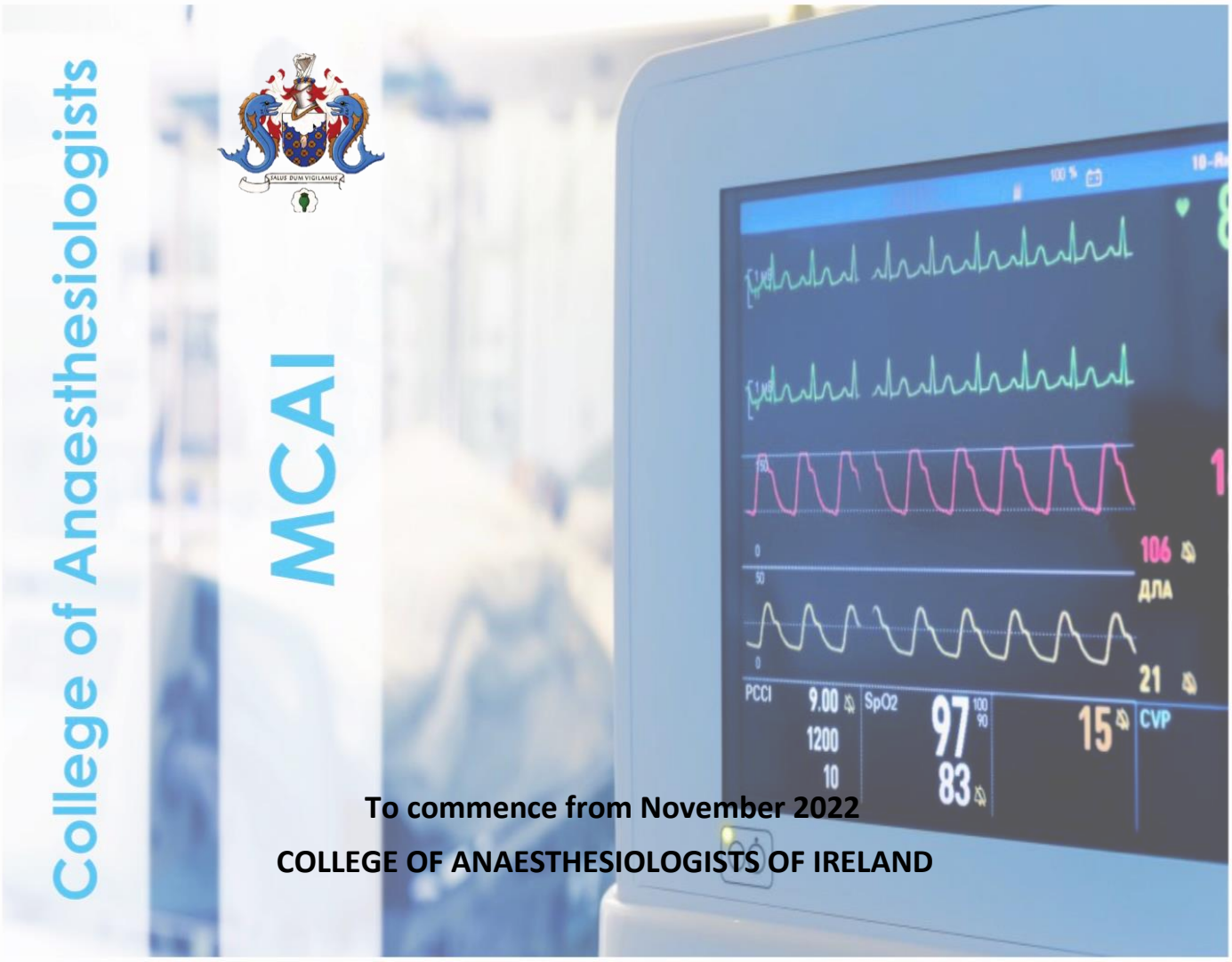
CAI
SALUS DUM VIGILAMUS
College of Anaesthesiologists of Ireland

MEMBERSHIP (MCAI) EXAMINATION

From November 2022



To commence from November 2022

COLLEGE OF ANAESTHESIOLOGISTS OF IRELAND

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College of Anaesthesiologists of Ireland

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1.0 Introduction

To become a **Member** (MCAI) or **Fellow** (FCAI) of the College of Anaesthesiologists of Ireland by examination, candidates must pass the Membership and the Fellowship Examinations respectively.

