

HAC EXAMINERS REPORT 2004(2) (Final draft 09.01.05)
Collated by J Irwin 25.12.04

THEORY PAPER

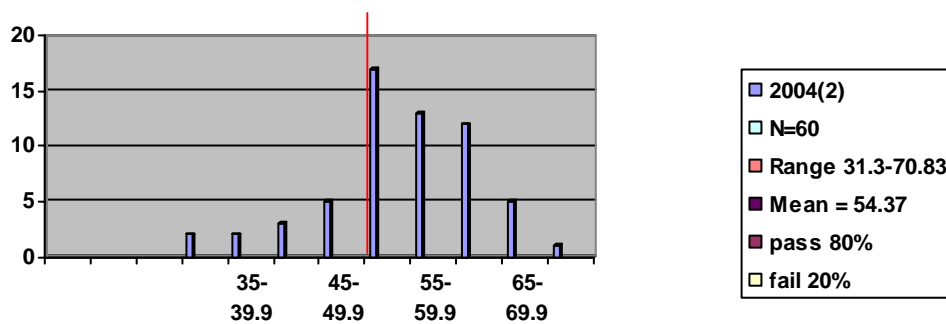
General comments

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

Of the 60 candidates who sat the theory exam 4 (6.7%) failed badly, 8 (13.3%) failed, 30 (50%) passed, 17 (28.3%) passed with merit and 1 (1.7%) 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:

In general, the rehabilitation questions were poorly answered. Candidates seemed to have learned stock answers which did not fit the question! Rehabilitation holds equal weight with other areas and deserves time and effort to be spent on it during training.

Theory Paper Overall marks 2004(2)

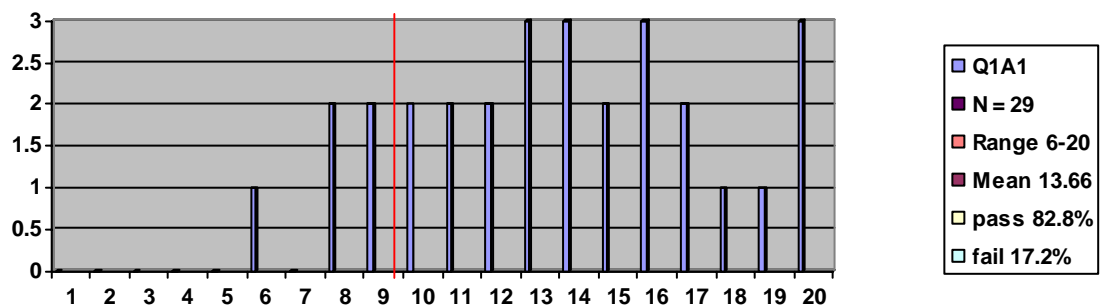


1A1 Part 1 Briefly define or otherwise explain the difference between:

- a) **Moderate and severe hearing loss.** 2
- b) **Hereditary and congenital hearing loss.** 2
- c) **Sudden hearing loss and hearing loss of rapid onset.** 2
- d) **Non-organic hearing loss and Obscure Auditory Dysfunction (OAD or King-Kopetzky syndrome).** 2
- e) **Acute otitis media (AOM) and otitis media with effusion (OME).** 2

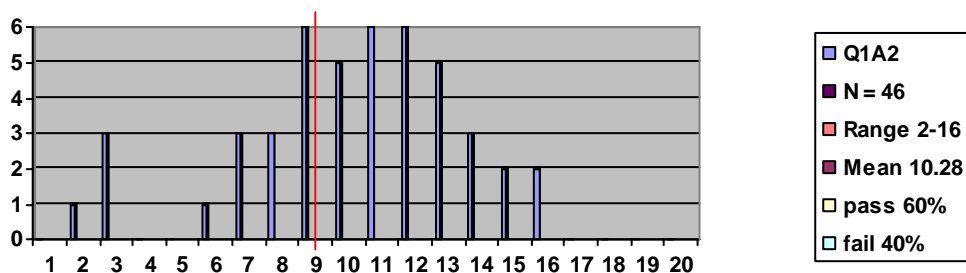
Part 2 With regard to part 1 e); In each condition (AOM and OME) describe the symptoms, otoscopic appearances, audiograms, tympanograms and treatment options available. 10

This was generally well answered. There remains confusion as to what exactly OAD is. This is by definition someone who complains of difficulties in understanding speech – especially in adverse listening conditions. The PTA is however normal. The differences between OME and AOM were also a little blurred by some candidates.



