

HAC EXAMINERS REPORT 2004(1)
Collated by J Irwin 25.06.04

THEORY PAPER

General comments

In the graphs that follow the red line is the pass mark.

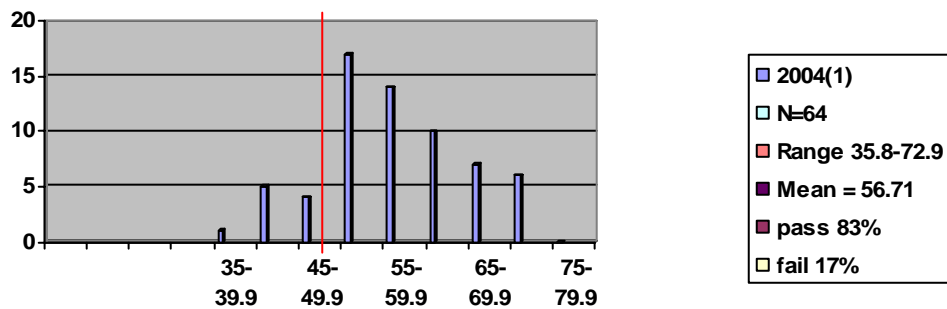
Of the 64 candidates who sat the theory exam 1 (1.6%) failed badly, 9 (14.1%) failed, 31 (48.4%) passed, 17 (26.6%) passed with merit and 6 (9.4%) passed with distinction. As usual some questions seemed harder than others did but there were also some questions with high average marks. Examiners comments included:

“Candidates were more accurate in spelling than in previous examinations”.

“They also answered the multi-part questions in parts rather than giving one essay type answer, which facilitated marking.”

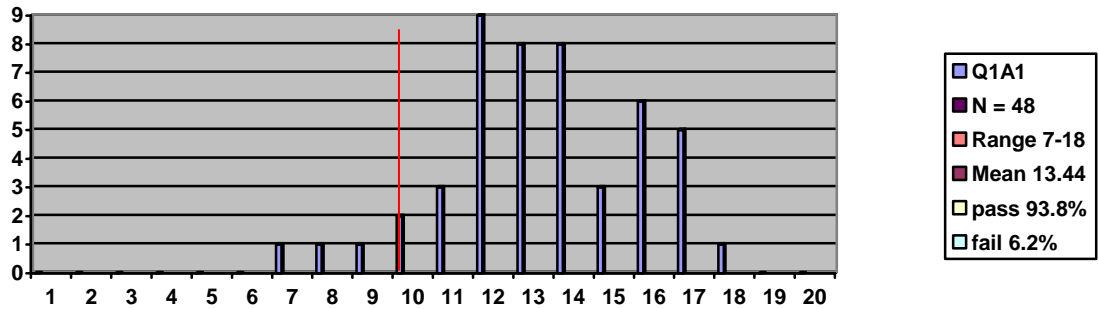
“The majority of candidates continue to show a satisfactory standard both theoretically and practically.”

Theory Paper Overall marks 2004(1)



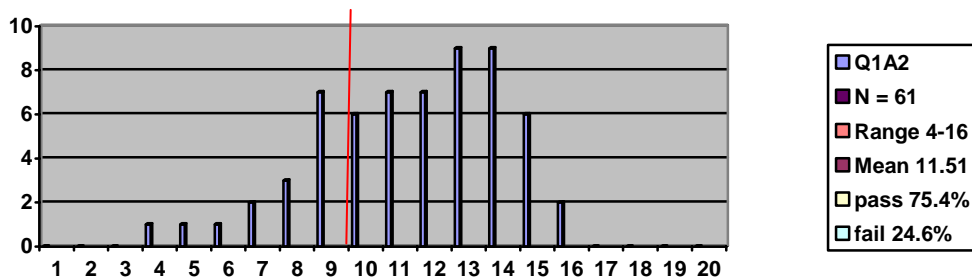
- 1A1**
- (a) **Draw a cross-section of one turn of the cochlea and label its parts.** **8**
 - (b) **Explain how the passage of vibrations through the cochlea results in the production of an action potential.** **6**
 - (c) **List 3 ototoxic drugs.** **3**
 - (d) **List 3 effects of ototoxic drugs on the cochlea.** **3**

This was generally well answered with no consistent errors. There were some imaginative answers to the ototoxic drugs and how they damage the cochlea sections.



- 1A2**
- (a) **Why does the middle ear need an impedance matching mechanism?** **(2)**
 - (b) **Describe the impedance matching mechanism.** **(8)**
 - (c) **Name the middle ear muscles and describe their function.** **(4)**
 - (d) **What information can be gained from middle ear reflex measurements?** **(6)**

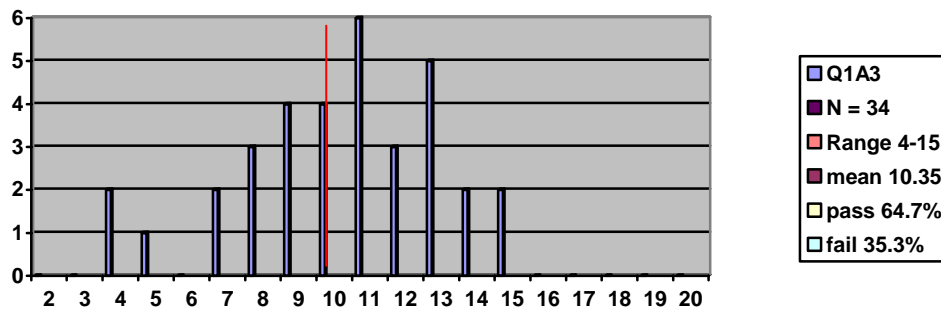
Again there were no consistent errors in answers to this question. Most marks were lost on section d which is understandable. Although there were several candidates who scored full marks in this section.