The Examinations are set and supervised by the CAI through a specialist group of Examiners who are Consultant Anaesthesiologists and experts in their fields. The College is committed to maintaining the **highest possible standards** for its Examinations. In order to maintain this position, the MCAI / FCAI examiners and the Examinations Department **rigorously quality assures all its processes** and actively follows best medical education practice to ensure the pre-eminence of the Membership and Fellowship Examinations.

The CAI overriding concern is to ensure our **assessments endorse**:

College of Anaesthesiologists of Ireland Examination Department Mission Statement

"The choice of assessment method(s) is appropriate to the content and purpose of that element of the curriculum"

Methods are **chosen** based on validity, reliability, feasibility, cost effectiveness, opportunities for feedback, and impact on learning.

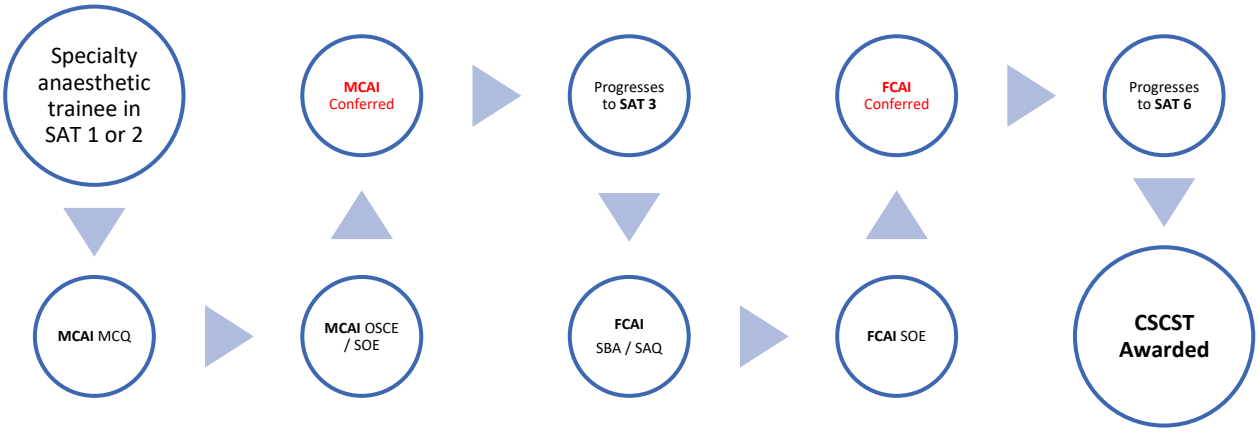
The rationale for the choice of each assessment method is documented and evidence based.

*Over the past four years, the CAI has made **significant changes** to all elements of their examinations, from examiner training, question drafting and review, standard setting, examiner and examinee feedback and quality assurance. These changes have been fully supported by best medical education and assessment practice.*

The Examination Committee feels confident that our **programme of assessment** is valid, fair, acceptable, feasible and effective. It supports examiners to make reliable judgements and is blueprinted to the curriculum, including the generic, shared, and specific learning outcomes.

The CAI **assessment processes** are **fully aligned** to the **stated learning outcomes** in the Membership curriculum (Edition 3, 2020): https://www.anaesthesia.ie/wp-content/uploads/2020/07/MCAI-Syllabus-2020.pdf

We have **defined levels of performance** at **critical progression points** in our training and assessment programme.