1A2

- a) **How does the cochlea respond to sounds of different frequency?** 6
- b) **How does the cochlea respond to sounds of different intensity?** 4
- c) **What are the tuning curves of the cochlea (psychoacoustical or psychophysical tuning curves, or PTCs) in relation to frequency resolution?** 4
- d) **Explain the differences between the PTCs of a normal and damaged cochlea and how this relates to the problems associated with cochlear hearing loss.** 6

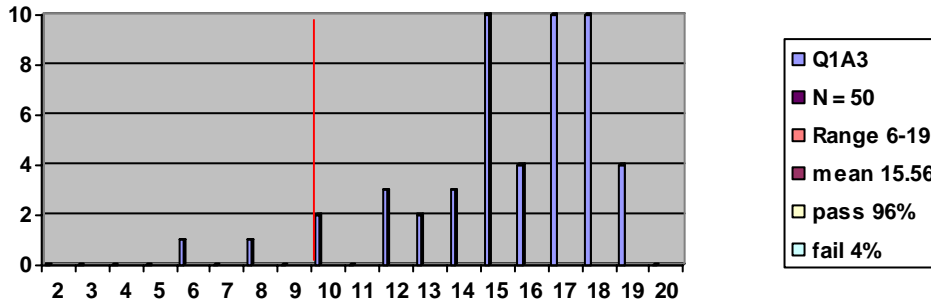


The answers to this question were disappointing. Candidates were able to describe how the cochlear responded to sound of different frequency but were less clear on the way in which the cochlear signaled intensity. Not all candidates included a sketch when describing tuning curves. Frequency resolution and recruitment were mentioned but were poorly described.

1A3

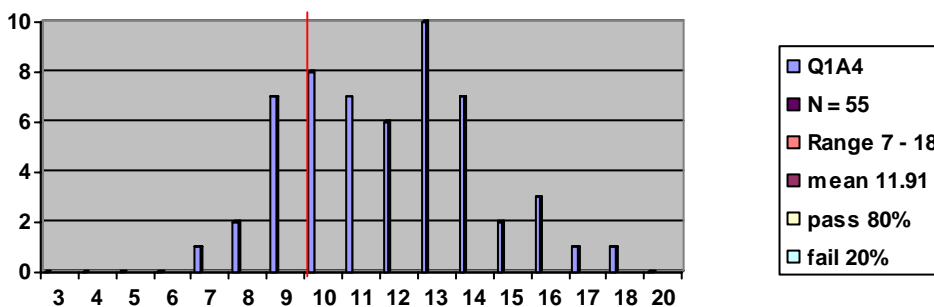
- a) **List 5 unrelated causes of hearing loss in adults.** 5
- b) **In each case describe briefly how the hearing loss happens.** 5
- c) **Describe OR draw the possible audiometric pattern that you might find in each case.** 5
- d) **Choose one condition and briefly describe the symptoms, otoscopic Findings and possible management.** 5

The confusion between OME and AOM also surfaced here. Glue ear (OME) is only found in certain circumstances in adults. Some candidates clearly answered part d) as if the client/patient was a child despite adult being highlighted in bold. Otherwise this was an easy way to pick up marks very quickly.



1A4

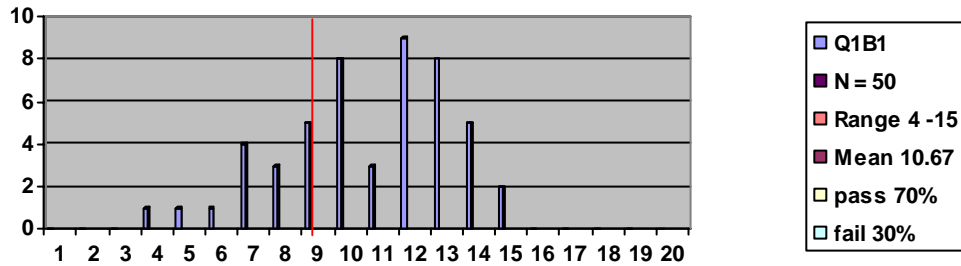
- a) **From the medical history and your findings, what would make you suspect that a client has otosclerosis?** 8
- b) **What is the mechanism behind the hearing loss in otosclerosis?** 4
- c) **Draw a “typical” audiogram that you might obtain.** 4
- d) **How might a client with otosclerosis be helped to hear better?** 4



In general this question on otosclerosis was answered quite well though some were vague regarding the pathological process involved. There was some confusion with regard to Carhart’s notch. This was apparent when an audiogram was drawn as several depicted normal bone conduction thresholds.

