

Guide to Passing Primary FRCA

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Introduction

The FRCA Primary examination is a daunting prospect to both the postgraduate exam newcomer and the seasoned campaigner. The sheer breadth and depth of knowledge required over a wide range of specialties, combined with a punishing exam schedule, can make it seem an impossible task. Passing the exam requires a combination of preparation, hard work and a little bit of luck on the day. It is important to remember that everyone works in different ways, so there may be some disagreement as to the methods or suggestions proposed in this guide. Study leave and financial circumstances certainly have an impact on preparation, as does geographical location. However, the aim of this guide is to be precisely that: a guide or a framework that can be adapted to the individual as needed. The aim is to prove that this is achievable.

Exam structure, marking, & updates are continually under review by the RCOA and, as such, it is very important that the candidate keeps abreast of these updates or changes by regularly visiting the Examinations section of the RCOA website [here](#). Information may also be obtained by accessing or downloading [The Candidate Newsletter](#).

Preparation

The two main reasons that candidates fail the Primary are through a lack of preparation, and an unwillingness to take it seriously and devote adequate time and resources. The recently failed candidate is often heard loudly proclaiming how unfair his/her OSCE/viva (or Structured Oral Examination!) was because "they asked me in detail about depth of anaesthesia monitoring in my physics viva". What they haven't mentioned (or even realised sometimes!) is that they weren't able to talk about propofol in a structured sensible manner, or that they weren't able to examine a patient's respiratory system confidently, or they didn't know their resuscitation algorithms. The OSCE/SOE section of the exam is structured to be fair. It allows the prepared candidate to demonstrate as much knowledge as they can in the allotted time, giving the best possible chance of succeeding.

For the old-style examination where the OSCE/SOE occurred approximately five weeks after the MCQ, the average candidate required six months to prepare for this exam, give or take. Since June 2007, the structure has changed and the MCQ/SBA section has become a stand-alone pass/fail examination. The length of time taken to prepare oneself for an MCQ/SBA examination alone will vary according to working patterns but, even though the Primary now presents itself as two separate examinations, the approach taken should be very similar if not identical to that of the old-style Primary. The syllabus has not changed and therefore the time taken to cover it will not either. Currently, successful candidates at the MCQ can apply for the next sitting of the OSCE/SOE so there exists considerable time-pressure to achieve an adequate standard for the OSCE/SOE section in a relatively short period of time.

Before starting the work in earnest, a period of planning is required. Part of this is mental preparation and gearing yourself up for the fact that this will take up a significant proportion of your time and energy. It is also extremely difficult to motivate yourself to revise for an exam in six months' time. The other factor is the logistical preparation: planning and booking courses (see later), speaking to people who've already taken the exam, taking the plunge and actually booking the exam (no going back!), deciding on which books to buy, and plotting your assault on the syllabus with an inevitably colourful and detailed revision timetable.

a) Finance

This is not a cheap exercise. As well as being an emotional and mental challenge, it can prove to be a dent in the finances. You wouldn't spend a couple of thousand pounds on a TV and throw it away because you couldn't understand the manual and subsequently couldn't watch the TV. Likewise, it is pointless to spend all the money on this exam only to fail because you couldn't be bothered to put the work in. Factors to consider include: the cost of books, courses (with concurrent travel and accommodation), the exam fee, and accommodation and travel to London for the exam.

b) Study leave

If you are planning on attending courses, you need to check with your department how much study leave you qualify for prior to booking. Do not forget to factor in the exam periods as well; otherwise, you'll end up using valuable annual leave (required for post-exam holiday: see later!). You may or may not have a study leave budget: use it wisely!

c) Syllabus

It is often evident during Guidance Interviews for candidates who have failed the exams, that reasons for failure point towards poor study technique, particularly an ability in following the syllabus when structuring their revision. It is recommended that candidates use the syllabus for the Primary FRCA to form a road-map during their study period. I structured my revision using the FRCA primary syllabus with some adaptations. It can be downloaded [here](#).

d) Exam application

The Primary FRCA Examination Calendar for [MCQ](#) and [OSCE/SOE](#) is found on the RCOA website. Examination application forms may be found [here](#). Examination regulations are found [here](#). It is imperative that you read and understand the procedures involved in applying and paying for the exam.