- 1A3 Write short notes on 4 of the following:**
- (a) **Otitis externa;** (5)
 - (b) **Chronic otitis media;** (5)
 - (c) **Diplacusis;** (5)
 - (d) **Abnormal loudness growth (recruitment)** (5)
 - (e) **Barotrauma.** (5)

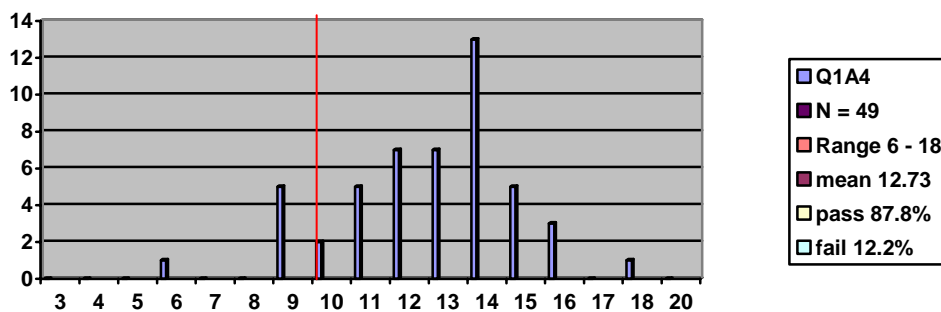
This was a part question and a number of candidates answered too many parts. This clearly affected their ability to answer the four required parts satisfactorily. Care in reading the question needs to be emphasised with future candidates.

The part which caused the greatest difficulty was “chronic otitis media” with a number of candidates confused with regard to what was a chronic otitis media. The terminology used when referring to otitis media varies and some agreed definitions would be useful in future.



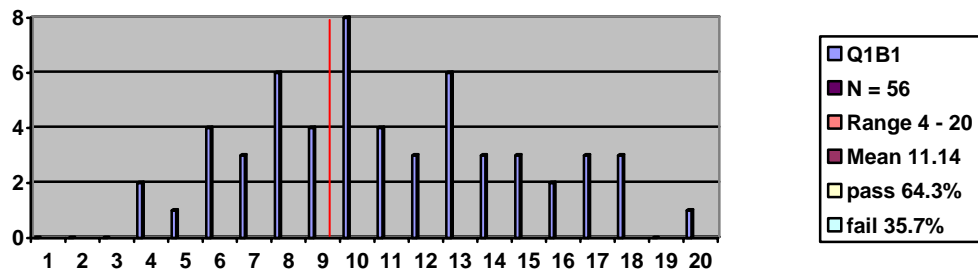
- 1A4**
- (a) **Describe the anatomy of the external auditory canal, up to but not including the tympanic membrane. Use diagrams if you wish.** 10
 - (b) **List 2 functions of wax.** 2
 - (c) **How does the normal auditory canal modify the acoustic input to the middle ear?** 2
 - (d) **List 2 non-infectious conditions of the external auditory canal.** 2
 - (e) **How is the acoustic input affected by each of the 2 conditions described above?** 4

In general this question was answered quite well. Only six candidates had a failing mark. Candidates had a good knowledge of the anatomy of the external auditory canal and most could draw a clear diagram. Most candidates were aware of the relevance of the resonance frequencies of the canal when answering other parts of the question.



- 1B1 (a) What are the daily performance checks you can perform on an audiometer? What errors could you find for each of these checks? 9**
- (b) The standard BS EN 60645-1: 1995 defines the levels for pure tone audiometer calibration. What are these? 6**
- (c) Define the rise time and fall time. How could a too slow and too fast rise and fall time result in erroneous pure tone thresholds? 5**

The general standard of answers to this question was good. Most candidates scored well on the first part of the question but marks were commonly dropped for correctly quoting the daily check, but not explaining what errors may be found as a result of that check. The second part of the question was again well answered and many candidates showed a good understanding not only of the calibration criteria but also of the effect of calibration. The third part of this question was where most candidates lost marks. Candidates generally did not seem to understand the effect of too fast a rise time, little mention of the 'on effect' or temporal integration.

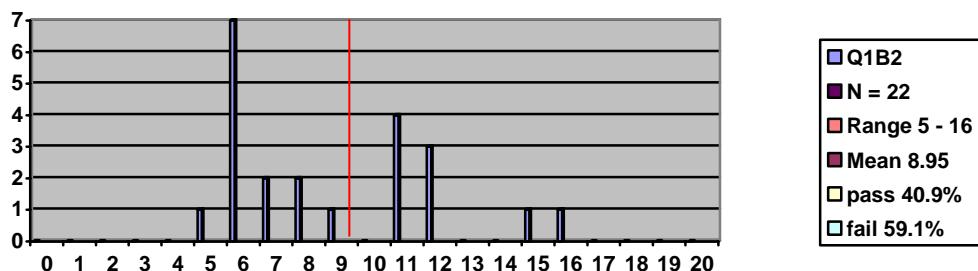


- 1B2 Otoscopy on two clients shows that each has intact tympanic membranes. The completed audiograms of these clients give similar air conduction hearing threshold levels, with normal hearing in the right ear and approximately 45dB hearing threshold levels across the frequency range in the left ear. Client A has a sensorineural hearing loss and Client B has a totally conductive hearing loss due to dislocation of the ossicular chain.**