1B1

- a) **How do the acoustic features of speech differ from those of a sustained 1kHz pure tone?** **10**
- b) **Your client has a severe sensori-neural hearing loss above 1kHz, but normal hearing in the low frequencies. How is their speech perception likely to be affected?** **10**



a) The key word **differ** in this question is seeking a comparison between the acoustic features of speech and a sustained 1 kHz pure tone. Most candidates had a good grounding of knowledge on the acoustic features of speech, but many failed to compare this with a sustained pure tone. The answer required a comparison of the speech frequency range to a single sinusoidal pure tone: variable waveform and intensity against a constant compression and rarefaction waveform: temporal integration, with long/short cues, against a sustained waveform.

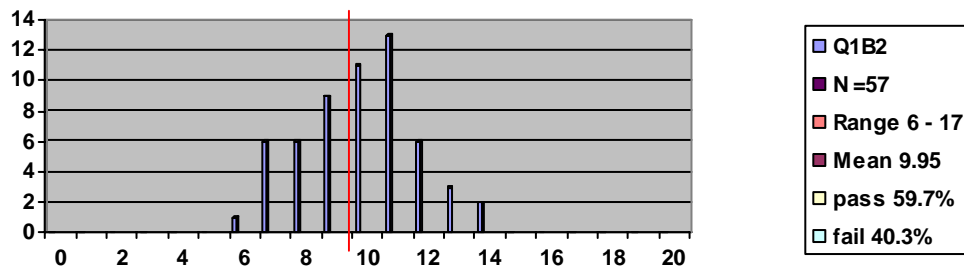
b) The effects on speech perception for a client with a hearing loss above 1kHz required the candidate to consider two aspects - the loss of speech sounds and the physiological affects. Candidates tended to lose marks on the latter when abnormal loudness growth, poor frequency resolution, upward spread of masking and limited temporal coding with the loss of cues should have been mentioned.

1B2

Describe the procedure you would follow to carry out unmasked pure tone audiometry on a client who has never previously had a hearing test. 8

How might your technique need to be varied when:

- a) testing a very elderly person 4
- b) testing someone at home 4
- c) testing someone who could not speak your language?



There were no consistent errors in the answers to 1B2 but the most common omission was to check the case history re noise exposure or tinnitus. Most candidates however scored well in this section.

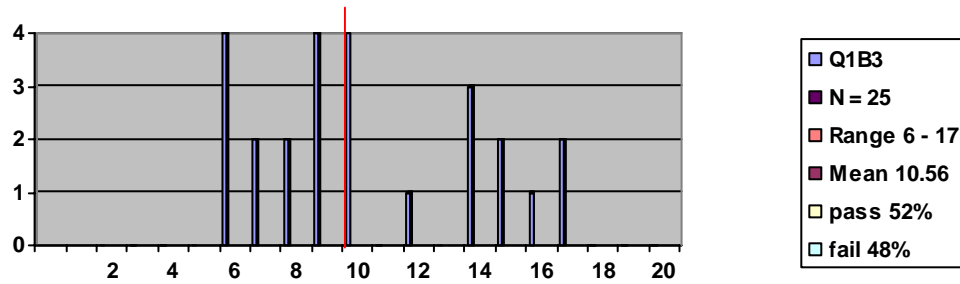
(a) Most candidates noted that a shorter than normal test would be advantageous but few suggested how this could be accomplished.

(b) This part of the question received more consistent marks but several candidates lost marks for not suggesting that an alternative venue could be sought if the noise were too high.

(c) Some interesting answers to this part of the question! On the whole the answers were good but I am not sure that dispensers should carry laminated cards with instructions for audiometry translated into all possible languages.