e) Courses

Some candidates are fans of courses and others prefer their own styles of revision - it is up to the individual to decide! I am extremely pro-courses and have always done as many as I could prior to exams. I believe that they concentrate your mind to the task at hand, and provide you with valuable teaching, practice and experience not gained just from books. They are invariably run by or taught by some of the actual examiners you may meet on the day, and, as such, will be pertinently relevant to the exam. A list of the recommended courses can be found [here](#). There are many other courses of a similar vein, all of which have been recommended by those attending. It is a matter of talking to previous candidates and finding something that suits the individual.

f) Books

There are some books you must acquire, which are fundamental to passing this exam, and there are others that are a personal choice. A good place to start looking is the [Anaesthesia UK](#) recommended Primary FRCA Book List. Also vital to preparation is the [Guide to the FRCA Examination. The Primary](#). Recently updated in December 2013, it provides an invaluable source of information and practice questions with model answers – a unique insight into what examiners are looking for in successful candidates. I bought all of my textbooks new (at great cost) in the pre-Amazon/eBay era so I could scribble in them, but it's also worth checking whether anyone in your department has got old books to sell. In the 'prehistoric' days when I was studying for the Primary, I liked to visit the bookshop (old-fashioned, I know!) to get a physical feel for each book i.e. what it entailed and ease of reading. These days, with the vast array of online availability and various auction sites e.g. [eBay](#), prices can be competitive. It is also possible to preview most books online, either at [Google Books](#) or other online stockists such as [Amazon](#) or [Waterstones](#). A worthy mention should go to the 'modern' way of revising either via podcast; the extremely successful [Dr Podcast](#) series caters for both Primary and Final FRCA, or out of the box as with the viva-tastic [Primary FRCA in a Box!](#)

g) Online revision

A large proportion of learning and exam revision has moved to an online basis. With the explosion of e-learning resources and portable computing/tablets, it has never been a better time for candidates to have a multitude of resources at their fingertips. A good starting place is the e-learning portal developed in conjunction with the [RCOA](#) and [e-Learning for Healthcare](#). Another really important internet site to aid in revision is [AnaesthesiaUK](#). Register on their exam home page for free access to the online interactive examinations. There is a large bank of Primary MCQs taken from previous exams, with accompanying explanations. Using the exam menu on the left side of the page, you can also access the OSCE and SOE resources. They have an enormous bank of OSCE stations and SOE questions sent in by previous candidates. There are also large tutorial sections with many diagrams and explanations on vital topics in anaesthesia, especially relating to basic principles. Together with the text books used above, this website formed the basis for my revision and ultimate success in this exam.

Subscription-based question databases:

- [FRCAQ](#): Over 1500 SBA and MTF multiple choice questions

- [BMJ Onexamination.com](http://BMJOnexamination.com): Over 1000 SBA and MTF multiple choice questions
- [Examdoctor](#): Over 1600 5-part MCQs and SBAs, including mobile browser access plus free app
- [PasTest](#): Over 1000 multiple true/false questions and single best answer questions; also includes a multiplatform app for revision on-the-go
- [123Doc](#): online e-course with a database of over 800 Primary FRCA exam questions

Apps

- [Conquest FRCA](#): Over 880 five stem questions (including over 100 SBAs)
- [iFRCA](#): Over 500 Multiple Choice Questions and Single Best Answers
- [Anaesthesia exams](#): Provides structured oral vivas to simulate the real thing!

Websites

- [CEACCP](#): Useful for both Primary and Final FRCA revision. Short review articles on many relevant Primary-based topics.
- [Anaesthesia Tutorial of the Week](#): useful articles/web-based tutorials written about basic principles/important topics and run by the World Federation of Societies of Anesthesiologists.
- [NYSORA](#): great for regional block techniques found in some OSCE stations
- [Neuraxiom](#): another fantastic anatomy/regional anaesthesia resource
- [Open Anaesthesia](#): a huge repository of anaesthesia-based information and knowledge
- [Virtual-Anaesthesia-Textbook](#): huge site with many anaesthetic-related resources
- [Anaesthesia Education Website](#): a portal site for other sites containing exam tutorials/MCQs & various other resources
- [Handwritten Tutorials](#): A cartoon-based website for 'alternative' methods of revision

h) Holiday

Book a holiday for just after the exam. It will give you something to aim for and look forward to. Can you honestly say that a week of nights on the labour ward post-exam is just reward??