For each client draw out your findings of the following tests, and explain the results

- (a) masking charts for bone conduction at 1000Hertz 10**
- (b) uncomfortable loudness levels 5**
- (c) tympanogram 5**

Not many candidates attempted this question and those that did generally did not score well. Very few candidates actually drew masking charts! There were several masked audiograms showing possible results after masking, but the question did not ask for this. Those that did draw a masking chart tended to draw only one for client A but missed client B. Several candidates explained why masking would be necessary but still failed to answer the question. The ULL results were again hit and miss. Several candidates only showed ULL's for 1 ear or for client A and not client B and only a few correctly identified the approximate ULL for each client (Client B should be beyond the limits of the audiometer in the left ear). The last part of the question was again badly answered. Very few tympanograms had any scales, and those that did were mainly incorrect. The general shapes of the tympanograms were also vague.

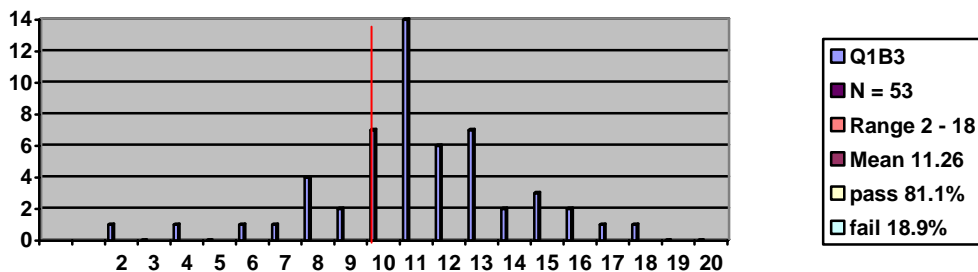


1B3 Write short notes on the following:

- (a) signal-to-noise ratio 5
- (b) speech spectrum 5
- (c) resonance 5
- (d) equal loudness contours 5

Candidates generally did well in the signal-to-noise ratio and the speech spectrum sections, but a few candidates were confused between resonance and reverberation. Resonance occurs when a periodically vibrating force makes an elastic body vibrate. Every body has its own natural frequency and the nearer the applied force is to the natural frequency of the elastic body, the greater will be the amplitude of the vibration. This creates ‘sympathetic’ vibration or resonance and will cause standing waves of reinforcement or cancellation. Many candidates correctly applied this knowledge to the resonance properties of the ear canal.

Candidates should note that the 40 phon curve represents pure tones across the frequency range that are judged to be equally loud as a 1kHz tone of 40dB SPL as the reference point – many candidates omitted 40dB SPL or the diagram gave inaccurate dB SPL plotting at the reference point of the 40 phon curve



1B4 Explain in full the terms dB SPL; dB HL; and dB(A). Make clear in your answer the difference between the terms and how they are derived. In what circumstances would you encounter each of these terms.

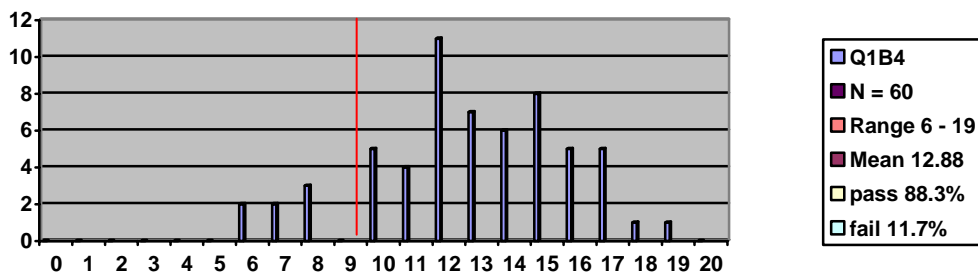
15

The performance data of a hearing aid is measured to IEC 118-7 and IEC 118-0 specifications. Discuss how these two methods of measurements differ.

5

This question required the candidate to note the differences of the decibel scales: - dB SPL is an objective physical measurement: dB HL is a subjective sensation of sound: and dB(A) is an inverted 40 phon curve that is weighted to approximate the response of the human ear.

Some candidates incorrectly detailed the threshold testing of 600 healthy otologically persons under dB SPL. The sensation of sound, as perceived by the human ear, should be included in the dB HL section, leaving the conversion of a huge audible range in Pascals into a manageable logarithmic dB SPL scale.