2.0 The Membership of the College of Anaesthesiologists of Ireland (MCAI) Multiple Choice Question (MCQ) Examination

2.1 MCAI Multiple/true false (MTF) examination

- The number of MTF questions is 60.
- The total number of marks available for this component is 300.
- Time: 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 is 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. Aγ > Aδ > Aβ = B > Aα > C
B. B > Aδ = C > Aγ > Aβ > Aα
C. B > Aδ > Aγ > Aβ > Aα > C
D. C > B > Aδ > Aγ > Aβ > Aα
E. C = Aδ > B > Aγ > Aβ > Aα

Answer: B. B > Aδ = C > Aγ > Aβ > Aα

2.3 Standard setting

For both examinations, the cut score (pass mark) will be determined using **Modified Angoff referencing.** A group of subject-matter experts judge how difficult each item is in an exam. This produces a defined absolute 'pass mark' standard, based on the questions. The Modified Angoff method is widely used in high-stakes exams such as MCQs.

The experts consider each item and how likely a borderline (or minimally competent) candidate is to answer each item correctly, and then allocate a probability of this borderline candidate answering correctly.

A **'borderline' candidate** is one who has completed the required training, has an average amount of knowledge and has done a reasonable amount of exam preparation, and who has a 50% chance of passing the exam (and 50% chance of failing).

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.

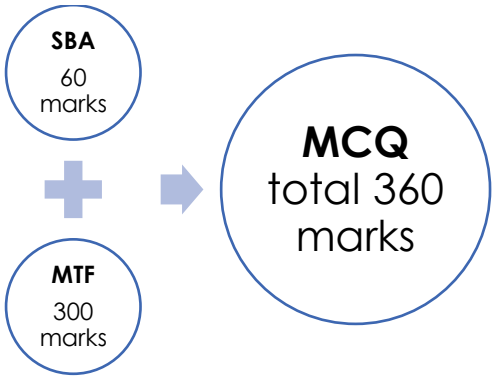
This avoids the need for a cohort of candidates to come together in an examination hall, as the examination can be taken at home, in the workplace etc.

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.



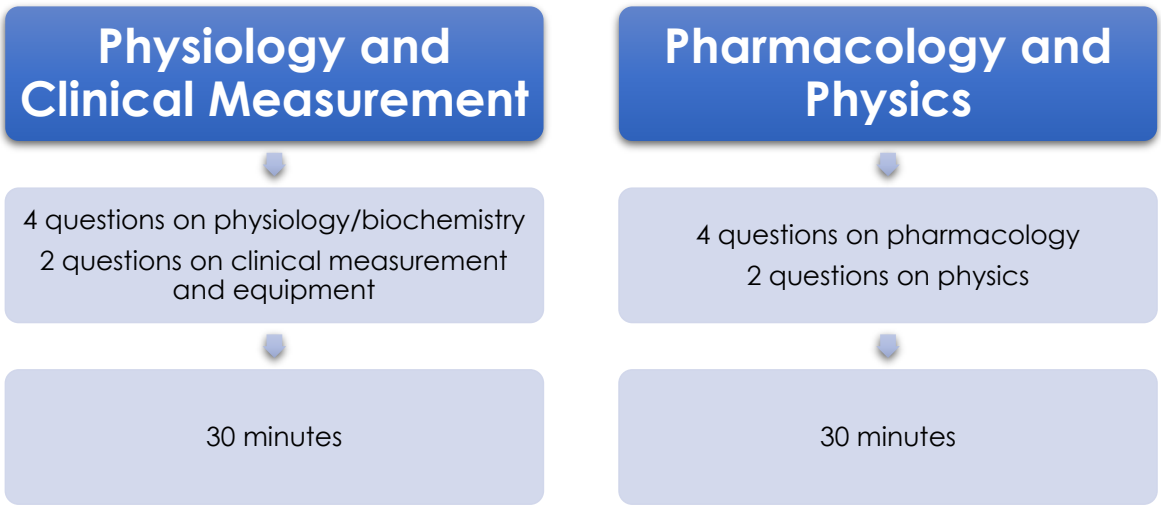
You will be notified by the CAI examinations department of the issue of results date, which will be available on the CAI website → Examinations → Recent results.