The Exam

a) MCQ PAPER

There are different schools of thought on how to revise for this section of the examination. Some candidates plough through the textbooks, and then attempt MCQs later on. Others like to base their revision around MCQs topic by topic, referring continually to textbooks. There is no correct method, but I believe the key factor to passing this section is sheer volume of MCQs completed. Most candidates will have experienced medical MCQs at some point in their careers, i.e. Finals, MRCP or other, and will also have their own methods for answering MCQs. The MCQ exam is no longer negatively marked; therefore it makes sense that all stems from the questions should be attempted.

There are 60 Multiple True/False (MTF) questions (five stems in each question) and 30 Single Best Answer (SBA) questions to be answered in 3 hours. There are 20 pharmacology MTF questions, 20 physiology (including related biochemistry and anatomy) MTF questions and 20 physics, clinical measurement, and data interpretation MTF questions. There are 30 SBA questions in any of the categories previously mentioned. For the MTF paper, candidates are provided with a question booklet, some scrap paper, & an Optical Mark Reader sheet to record answers in a True/False style or the single best answer from 5 options. Candidates have a maximum of five attempts at the examination, and a pass is valid for three subsequent years from the published start date of the exam applied for.

As mentioned by the College: "One mark will be awarded for each correct answer in the MTF section. Four marks will be awarded for each correct question in the SBA section. The marks for each section are combined to produce a total mark. With 60 MTF (60 x 5 stems) and 30 SBA the maximum mark obtainable for the MCQ paper is 420 marks. The passmark is set by the Examiners using Angoff Referencing. To allow for the examination's reliability this mark is then reduced by one Standard Error of Measurement (SEM) to give the passmark."

Regarding SBA technique, current advice would be to get your hands on as many of the SBA-style questions as possible. The RCOA is continually expanding their bank of example SBAs which can be found [here](#), [here](#), and [here](#). An extremely insightful document by Dr Anthony

McCluskey, Chair of the Primary MCQ, can be found [here](#), with the rationale and justifications behind the introduction of this format into the FRCA examinations.

On the day itself, make sure you know the way to the College (type WC1R 4SG into [Google Maps](#)). Arrive early and make sure you bring photo ID. Ensure that you fill your details/candidate number in correctly on the answer sheet, and then get cracking!! Obvious things to say include: read the question, check that the relevant answer is marked in the correct box, and re-check everything at the end. It would be tragic to fail because the paper was filled in incorrectly. Once finished, go and have a drink at the Square Pig across the road and ignore everyone else dissecting the exam in intimate detail!!

b) OSCE

Again, turn up early and register with photo ID. Dress smartly i.e. suit (neutral shirt/tie) for men and interview clothes for the ladies. Bring a stethoscope. It is a long and stressful day; some people even bring a change of shirt/underwear for the afternoon!

The OSCE section of the examination is held in one room, divided by many little cubicles. There are 16 active stations and 1 test station; neither examiner nor candidate knows which stations are live or test, so treat all equally! Make sure that you write your candidate number at the top of all answer sheets! Some cubicles have one or two examiners in them, some will have a live patient in them as well. Others, e.g. X-ray, just have a question/answer sheet. Each station is five minutes long, with a one-minute break in between, to gather your thoughts and read the instructions for the next station. By understanding the format and marking of the OSCE, you give yourself the best chance of passing it. Each station has a specified mark sheet with tick boxes; if you say/do the right thing, you get a tick - i.e. there is no examiner discrepancy. Each station is marked out of 20, the pass marks for all 16 stations are added together to determine a final score out of 320 for the OSCE.

i) OSCE stations

The RCOA has produced a useful pdf document describing the layout, marking and content of the OSCE section of the exam. It can be located and downloaded in pdf format [here](#).

Multiple examples of OSCE stations can be found on the [Anaesthesia UK website](#).

There are some important points to remember:

- If you have a bad station, as hard as it may seem, forget about it and move onto the next station. You will not do yourself justice if an under par performance in one station affects subsequent ones. My first three OSCE stations were, in my opinion, disastrous and I felt like leaving right there and then. My next one was a respiratory exam which I could do, and it got me back on track.
- There may also be an anaesthetic machine check. This could include the old Boyles machine. Practice until you can do it blindfolded – if you fail this station, it looks very bad if you're borderline elsewhere! The Association of Anaesthetists publish the guidelines for checking the machine [here](#) and [here](#). There may also be checking of various circuits, e.g. Bain.
- There will be two resuscitation stations. You are expected to know the updated 2010 algorithms for both ALS & PALS, including emergency paediatric drug doses. They can all be downloaded from the [Resuscitation Council UK website](#). Resuscitation of a pregnant woman has been included in the past. Don't forget left tilt, and request obstetric/paediatric assistance. Again, there is no excuse to fail these stations – it should be a gift! Similarly, there may be trauma or paediatric scenarios, so ATLS/APLS knowledge is required.
- Re-learn how to examine body systems (the 'Finals' way - i.e. like a medical student!). You are likely to get one of cardiovascular, respiratory, cranial nerves, upper and lower limb peripheral nervous system. This may also include measuring and describing pulse, BP and CVP. You need to look slick and gain yourself an easy pass at this station.
- In communication stations, you get a mark for introducing yourself and also for checking who you are speaking to sometimes. There are also further points for empathy etc., so be nice!! Some of the patients (actors/actresses) may get quite aggressive, e.g. the 'tooth-knocking-out scenario'. This has been known to upset candidates in the past. Do not be put off by this,

remain calm and try to diffuse the situation professionally, as you would do at work.

- Have a structure for examining/presenting CXRs and ECGs.

ii) Anatomy

There will be anatomy OSCE stations in the exam. The majority of candidates find anatomy tedious to learn and will often skimp on this revision section. This is not advisable, for reasons already mentioned. Although not exhaustive, the following list can be used as a guideline (full list found in the RCOA syllabus):

Regional blocks

These must include: landmarks, indications, contraindications, technique, LA dose and complications.

- Epidural
 - Spinal
 - Brachial plexus (interscalene/supraclavicular/axillary)
 - Upper and lower limb (especially femoral and ankle blocks)
- N.B. occasionally lumbar/celiac plexus blocks have turned up

Other

- Respiratory tract
- Cardiac + coronary arterial/venous supply
- Vertebrae (cervical, thoracic, lumbar, sacrum)
- Upper limb (brachial plexus, antecubital fossa)
- Head and neck (Base of skull, including 'holes' and CN pathways, neck/laryngeal/pharyngeal anatomy, the orbit, Circle of Willis)
- ANS
- Ascending/descending motor/sensory tracts
- Dermatomes

c) Structured Oral Examination

The Structured Oral Examination (SOE) is a game, and to succeed or win at the game, one needs to learn how to play it. It is the section of the exam which the majority of candidates are most apprehensive about, as the onus is on them to do the talking. In fact it is much more structured than the candidate realises.

The Structured Oral Examination has been merged into a single SOE examination which is taken as two sub-sections, each with two examiners (one asks questions and the other one marks, and then they swap after 15 minutes), and the number and contents of questions are unchanged.

The two SOE sub-sections, each lasting 30 minutes, are divided as follows:

- 30 minutes consisting of three questions in Pharmacology, and three questions in Physiology & Biochemistry
- 30 minutes consisting of three questions of Physics, Clinical Measurement, Equipment, and Safety, and three questions on Clinical Topics (which will most likely include a Critical Incident).

There are 12 questions, 2 marks for a pass, 1 mark for a borderline performance, and 0 marks for a fail, giving a maximum total score of 48 marks and a pass mark of 37.

The examiners are not allowed to ask any question they like, avoiding the problem of 'pet topics' in times gone by. They have a list of questions/topics upon which they have to guide the candidate through; obviously, the better the candidate, the more material covered and potential marks picked up. The examiners will also move the candidate on to a different topic if they appear to be struggling or have stalled; again, the idea being to find out what the candidate does know. Contrary to popular belief/scare-mongering, the examiners are very friendly and do their best to put you at ease. The RCOA has made an extremely interesting resource available to candidates [here](#); the videos do not provide model answers, rather performance behaviours.

The hardest part of viva preparation is starting the viva practice itself. You may have all the knowledge in the world, but the trick is to be able to impart this knowledge in a concise, relevant, structured and confident manner. Practice is the key; bully your consultant/StR/SHO colleagues to give you regular viva practice. At first, it will be an awkward experience but do not be concerned about humiliating yourself in front of them – they have all been through the same ordeal. The more you practice, the more refined and polished your technique will become, and the more tips you will pick up from various colleagues. If you are lucky enough to have a Consultant who is a Primary examiner, make full use of this valuable resource. They will know

exactly what is required to be successful in the viva section. There is a bank of viva questions asked in previous Primary exams on the Anaesthesia UK website.

The big secret to passing the viva is to look at it from the examiners' viewpoint. Examining multiple candidates on the same questions for several hours can be boring! Your job is to make it easy for the examiners to pass you. They will generally be able to tell whether they want to pass you in the first couple of minutes; from the moment you sit down to your opening statement. Your appearance matters, so dress appropriately (see earlier), smile and look confident, even when you feel like a spot of reverse peristalsis!! Maintain good eye contact, especially with the person asking the questions, and avoid wild gesticulations and nervous tics/habits (hopefully these will have been spotted during previous practice). Hands clasped in lap, unless drawing a diagram/graph is usually recommended. Once completed, to avoid playing with the pencil, I would put it back on the table and clasp my hands again! Do not mention subjects about which you know very little; the examiner may ask you to elaborate!

You must have a confident opening statement. Do not say the first thing that comes into your head! Take a few seconds to think about the question - i.e. what the examiner requires - take a deep breath and then proceed. I used the 'DEFINE & CLASSIFY' approach which was recommended on a course, e.g. 'Tell me about Thiopentone'..... 'Thiopentone is a thiobarbiturate used for the intravenous induction of anaesthesia and in the management of status epilepticus' etc etc. At this point, the examiner will start to relax: here is a candidate who knows his essential basics well, and so on.

i) Drugs

On the subject of drugs, it is vital to have a framework which can be used to talk about any drug. I used a combination of structures obtained from textbooks & courses:

- Chemical/Classification
- Presentation/Manufacture/Physicochemical properties
- Uses
- Action & mechanism/Duration of action
- Onset/Offset of action
- Doses/Routes of administration
- Effects – CVS, Respiratory, CNS, Other
- Side effects/ Toxicity/Contraindications/Interactions
- Kinetics – Absorption, Distribution, Metabolism, Excretion

ii) Drug you should be able to talk about

Anaesthetics: Intravenous/Inhalational agents / Muscle relaxants (non-depol/depol) / Anticholinesterases / Local Anaesthetics / Anticholinergics

Intravenous fluids: Colloids / Crystalloids

Analgesics: Opioid / Simple

CVS: Antiarrhythmics/Antihypertensives/Beta-blockers/Inotropes

CNS: Stimulants/Anti-epileptics

GI: Antiemetics / prokinetics

Other: Antidiabetics (Insulin/PO hypoglycaemics) / Diuretics / Anticoagulants / Antibiotics

iii) Drugs you should be able to draw

It is quite feasible to be asked to draw the structure of a drug, and then describe the structure-activity relationship.

Propofol

Thiopentone

Inhalational anaesthetic agents

Local anaesthetics basic structure

Acetylcholine + suxamethonium

Anticholinesterases basic structure

Catecholamine synthesis pathway

iv) Clinical

Candidates are given a clinical scenario, including blood results/ABGs/ECG etc to read and think about approximately ten minutes before starting the viva. The viva usually begins with: 'How would you anaesthetise this patient?' I used the following approximate approach:

'I would divide my approach to anaesthetising this patient into preoperative, perioperative, and postoperative:

- 'In my preoperative assessment, I would go the ward to introduce myself to the patient, explain my role, and establish a rapport. I would perform a full history and examination, review of observations and investigations, e.g. blood results, ECG (+ further cardiac investigations) and CXR. I would also read the case notes, particularly paying attention to previous anaesthetic charts and any documented perioperative complications. I would explain the nature of the anaesthetic to the patient, documenting any potential complications of procedures discussed'.

- The next section would involve perioperative management. It is wise to mention that you recognise that this patient has numerous comorbidities and you would request the advice and help of a senior anaesthetist, i.e. Consultant, to be present for the anaesthetic (at which point you are usually told that there are none available!!). Plan your anaesthetic sensibly. Rapid sequence induction is not: 'RSI with thio, sux and tube'; rather, 'I would ensure that I had checked the anaesthetic machine and all equipment according to the Association of Anaesthetists' guidelines. I would have a trained assistant with me and all drugs, including emergency drugs (be prepared to explain which ones), pre-drawn up before patient arrival. I would apply monitoring according to the Association of Anaesthetists' minimum monitoring guidelines. I would check that I could tip the trolley, and that adequate suction is to hand. I would preoxygenate the patient for at least three minutes, and, with cricoid pressure maintained, I would administer intubating doses of thiopentone and suxamethonium via a fast-running wide-bore cannula. Upon cessation of fasciculations, I would pass the endotracheal tube through the vocal cords into the trachea and inflate the cuff. I would check the position of the endotracheal tube by auscultation bilaterally, visible chest movement, and by looking for the presence of a capnography trace. Upon confirmation of tube position, the cricoid pressure will be released and the endotracheal tube fastened securely in position.