1B3

- a) Describe the composition of 2 types of speech lists commonly used for assessing hearing aid benefit with adults. How are the tests scored using these materials? 6
- b) Describe the relative advantages and disadvantages of these 2 lists. 6
- c) Describe how a simple speech test might be set up and undertaken to assess hearing aid benefit and mention any particularly important aspects. 8



Candidates generally did well in describing the composition of 2 types of speech lists and the method of scoring, but fared badly or did not answer the question on how a simple speech test might be **set up**. Candidates should have mentioned that sound field speech tests could be performed by live voice or with the use of an audiometer that accepts the signal from a recorder, which then passes via an amplifier to a loudspeaker. The distance from tester or loudspeaker to the client should remain constant throughout the test and levels should be checked with the use of a sound level meter.

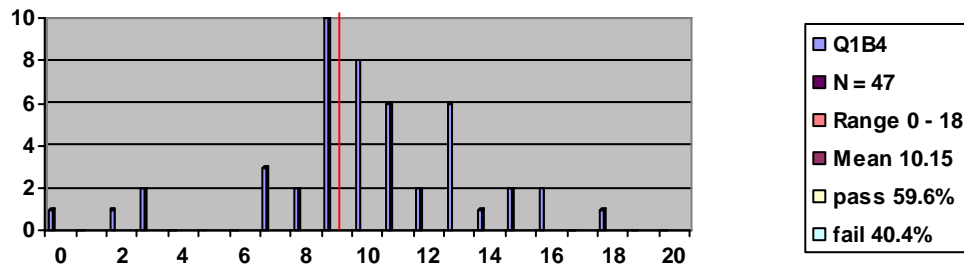
Candidates often state how the 6 weeks of practical training makes sense of the underpinning knowledge for their theory examination. With this understanding, these results would suggest that a demonstration of setting up and undertaking speech audiometry should receive more attention.

It might also make this type of question more popular!

1B4

Write short notes on:

- | | | |
|----|------------------------------------------------------------------------------------------------------------------------------|----------|
| a) | The octave frequency scale and its relevance to hearing | 5 |
| b) | What are the properties of a sound that allow you to tell whether it originates near to you or comes from a distance? | 5 |
| c) | Factors affecting reverberation time | 5 |
| d) | Upward spread of masking. | 5 |



(a) Only 1 candidate drew any similarity between the octave scale and the decibel scale. Only a few stated that the ear does not have a linear response to frequencies.

(b) Most candidates correctly stated and quoted the inverse square law. Few made reference to the reduction of high frequency energy over distance.

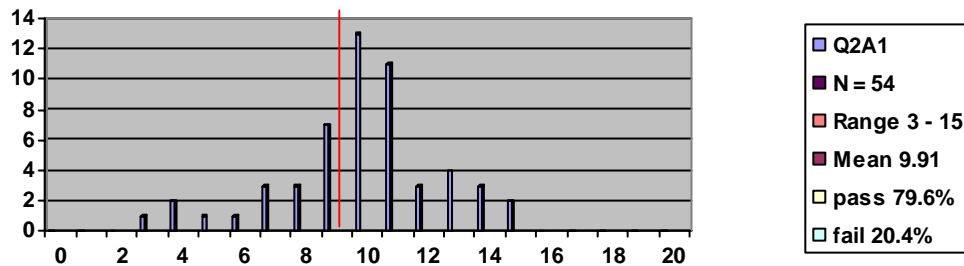
(c) This was the most consistently answered section in 1B4 with most candidates noting the influence of reflective surfaces and absorbent materials on reverberation. A lot of candidates defined reverberation time (not asked for in this question) and will have used valuable answer time to state it.

(d) This section was again well answered with most candidates receiving most marks. Many candidates dropped a mark relating the problem to the final choice of hearing aid system.

2A1

Background noise, distance from the speaker and reverberation are three different types of difficult listening conditions a person with a bilateral, sensorineural hearing loss may experience.