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

3.0 MCAI Structured Oral Examination

Candidates may only take the Membership structured oral examination (SOE) once they have **been successful** at the **Membership MCQ examination**. The SOE section gives the opportunity for examiners to explore a candidate's **understanding** as well as their **knowledge** of clinical and basic science concepts which underpin the practice of anaesthesiology. **SOEs are also good at linking the curriculum and the more areas sampled, the better the validity of the examination.**

The structured oral examination consists of **two parts**:



Each structured oral examination lasts a total of 30 minutes. In each section candidates are exposed to 6 questions of 5 minutes each, and 2 examiners evaluate their answers independently. Thus, a total of **4 examiners** are involved in independent scoring for each candidate. However, there is an **overall agreed score** at the end of the SOE.

Although all questions are **structured**, the face-to-face nature of these examinations allows exploration not only of knowledge, but also of the **understanding (application)** of that knowledge.

3.1 Concept of the Structured Oral Examination (SOE)

The 12 questions asked in both SOEs, may cover **any aspect** of the MCAI examination syllabus. Each question lasts 5 minutes, and the examiners will move from one topic to another to ensure that adequate time is allocated to allow the candidate to display the necessary **knowledge** and **understanding** in each area.

3.2 Physiology and Clinical measurement SOE

The focus of this SOE is to explore MCAI candidate's knowledge of topics specific to **physiology, biochemistry, clinical measurement, and equipment related to clinical anaesthesiology and intensive care medicine.** The physiology SOE has an emphasis on cardiorespiratory physiology. In addition, neurophysiology, gastrointestinal, renal, and endocrine physiology are examined.

An example of a Physiology and Clinical Measurement SOE Menu:

Question	Example
Physiology	Mechanisms of cerebral autoregulation?
Physiology	Types of hypoxia and the oxygen haemoglobin dissociation curve
Physiology	The sympathetic and parasympathetic nervous systems
Biochemistry	What are the biochemical changes associated with exercise?
Clinical measurement	Principles of measurement: what do you understand by the term calibration?
Equipment	Laryngoscopes and how they work

3.3 Pharmacology and Physics SOE

The focus of this SOE is to explore MCAI candidate's knowledge of pharmacology and physics pertinent to the practice of clinical anaesthesiology and intensive care medicine. The pharmacology areas examined are general pharmacology, anaesthetic pharmacology, and systemic pharmacology (at least one question from each category) and include questions that are relevant to intensive care medicine.

For the pharmacology SOE, the four questions are taken from the four broad areas of the MCAI syllabus:

1. Pharmacokinetics, pharmacodynamics, and medicinal chemistry
2. Anaesthetic pharmacology
3. General pharmacology
4. Systemic pharmacology

There will be at least one question from each category.

An example of a Pharmacology and Physics SOE Menu:

Question	Example
Pharmacology	Discuss the uptake and excretion of sevoflurane
Pharmacology	Anti-arrhythmic drug classification
Pharmacology	Antimicrobial chemotherapy and resistance
Pharmacology	Anti-anginal pharmacology
Physics	Electrical circuit components: defibrillation
Physics	Principles of heat loss

3.4 Marking the SOE

There are **two examiners** at each SOE table. Examiners alternate roles as **questioner** and **observer**. Both questioning and observing examiner **independently grade** each candidate (4, 3, 2, 1) for each question during the SOE. At the end of the SOE, each examiner independently allocates an overall grade to that candidate (4, 3, 2, 1). These overall SOE grades are then discussed between examiners and a final grade for that SOE is **agreed**.