2A1 (&3A1)

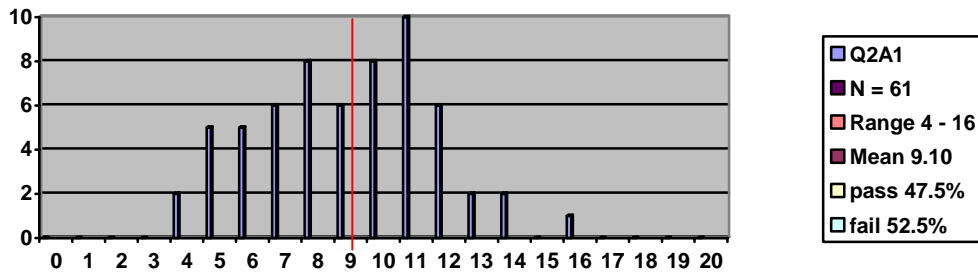
- (a) Describe three situations which present difficult listening conditions for a person with a bilateral, sensorineural hearing loss. 6**
- (b) What features exist in currently available hearing aid systems which are designed to assist in each of the three situations? 11**
- (c) How can hearing tactics assist in the three situations? 3**

Surprisingly few candidates made any reference to the advantages of a binaural fitting. The majority of candidates chose listening conditions involving various types of background noise but made no reference to the problems of distance from a sound source and reverberation. Too often, specific difficult listening conditions were too briefly described especially as to why they were difficult for many sensorineurally impaired people.

When different programme/memory settings were referred to, there was often little description of the purpose of these user selectable settings and how the response of the hearing aid system varied between such settings.

The technical features available in current digital technology were generally not related to the stated difficult listening conditions.

Answers were too often poorly organised.



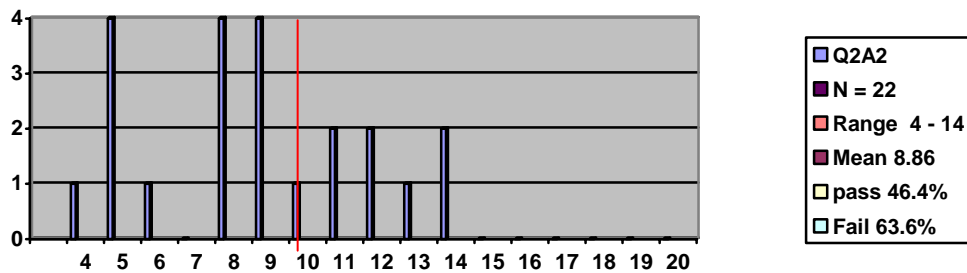
2A2 & 3A2.

- (a) Describe how real ear (or probe microphone) measurements of hearing aid performance would be carried out. Include in your answer definitions of REUR, REIR and REAR. 12
- (b) How might you check the prescription of a non-linear or WDRC aid using real ear measurements? 4
- (c) Briefly describe 2 advantages and 2 disadvantages of assessing aid performance using real ear measurements? 4

(a) Most candidates were quite strong in explaining the procedures involved in REMs as a concept and mentioned most of the salient points. A high proportion got confused, however, over the different terminology. Understanding the definitions was important in explaining their use and benefit. A candidate would not be marked down simply for getting abbreviations mixed up. Those, however, who demonstrated a rather woolly understanding of the terms and therefore their correct procedural protocol scored low marks.

(b) Most missed the significance of prescription, ie target gain curves. Too many generalised their answers reverting to "...and the patient response should always be noted.."

(c) Generally answered very well.



2A3 & 3A3 Write notes on FOUR of the following:

- (a) **Loudness scaling (or loudness mapping) and its use in aid selection and programming.** (5)
- (b) **Real Ear Insertion Gain** (5)
- (c) **Equivalent Input Noise Level** (5)
- (d) **Reference Test Gain and its use** (5)
- (e) **Real Ear Coupler Differences (RECD) and their use in programming aids** (5)

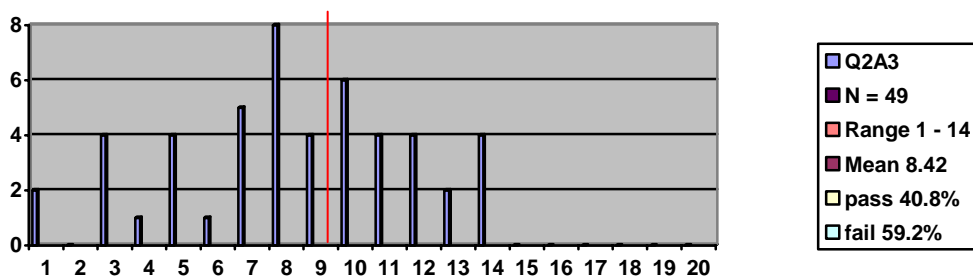
(a) Generally answered reasonably well although a high number focused more on the procedures involved in loudness scaling and not much time on explaining its application. Some also were under the mistaken impression that it could only be performed through one specific hearing aid, which should be corrected by all by trainers as this is obviously not the case.

(b) Again, as with the REM question (2A2/3A2), a number of candidates get the various terms mixed up. Credit was awarded for general comments applicable across the different measurements.

(c) Description answered well although only a minority were able to accurately define its calculation.

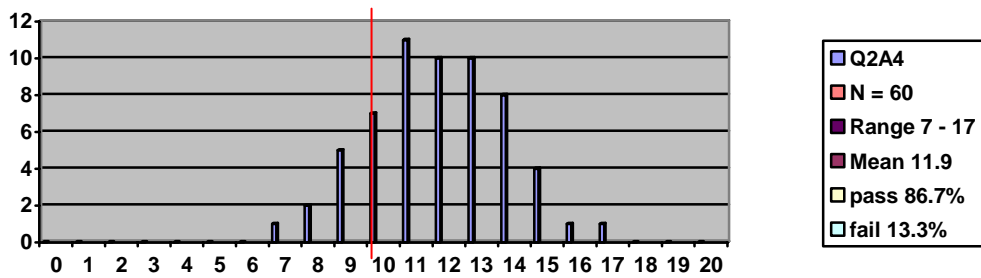
(d) Generally answered well

(e) By far the weakest topic for most. Those that did attempt to answer did not really understand its use. Trainers should pay more attention to explaining how and why as there seems to be a genuine ignorance on this topic.