- 'Postoperatively, I would ensure that the patient is maintaining their own airway with spontaneous respirations, has supplemental oxygen, stable observations, good fluid balance, and is ideally pain-free or with a pain management plan. There must also be a clear plan for discharge from the Recovery suite, i.e. ward/HDU/ITU'.

v) Critical incident

At some point, inevitably, there will be a critical incident either perioperatively or postoperatively. It is your job to anticipate it and recognise its onset. It can be quite subtle sometimes, so be alert. The Oxford Handbook of Anaesthesia has a well-organized and concise section on anaesthetic emergencies. It is imperative that you know how to deal with a range of critical incidents; poor performance in this area is not favourable!! The following list is not exhaustive but provides a guide for revision:

- Difficult/failed intubation
- Difficult ventilation
- Displaced ETT during operation
- Pneumothorax
- Bronchospasm
- Postoperative hypoxia/hypercarbia
- Intraoperative hypoxia/hypercarbia
- Postoperative airway obstruction
- Postoperative apnoea
- Failure to wake postoperatively
- Hypothermia
- Anaphylaxis
- Aspiration of gastric contents
- Malignant hyperthermia
- Suxamethonium apnoea
- Cardiac arrest/peri-arrest
- Arrhythmias/Heart block
- Hypertension/Hypotension
- Massive haemorrhage
- Pulmonary/Air/Cement embolism
- Complete/high spinal block
- LA toxicity

- Blood transfusion complications
- TURP syndrome

d) FORMULAE, DEFINITIONS & DIAGRAMS

Candidates may be asked to produce formulae, definitions and diagrams/graphs to form the basis of an answer to a particular question. These should be at the tip of your tongue, so before the examiner has finished the question, the pencil is in your hand, ready to reproduce what is required. Blank paper is provided with a pencil – make sure your 'sketchings' are large, well-labelled and clear. When drawing graphs, label the axis first (correctly), and then proceed with the rest of the graph. The excellent '[Equations for Primary FRCA](#)' at the top of this guide by Dr Adrian Jennings covers all of the equations you will need to know and understand for the exam. The following list also contains examples of diagrams and definitions.

i) Diagrams

CVS

- Iso-shunt graphs
- Valsava manoeuvre
- Action Potential: Cardiac Muscle fast-response & Pacemaker slow-response cell
- Cardiac cycle
- Starling's law
- Jugular venous pressure waveform
- Pulmonary artery catheterisation waveforms

Respiratory

- Fowler's Method for anatomical dead space
- Compliance curves
- Oxygen cascade
- Alveolar wall-cross section
- West zones
- Oxyhaemoglobin dissociation curve
- Lung volumes

CNS

- Action potential
- Spinal cord: Transverse section
- Pain pathway + gate control theory
- Cerebral blood flow/Cerebral perfusion pressure

Physics

- Nitric oxide isotherms
- Vacuum insulated evaporator
- Vaporisers including desflurane
- Defibrillator circuit
- Electrical symbols
- Wheatstone Bridge circuit
- OxyHb/DeoxyHb wavelength absorptions
- Mapleson breathing circuits

Pharmacokinetics/Pharmacodynamics

- Bioavailability
- Agonists/partial agonists/antagonists

Other

- Renal: Nephron/Juxtaglomerular apparatus
- Starling's forces
- Body water distribution
- Meyer-Overton hypothesis

ii) Definitions

- Potency/efficacy/affinity

- Volume of distribution
- Mass/force/momentum
- Pressure + units
- Electrical units e.g. Ampere/Joule/Coulomb etc
- Resonance/damping
- Humidity/SVP
- Osmolarity/osmolality
- pH/H⁺/mole
- Critical/pseudocritical temperature
- Critical pressure
- Filling Ratio

Good Luck!!

Disclaimer

A lot of material used in this guide has been obtained from the textbooks, courses and online resources described above. I make no claim that any of it is my own work, merely that this guide is a collaboration of these sources, in addition to an account of my experience of passing the FRCA Primary examination. There is no personal financial gain to be made from this guide; it is freely available to all online, and will in no way act as a substitute for textbooks, online revision and courses.