Responses to the questions are assessed using the rating scale below:

Grade	*Description*
4	Outstanding – worthy of a prize.
3	Pass – the candidate shows satisfactory knowledge and understanding of the topic. A clear pass.
2	Borderline / Marginal fail. The candidate shows incomplete / partial understanding of the topic.
1	Outright fail. The candidate shows very limited knowledge or understanding of the topic.

Dress code: These are professional exams, and you must wear professional business attire.

Example SOE Question – Pharmacology

A 56-year-old woman is listed for a wide local excision of a breast tumour under TIVA.
Questions to be asked by the examiners **1.** What is TIVA? **2.** Can you outline indications for its use? **3.** What drugs are suitable for use in TIVA? **4.** Can you describe the components of the three-compartment model? **5.** What are the main components of a TIVA system? **6.** Can you tell us about the pharmacokinetic model for remifentanil TCI? **7.** Can you outline the safety principles when using TIVA?

4.0 The Membership Objective Structured Clinical Examination (OSCE)

The OSCE tests **applied knowledge** and **skills** in a variety of clinical areas. The style of the station varies e.g., interactive with an actor and/or examiner, completion of an answer sheet. The questions are chosen by the OSCE coordinator group to ensure a range of topics across the examination syllabus is included in each OSCE circuit. The process of an OSCE follows clear guidelines; the questions, instructions to candidates and examiners and the marking schedules are **specific** and **fixed.**

The OSCE comprises **18 stations** in approximately 2 hours (5 minutes per station, and 1 minute reading time). There are two pilot stations. These stations do not contribute to the final mark but are used to **ensure validity** of the questions before they are used in examinations. Neither the candidates nor the examiners know which stations are test stations. All the stations are regarded as active. However, the results from the pilot stations do not contribute to the candidate's final mark. There is one rest station. Therefore 15 stations are used to calculate the result of the OSCE. **Each station has 20 marks.**

OSCE Blueprint

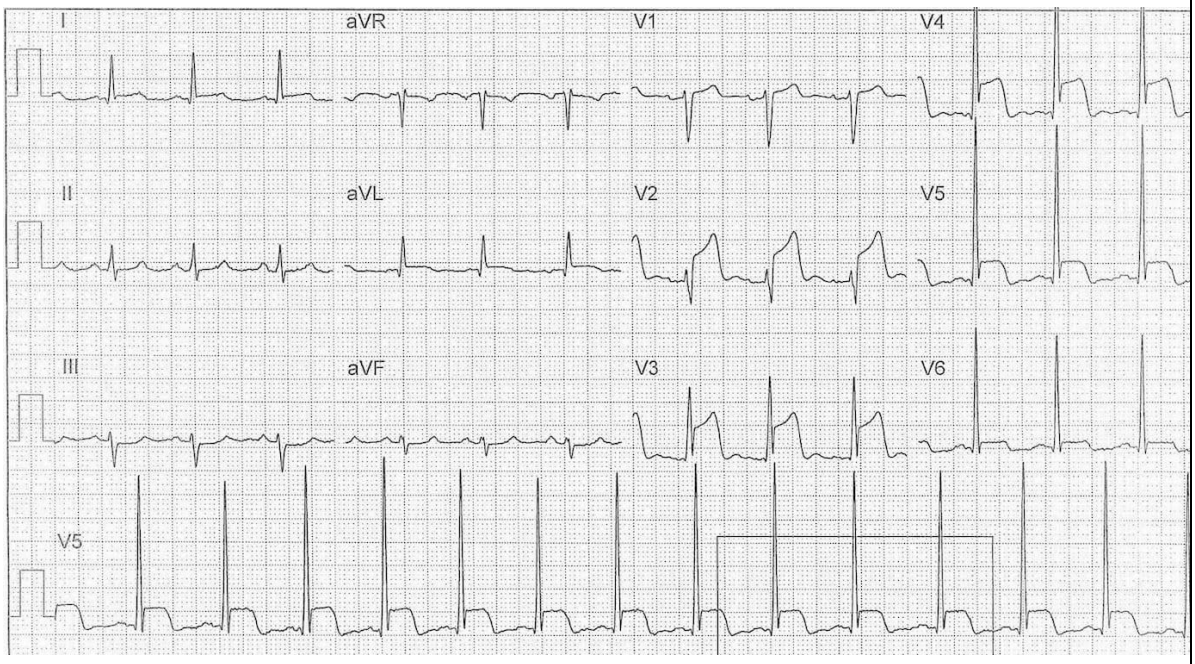
The MCAI OSCE circuits follow the format below and are explicitly blueprinted to the MCAI curriculum.