- a) **For each difficult listening condition listed, briefly describe a situation that illustrates the difficulties created and explain why each would be difficult for such a person.** 7
- b) **What technical features exist in currently available hearing aids are designed to assist in each of the three situations? In addition to these technical features, what other recommendations would you make to minimise each of the difficulties described.** 10
- c) **How can hearing tactics assist in each of the three situations?** 3

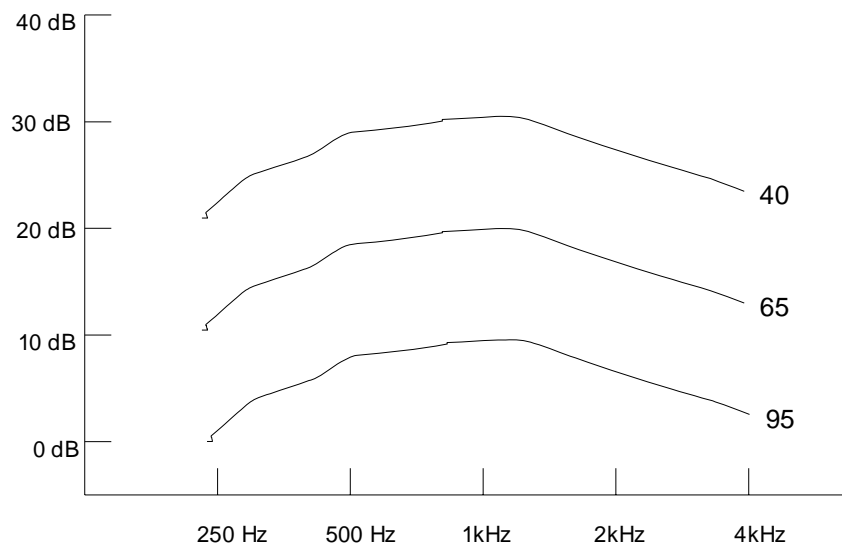


This question concerned the three main types of listening conditions which are difficult for those with bilateral, sensorineural hearing loss, namely background noise, distance from a speaker and reverberation. The first part of the question required an example of each type of difficult listening condition and why a sensorineurally impaired person would have difficulty in each example described. The second part of the question required a description of the technical features which can be found in currently available hearing aids which are designed to assist in each difficult condition and also an explanation of what other recommendations could be made to minimise the difficulties. The third part of the question asked how hearing tactics could assist.

Most candidates dealt quite well with the problems associated with background noise but less well with distance and reverberation. However, a disappointingly small number of answers drew a distinction between general environmental noise and the background noise created by a number of people talking at the same time. The term 'signal:noise ratio' was either not mentioned or, if it was, it was often not defined. Only a minority made reference to the Inverse Square Law and its particular effect on higher frequencies which are, of course, important for good speech discrimination. Descriptions of why reverberant conditions are difficult were very poor. A large number of candidates defined 'Reverberation Time' but said nothing about its significance in terms of speech intelligibility. Very much the weakest section in candidates' answers was on the technical features in currently available hearing aids which are designed to assist in difficult listening conditions. Too often, technical features such as 'noise reduction', 'speech enhancement', 'directional/dual microphones', 'telecoil' and others were described but with little or no explanation as to how they may assist and why. Again, particularly disappointing was the lack of statements about why background noise reduction features in hearing aids do not assist when the background noise consist of groups of people talking and how such features function to try and distinguish speech, as the wanted signal, from general environmental noise as the unwanted signal. Most surprising of all was that only a small minority of candidates made any reference to the beneficial effects of being aided binaurally.

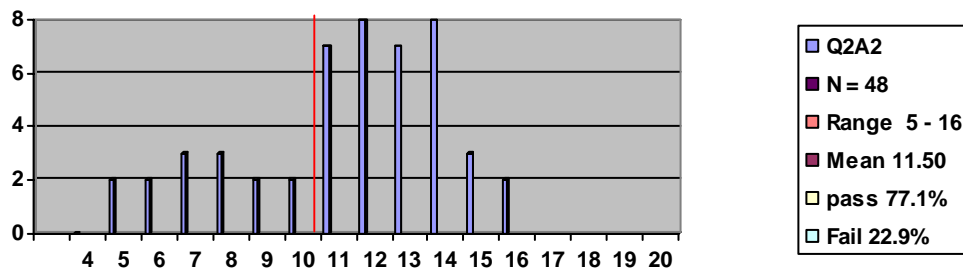
The section of answers about hearing tactics was often weakened by not stating how a particular hearing tactic may help and to which of the difficult listening conditions it was most applicable. Basically, poorly organised answers.