- 2A4 (&3A4) Many hearing aids have or can be fitted with a telecoil.**
- | | | |
|-----|---|----------|
| (a) | In what listening conditions can a telecoil be beneficial and why? | 3 |
| (b) | What is the difference between a switch marked 'T' and 'MT'? | 2 |
| (c) | How can some programmable systems enable variations in the response of a telecoil and for what reasons would this be an advantage? | 4 |
| (d) | For what type and degree of hearing loss can a telecoil be most helpful? | 6 |
| (e) | What can be the disadvantages of a telecoil? | 5 |

Most candidates got over 50% in this question, however few earned very high marks. Attention is drawn to the allocation of marks; answers in sections c & d generally lacked sufficient detail to earn all the marks available.

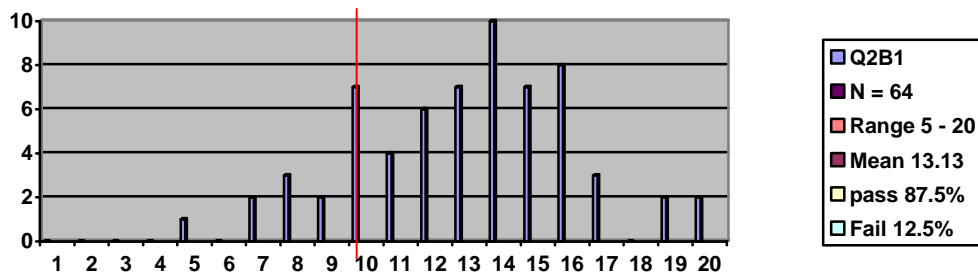


2B1 & 3B1

With reference to the *current* Code of Practice:

- (a) What are the requirements of clause 10 regarding home visits? 10
- (b) Under clause 11 what written information must be provided before a new aid is supplied. 10

Most candidates produced accurate answers. It was noted that there were more errors describing clause 10 than clause 11, suggesting a lack of understanding.



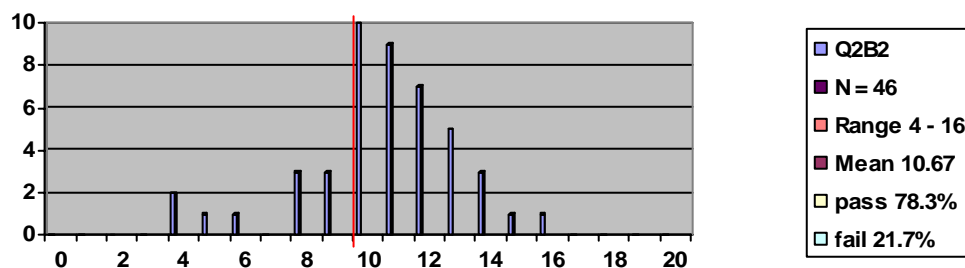
2B2 & 3A5 You have a client who is considering acquiring a hearing aid system and whose audiogram shows a typical presbycusis pattern for a person in their mid seventies. This client has an active social and family life as well as being a regular churchgoer.

- (a) Describe this client's likely hearing impairment. 4
- (b) Detail the hearing problems, which this client is likely to experience, based on the lifestyle described. 6
- (c) Explain your recommendations for a programmable, digital hearing aid system. Include any specific technical features, which may be beneficial to this client, and the reasons why they may be helpful. 10

In section (a) in which the hearing loss/impairment should be described, this was too often lacking in detail. Too much was included in this section about the likely problems associated with such a hearing loss.

In spite of so many examiner comments in the past, audiograms were still drawn without labelled axes.

Appropriate technical features and the benefits of programmable, digital technology were generally not well covered.

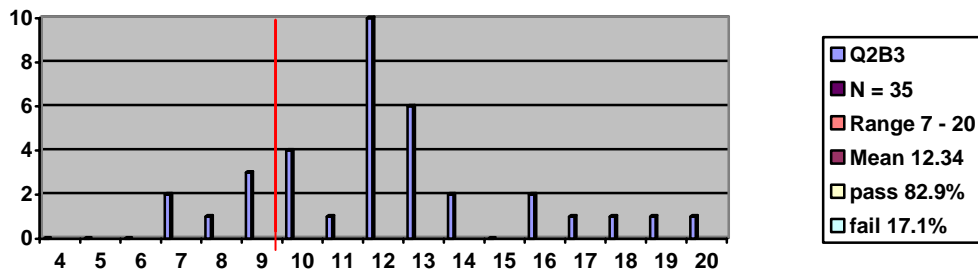


2B3 An elderly, active and intelligent client was fitted with a binaural in-the-ear hearing aid system approximately 12 months ago.

A relative of the client contacts you to say that the client stopped using two hearing aids after a few months of the fitting and has only worn one of them irregularly over the last 6 to 8 weeks.