Station	Clinical skills being tested	Number of stations
Resuscitation	Tests knowledge and skills in dealing with peri-arrest or arrest scenarios	1
ECG	ECG interpretation, risk assessment, ability to calibrate	1
Physical signs	Ability to undertake a detailed examination of major body systems	1
Critical incident	Management of common critical incidents	1
Simulation	Ability to interpret clinical monitoring and relate to clinical context	1
Communication	Ability to listen to, understand and explain	2
Technical skills	Practical anaesthesia skills	2
Equipment	Identify, describe and/or perform a basic safety check of the equipment used in routine anaesthetic practice	1
Anatomy	Knowledge of anatomy relevant to anaesthesiology / ICM	1
Airway	Airway management including equipment	1
Radiology	Ability to interpret common radiological investigations	1
Data	Ability to interpret test results, and how the results may impact on anaesthesiology care	1
Clinical	Clinical topics as they relate to the practice of anaesthesiology and ICM	1

Example 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?**		
	• 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**		
	• 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?**		
	• Antero-lateral (1 mark) STEMI (1 mark) ○ Occlusion of left anterior descending coronary artery (1 mark)	**3**	
6	**What is the normal range for?**		
	PR interval: 120 – 200 ms (1 mark) **QRS interval:** 80 – 100 ms (1 mark) **QT interval:** 400 – 440 ms (QTc Bazett 430 ms) (1 mark)	**3**	
7	**Describe the components of the ECG electrode?**		
	• 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**	

OSCE Pass mark determination

1. For interactive OSCE stations with an examiner, Borderline Regression (BLR) is used.

Borderline regression is an **examinee-referenced standard** setting method, which uses a global score, based on the examiner's judgement of each candidate's performance during the exam. It is also a well-recognised and widely used method of standard setting in high stakes exams.

A candidate is awarded marks for their answers to items within the OSCE question, then a 'global score' for overall performance in the question. Examiners agree the definition of the points of the global score in advance (e.g., score 1-4 with 2 as 'borderline').

A graph is then plotted of marks against global scores and a line of regression is drawn. Where the regression line intersects 'borderline' indicates the pass mark for the exam.

Most stations use this method of standard setting.

2. For non-interactive stations e.g., written, Angoff referencing is used.

Looking at each question in turn (and the model answer for the OSCE) and the relevant marks for each part of the question, subject matter experts estimate what proportion of minimally *competent* candidates would get this question correct. The averages of all judges are taken and used to determine the station cut score.

The **overall cut score or pass mark** of the **OSCE is calculated by aggregating** the **pass marks** for each of the **separate OSCE stations**.

Cut score = Cut score derived from BLR (**X**) + Cut score derived from Angoff (**Y**)

Cut score = **X** + **Y**

Cut score = (X +Y) + 1 × SE_M

Upward adjustments are made using the **Standard Error of Measurement (SE_M).** Making such an adjustment reduces the probability of passing an incompetent candidate. However, there is also a chance of failing an only-just competent candidate. Protecting patients from incompetent doctors would support the argument for making such adjustments.