2A2



A digital aid produces the above graph on your computer screen when programmed to suit a client:

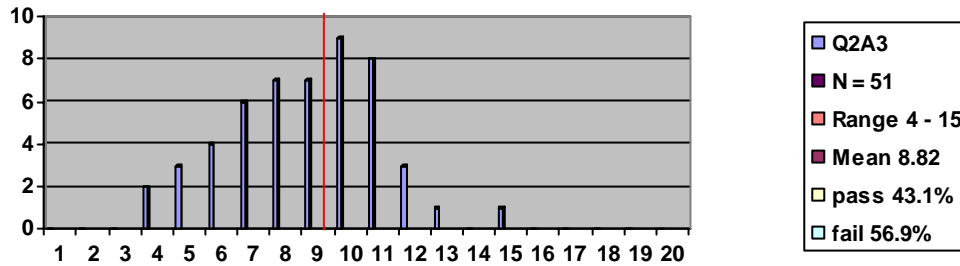
- (a) What does the graph show? 5
- (b) What can you tell about the nature of the aid from this graph? 5
- (c) If you assume that the aid is the correct one, what does the choice of aid tell you about your client? 5
- (d) Sketch an input/output chart for this aid at 1kHz and *estimate* its compression ratio. 5



This question was passed by most of the candidates that attempted it so overall candidates did well, however as can be seen from the average mark, marks were lost by the majority of candidates, this was actually across each section of the question. In a) some candidates failed to refer to the 3 different input levels, or that it was a gain graph across frequency. In b) Candidates failed to interpret the processing function of the aid as the question intended and instead referred to whether it might be a class A amplifier and a BTE / ITE. Definitions of level dependant frequency response and fixed frequency response were also confused. Part c) required candidates to discuss that compression was being used and therefore that the client would probably have a SNHL with recruitment not talk about their lifestyle. Disappointingly some candidates lost marks for simply not labelling their I/O graph or calculating the ratio. Other marks were lost because candidates did not plot the I/O function at 1kHz for the example given and simply drew a generic I/O graph, others drew a gain response curve.

2A3

- a) Explain what is meant by the occlusion effect in association with hearing aids. 6
- b) Explain which features of earmould and shell design affect occlusion. 6
- c) What audiometric results would suggest that a patient would be likely to report occlusion? 4
- d) What is meant by the viscosity of an aural impression material and why is it important? 4



This question was in four parts. The first three parts were all about the occlusion effect, how earmould and shell design affect occlusion and what audiometric results make the occlusion effect more predictable. The fourth part of the question required a definition of aural impression material viscosity and an explanation of its importance.

The occlusion effect as produced by a hearing aid fitting is a basic and important topic. Therefore, a high standard of answers was anticipated but was not to be the case. When one considers how often the occlusion effect is reported and, therefore, how frequently a dispenser has to deal with it, it is clear that trainers need to cover this topic more effectively.

Adequate venting of a fitting, as the principal method of dealing with this effect was usually discussed. However, very surprisingly, a significant number of candidates gave only a very limited explanation of why venting has a beneficial effect. When considering appropriate vent diameter or vent size, a number of candidates restricted their consideration of the audiogram to the thresholds of hearing only at 500Hz and below as advised in at least one recommended text. However, consideration should also be given to thresholds of hearing up to 1.5 KHz which can guide the beneficial use of very large or non-occluding fittings. Very few candidates referred to a deep canal fitting as being capable of reducing or even eliminating the occlusion effect.

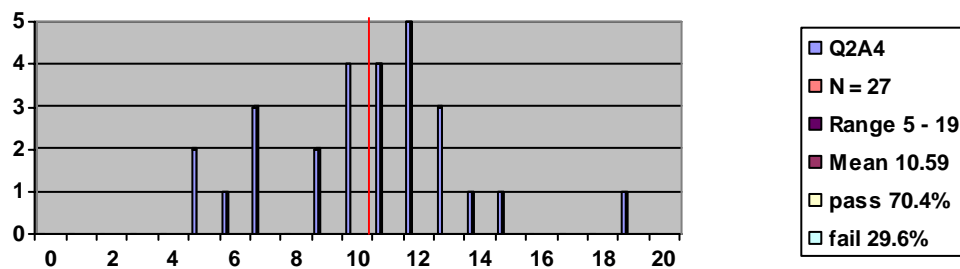
Good descriptions of what causes the occlusion effect and why it is such an issue with a client's own voice were generally poor with only a minority stating that it is a bone conduction phenomenon.

Aural impression material viscosity was generally not well covered. Viscosity was often inadequately defined. Many candidates strongly related viscosity with setting time and/or ease of mixing.

2A4

Two clients each have a moderate, bilateral, symmetrical hearing loss, one typically sensorineural and the other typically conductive.

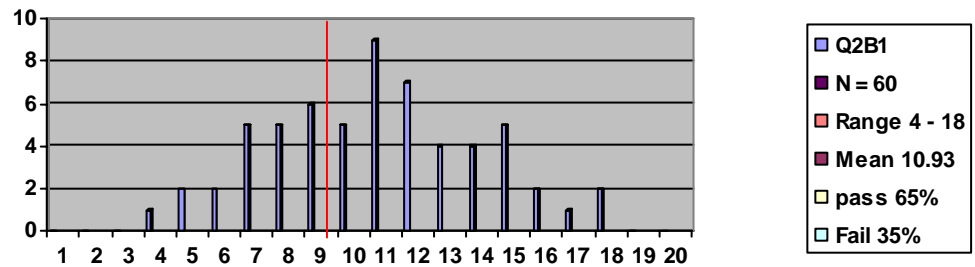
- a) Describe the hearing difficulties that these two clients would have in various listening conditions. How might these difficulties be similar or different for each client? 7
- b) Your general recommendations for a hearing aid system may not be the same for each client. Describe the similarities and the differences. 6
- c) You choose to specifically advise a programmable, digital hearing aid system for each Client. In what ways and why would your approach to programming the hearing aid system result in different performance characteristics. 7



The first part of this question was answered well but candidates lost considerable marks in the remaining two sections. A lot of candidates actually answered the detail required for c) in their answer to b) so when it came to c) they had nothing left to say. This question was marked therefore as b & c together and out of 13. The majority of candidates failed to mention actual system concepts such as bone conduction aids against air conduction, fitting binaurally, gain requirements against design and how the aids would actually be set differently to achieve a compression response for the SNHL over a linear response for the conductive. They talked about recruitment and why compression was required, which missed the point of the question.

2B1

- a) Who legally can be the ‘notified supervisor’ of a trainee dispenser? 3
- b) With reference to seven separate clauses of the Code of Practice describe seven responsibilities of a ‘notified supervisor’ in relation to a notified pre-exam trainee 7
- c) During the post-examination period what does the HAC Standard of Competence require of a supervisor and a trainee in respect of the logbooks? 8
- d) What are the duties of a supervisor of a trainee who is an applicant for registration undergoing an adaptation period? (clause 29)? 2

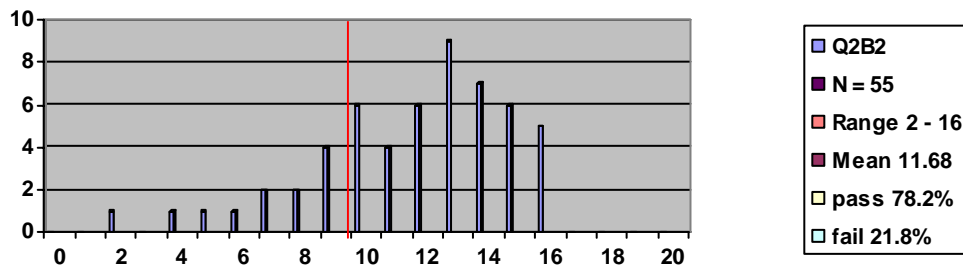


This was a simple question that most candidates attempted well although many included references to general clauses rather than those that apply strictly to supervisors. It was noted that many candidates had not studied the Code in sufficient detail to secure high marks.