- (a) **What are the possible reasons for this client not wearing both hearing aids regularly?** 6
- (b) **What would you do with a view to ensuring that the client makes regular use of amplification?** 6
- (c) **What can you do as a matter of routine practice to avoid such situations from arising?** 8

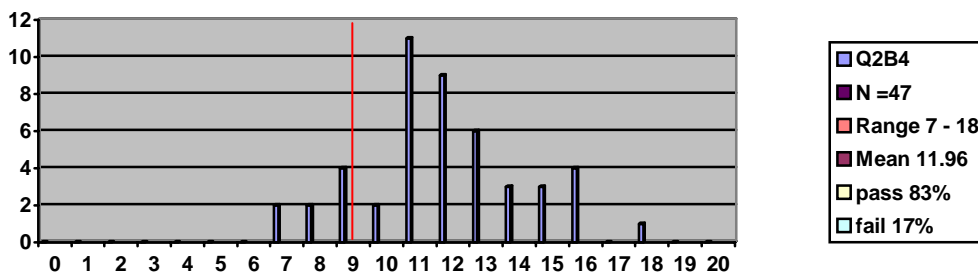
Overall this question was well answered , many candidates scored well in section a. Sections b & c caused some confusion as there is a degree of overlap, candidates who wrote very little for section c lost a substantial number of points. Marks were lost for writing about BTEs when the question deals with in the canal. Candidates suggesting actual scenarios like “perhaps the client went shooting & lost the aid are not really answering the question”. Full marks were not awarded in most cases as candidates concentrated on the “set up of the aid” or it being wrong the prescription , without stating how they would asses if this was correct or not . A lot of candidates failed to mention the role of significant others and structured rehabilitation.



2B4 New clients are advised that they need time to adapt to their new hearing instruments:

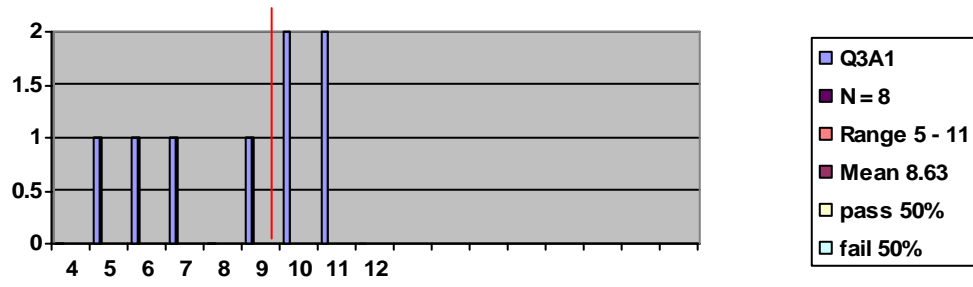
- a) **Explain why this is and what processes need to occur** (5)
- b) **What advice would you give the client to support them through this initial acclimatisation stage?** (5)
- c) **How would you advise a client to respond constructively when they fail to hear somebody talking to them?** (5)
- d) **List 5 other actions that are either to do with the environment, the speaker or the hearing impaired listener that will facilitate effective communication.** (5)

Most candidates scored over half marks on this question . Full marks were not gained by most because the changes in auditory plasticity were not explained well. Some candidates did not relate duration of loss , age , motivation etc to the advice they would give concerning the initial stages of using a hearing aid. A lot of candidates concentrated on listing hearing tactics and did not explain how to advise clients when they failed to hear . Section d was not as well answered as would be hoped , many candidates repeated the same points .



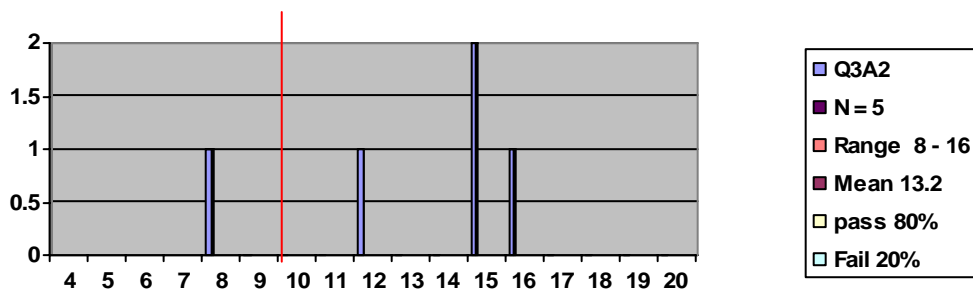
3A1

See 2A1



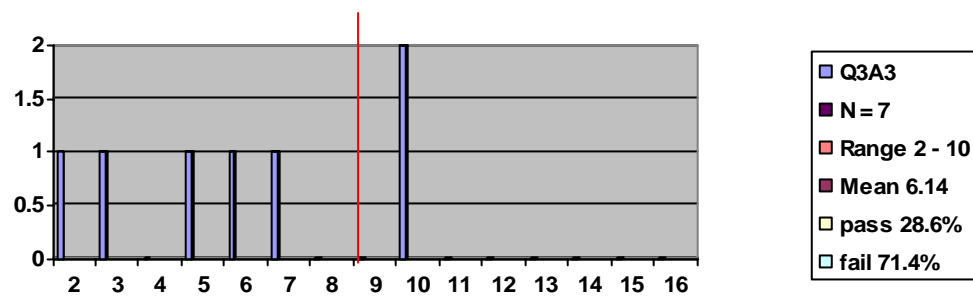
3A2

See 2A2



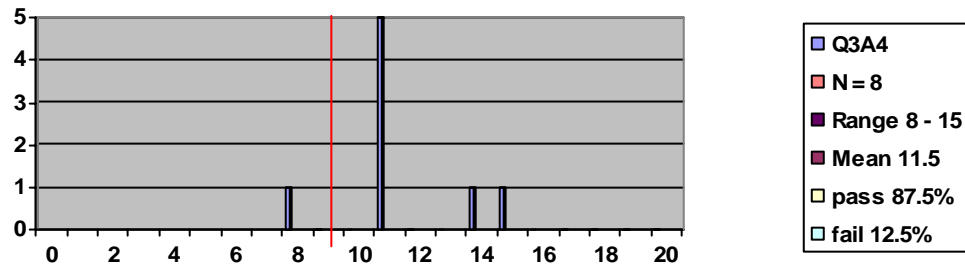
3A3

See 2A3



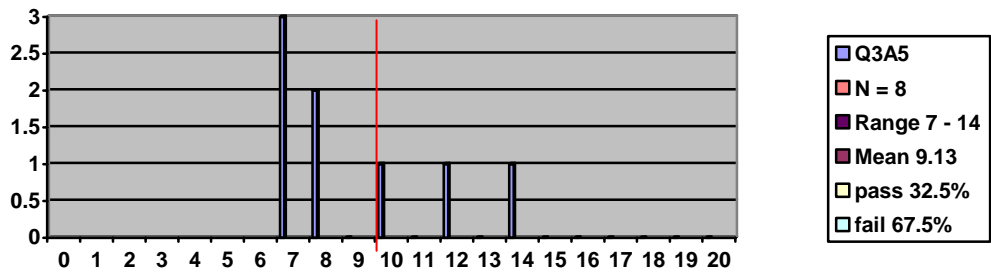
3A4

See 2A4



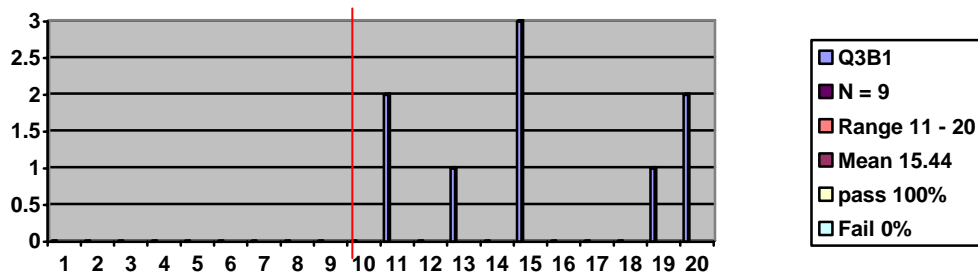
3A5

See 2B2



3B1

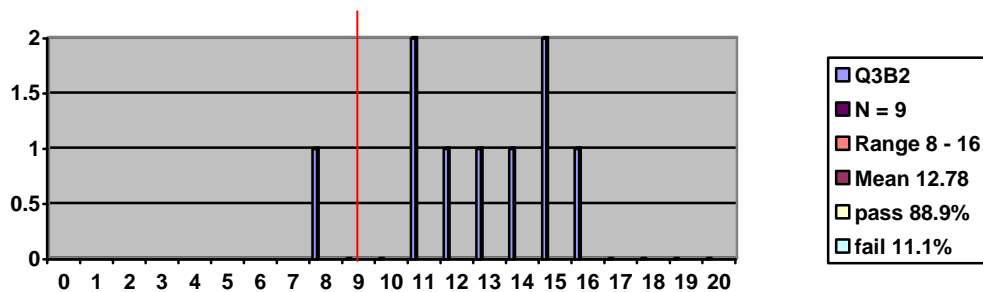
See 2B1.



3B2 In short note form, explain each of the following and include in your answer how these protect the consumer.

- (a) The restrictions on surveys regarding hearing loss (clause 17) (4)
- (b) The requirements for dispensers to service hearing aids (clause 18) (4)
- (c) Guarantee period for new hearing aids (clause 19) (4)
- (d) How dispensers may refer to their premises (clause 16) (4)
- (e) The requirements for a calibrated audiometer (clause 8) (4)

The answers to this question were generally accurate,



PRACTICAL EXAM

General

Overall 63 candidates sat the full practical with 12 (19%) failing, 50 (79.4%) passing and 1 (1.6%) achieving distinction. Of the 12 who failed 5 were offered a partial resit (see below).

10 candidates attended a partial practical resit during the week of the full practical and all 10 passed.

5 candidates attended for a partial practical resit a few weeks after their first examination and all of them passed.

Examiner's comments included.

"The courteous manner and professionalism shown made the examiners proud to be involved in this professional examination."

"The general competence was good with several candidates demonstrating a very high level of practical application."

Medical Aspects

Otoscopic examination was performed satisfactorily in most instances with appropriate attention to hygiene. Description of the findings was generally satisfactory.

There was good general knowledge of the anatomy and physiology of the external and middle ear and of the cochlea. Knowledge of vestibular anatomy and function has improved but was less well known than other parts of the ear.

Most (but not all) of the candidates knew the referable conditions under Clause 5 and the majority knew of two additional conditions which may be included under Clause 5 in the future.

Candidates knew most of the main causes of hearing impairment when prompted but would benefit from having a systematic approach eg. a classification, to aid memory. Genetic causes are still rarely mentioned. Whereas a number of candidates mentioned an "acoustic neuroma" not all knew the term now more commonly used – "vestibular Schwannoma", or the reason for this name. Some could not relate the symptoms indicating this tumour to the items mentioned in the Code of Practice indicating the need for referral for a medical opinion.

Some candidates were confused regarding the Uncomfortable Loudness Levels found in Meniere's disease. They thought that these were at lower levels than normal in this condition and used this in explaining the reduction in dynamic range which occurred.

Impression Taking

The overall standard was high with candidates demonstrating sound good practice. The following points were noted however:

- o Many candidates made minor errors when taking open-jaw impressions; in the absence of a BSA recommended procedure the HAC Examiners will issue guidelines for this.
- o Some candidates continue to use tweezers to handle clean specula. This is unnecessary
- o Instructions to the 'client should be given a little at a time, just prior to each part of the procedure. Some candidates tried to give too much instruction at one time which can confuse clients.

- o A full case history need not be taken prior to impression taking, but relevant questions must be asked. Candidates are not permitted to bring prepared case history sheets into the exam to act as memory aids.
- o It is important to have a range of sizes for otoblocks and specula; some disposable specula may not be available in a range of sizes. The correct size of otoblock and speculum must be used, and otoblock strings must be tied.
- o It is good practice to place the otoblock just beyond the '2nd bend' for all impressions, not just for ITE aids.
- o Slight jaw movement on the part of the patient can help when removing the impression, but excessive chewing motions are rarely necessary and can cause discomfort.
- o Some candidates paid too little attention to patient comfort generally and it is not good practice to grasp the top of the patient's head during any procedure.
- o The standard of earmould re-tubing was often very poor which indicates a lack of practice & experience.

Gaps in theoretical knowledge were also apparent

- o Some candidates confused skeleton and open moulds
- o The BSA procedures for cleaning specula were often mis-quoted
- o There was a lack of knowledge of relevant outer ear anatomy and its relation to otoscopy, impressions and earmoulds.

Hearing Aid Selection

The overall standard of knowledge demonstrated by candidates was good and, in a number of cases, better than their performance in the Hearing Aid and Rehabilitation sections of the written examination.

There were not many areas where it could be said that a significant number of candidates showed a lack of understanding. These comments can, therefore, be limited to:-

1. As most candidates would recommend the fitting of a DSP hearing aid system when presented with a case to consider, the question would ordinarily be asked about the qualities or properties which made a DSP system an appropriate recommendation. Many candidates struggled to suggest that it was the fact that such systems are programmable, rather than just "digital", which was important. When asked why programmability was an important property of DSP systems, too few readily explained why a dispenser had considerable flexibility to meet the needs of individual cases.
2. Too often, there was confusion between the terms "multi-channel" and "multi-programme" hearing aids as if the terms were almost interchangeable.
3. Some candidates were under the impression that a WDRC hearing aid could not be a digital hearing aid although they felt that DSP hearing aids could imitate WDRC. This was often accompanied by statements to the effect that analogue hearing aids amplified sounds but digital hearing aids did not. As amplification is a form of signal processing, this would all seem to result from the tendency of some to place specific topics into rigid compartments.
4. There was improved knowledge about outcome measures and techniques for validating a hearing aid fitting but little understanding about why these are used and the relevance of interpreting these results. The weakest area of knowledge was of Real Ear Measurements probably due to lack of practical experience.
5. Although some were rather too structured and inflexible in approach, candidates that did well, demonstrated understanding of how to individualise rehabilitation advice and discuss the relevance of recommended features to the particular case being dealt with. Disappointing comments were made by a number of candidates when talking about experienced hearing aid users and their rehabilitation. Little thought was given to their listening needs, suggestions that they might still be "in denial" and should wear a new aid for an hour first day etc were not appropriate. More focus was required on establishing how new features would provide a different listening experience and managing any unrealistic expectations about digital hearing aids.

Audiometry

The general competence was good with several candidates demonstrating a very high level of practical application.

Auricals made their first appearance in the practical exams, and caused their own set of complications! Because a written copy is required for the examiner, candidates must write out the audiogram as well as record it on the screen, this slowed proceedings down during the practical and meant that candidates lost their rhythm. It would be possible to use the aurical to perform the audiometry but record the results only on the audiogram. This would speed things up, maintain the flow of the exam, and the candidates train of thought, and leave the examiner in no doubt about the candidate's ability to record the results correctly, using the correct symbols.

Loss of marks was due to a combination of errors. The one most apparent was the rhythmical presentation of the test tone. A few candidates forgot to state 'no matter which ear you hear it in', which is a must for those clients that may present with cross hearing.

It was very pleasing to see the now widespread use of masking charts and the correct application of rule 3 of masking by most candidates, as was the application of clause 5 (e) & (f) of the C.O.P. after audiometry had been carried out.

The uncomfortable loudness level test caused a few hiccups. A few candidates are still neglecting to give a reason for the uncomfortable loudness level test. Some started at too high an intensity or jumped up in 10dB steps a definite cause for concern for clients with a substantially reduced dynamic range. Some candidates were being over protective by presenting the loud tones in very short bursts that can result in the brain interpreting the output at a reduced level – as was the case here where the ULL was elevated. Tones must be of 1 second duration with gaps between presentations of at least 1 second.

It was noted that many candidates were up to date in enquiring as to whether the client had been exposed to loud sounds prior to the visit.

Aptitude test

Nine candidates sat the theory part of the aptitude test. Of these 4 passed and 5 failed. 10 candidates sat the full practical of which 6 passed. One of those failing was offered a partial resit. One candidate passed a partial practical resit