SOE / OSCE

Candidates complete both examinations on the same day. They are held twice a year (Autumn and Spring) in Dublin. They are awarded three grades for each component – the OSCE, and SOE 1 and SOE 2.

Grade	Description
4	Excellent
3	Pass
2	Borderline fail
1	Outright fail

The **minimum grades** necessary to pass the examination are: **3, 3, 2.**

A candidate who obtains a **1** in any part of the examination will receive an **outright failure in the examination.**

A Candidate who is successful in the Membership SOE and OSCE examination 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**.

MCAI Medal Award

A candidate who obtains the highest mark is eligible for the Medal Award, where more than one candidate achieves these Grades the candidate with the highest MCQ score achieves first place.

MCAI Testing Time

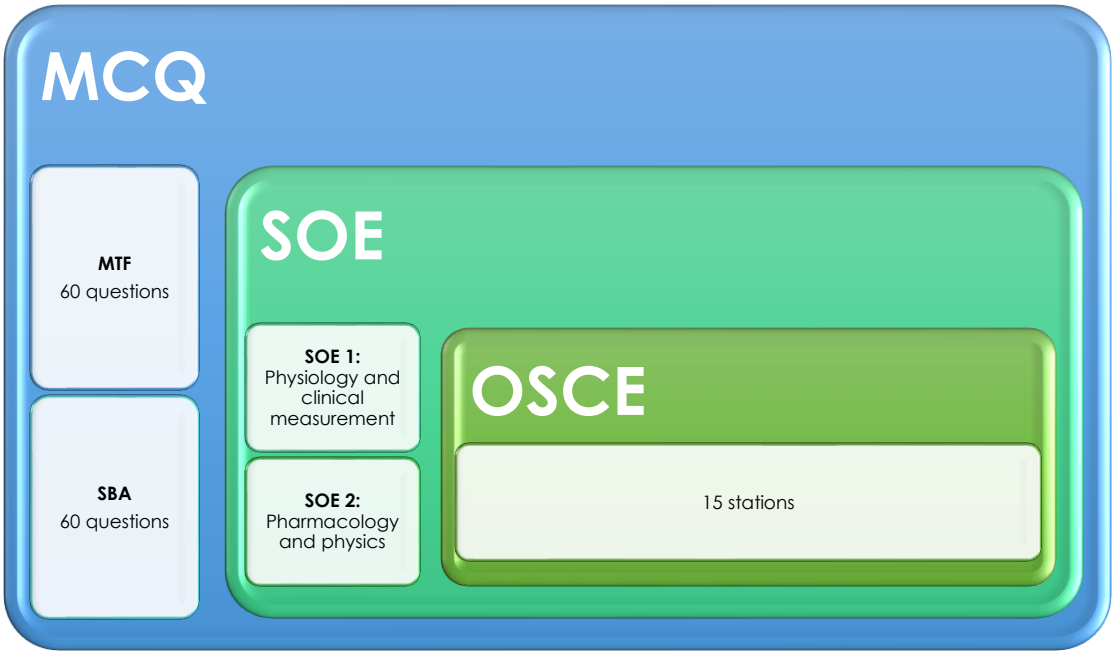
The MCAI curriculum is extensive, and the CAI has a duty to ensure that candidate's knowledge, skills, and behaviours are tested adequately. You can see from the table below, that a MCAI candidate will have a minimum examination time of 408 minutes or 6.8 hours, providing they pass each examination on the first attempt.

Examination	Time (minutes)
MCAI MTF	**120**
MCAI SBA	**120**
MCAI SOE 1	**30**
MCAI SOE 2	**30**
MCAI OSCE	**108**
Total testing time	**408 minutes (6.8 hours)**

MCAI Examination Regulations

The CAI have published regulations on the website.

Summary of the MCAI Examination


MCQ
MTF
60 questions
SBA
60 questions
SOE
SOE 1:
Physiology and clinical measurement
SOE 2:
Pharmacology and physics
OSCE
15 stations