2B2

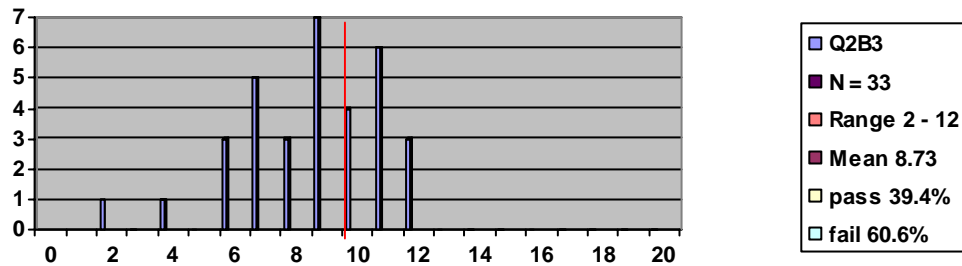
You feel that binaural aiding is appropriate for your client.

- a) Why might they initially reject the idea of wearing binaural hearing aids? 8
- b) How would you seek to change that attitude – and why? 12



Many of the answers to this question were disappointing. Candidates produced pre-learned ‘model’ answers about binaural fittings or counselling that did not really address the question. Candidates and trainers are reminded of the need to read the question carefully and make sure that the answers are relevant.

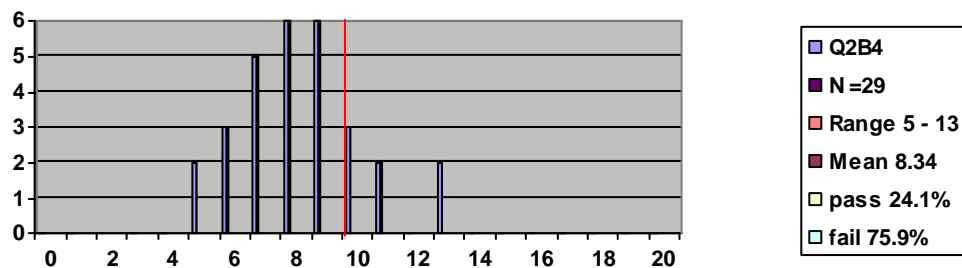
2B3: How might a person with a severe hearing loss be helped to follow proceedings in a lecture, church service or large meeting? 20



1. This is not primarily a hearing aid question. Great detail of fitting, with along discussion of WDRC etc, will gain no extra marks here.
2. Read the question: Stages of rehabilitation are not relevant.
3. Repeating your answer 3 times, i.e. for lecture, church and meeting, does not gain you additional marks.

2B4: A 28 yr-old client comes to you and tells you that she has been seen by ENT for many years. She has been told that she has a severe hearing loss in her right ear. She works in a large local department store as a floor manager in the TV, Music and HiFi department. On testing, you find a flat 80-85 dBHL loss in her right ear and normal hearing in her left ear. Having explained the results to her, she asks for your help as she is finding her work situation particularly difficult.

- a) LIST the hearing aid and earmould options that you would discuss with her. 3
- b) LIST the main consequences of a unilateral hearing loss. 2
- c) Describe how one of your options in a) would help reduce the effects of a unilateral hearing loss. 8
- d) Having discussed the hearing aid options, she is adamant that she will not wear any hearing aid system at all. What further advice would you offer this lady? 7

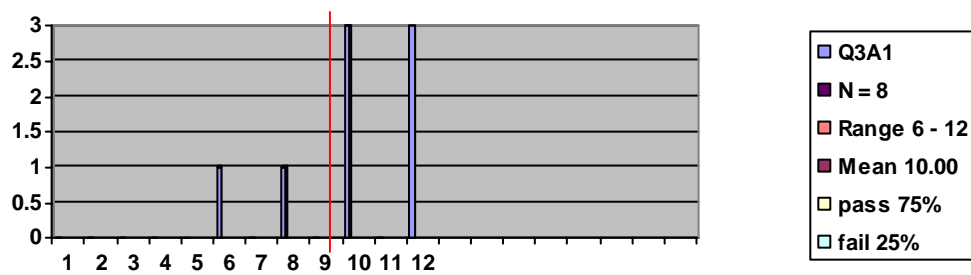


1. This is not entirely a question about hearing aid fitting!
2. Read the question: if an aid is said not to be wanted, it isn't wanted and alternatives e.g. tactics, assistive devices, etc. are required.
3. Read the question: The rehabilitation route is not required here.
4. Read the question: An audiogram is not a relevant diagram here.
5. