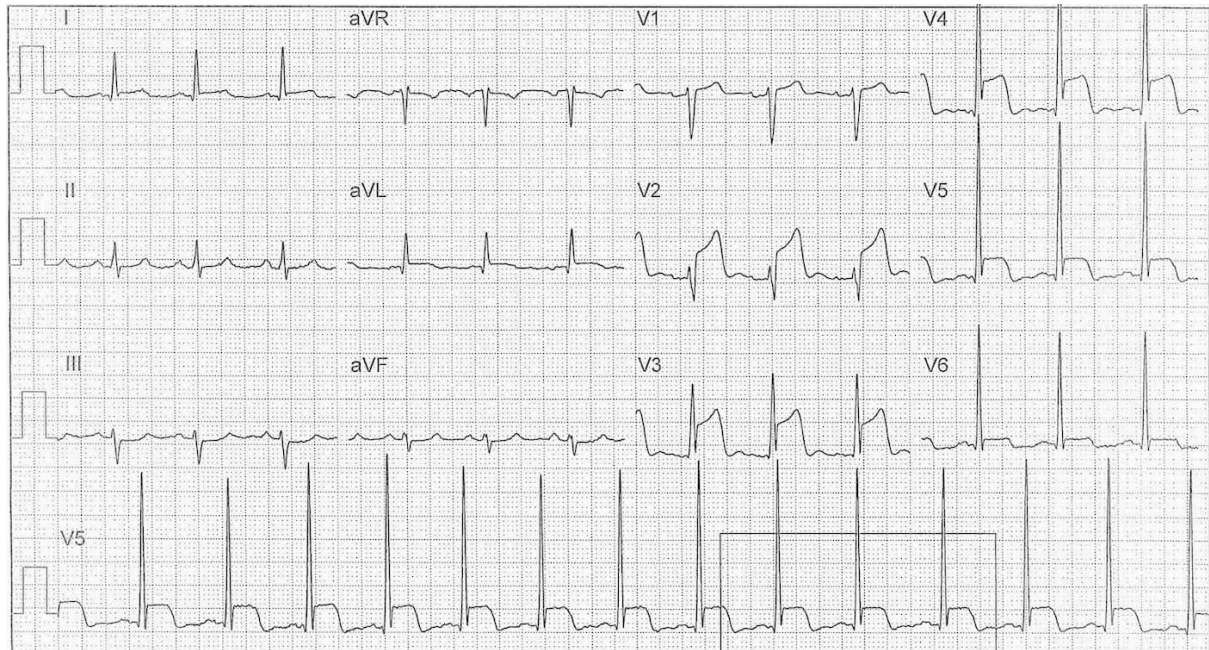
	Effect on local anaesthetic	Mechanism of effect
Adrenaline	Vasoconstrictors increase the duration and intensity of the block (1 mark)	Decreases in blood flow and the increased duration of analgesia (1 mark) are due to the α_1 -adrenoceptor agonist effect of epinephrine (1 mark)

Sodium bicarbonate	Onset of LA block faster (1 mark)	Local anaesthetic solutions are weak bases in an acidic solution. (1 mark) Alkalinization of local anaesthetics increases the non-ionized component and allows faster penetration of nerves. (1 mark)
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Appendix 2: MCAI OSCE Station (Electrocardiogram interpretation)

A 65-year-old woman complains of central crushing chest pain in the post anaesthesia care unit following a total abdominal hysterectomy.

A 12-lead electrocardiogram (ECG) is shown below.



Q	Question and answer	Max score	Marks awarded
1	Calculate her ventricular rate from this ECG?		
		2	
2	Comment on the rhythm?		
		2	
3	Comment on the axis?		
		1	
4	Describe the key abnormalities shown in this ECG		
		4	
5	What is the diagnosis, and what is the most likely underlying cause?		

		3	
6	What is the normal range for?		
	PR interval QRS interval QT interval	3	
7	Describe the components of the ECG electrode?		
		5	

ANSWERS

Q	Question and answer	Max score	Marks Awarded
1	Calculate her ventricular rate from this ECG?		
	Rate = $300/n = 300/4 = 75$ bpm	2	
2	Comment on the rhythm?		
	<ul style="list-style-type: none"> Regular (1 mark) Sinus rhythm (1 mark) 	2	
3	Comment on the axis?		
	Normal axis	1	
4	Describe the key abnormalities shown in this ECG		
	<ul style="list-style-type: none"> ST Elevation (1 mark) leads I (<1mm); aVL (1 mm); V1 (1mm); V2 (6mm); V3 (7mm); V4 (7mm); V5 (4mm); V6 (1-2mm) (1 mark) ST Depression (1 mark) leads III, aVF (1 mark) 	4	
5	What is the diagnosis, and what is the most likely underlying cause?		
	<ul style="list-style-type: none"> Antero-lateral (1 mark) STEMI (1 mark) 	3	

	<ul style="list-style-type: none"> ○ Occlusion of left anterior descending coronary artery (1 mark) 		
6	What is the normal range for?		
	<p>PR interval: 120 – 200 ms (1 mark)</p> <p>QRS interval: 80 – 100 ms (1 mark)</p> <p>QT interval: 400 – 440 ms (QTc Bazett 430 ms) (1 mark)</p>	3	
7	Describe the components of the ECG electrode?		
	<ul style="list-style-type: none"> • An electrode is a solid electrical conductor through which an electrical current can enter or leave a medium, for example the human body (1 mark) • They are usually in direct contact with a tissue. (1 mark) • Skin electrodes are usually silver metal (1 mark) • Coated in a thin layer of silver chloride (1 mark) • In contact with chloride gel on a spongy pad, which then comes into contact with skin. (1 mark) 	5	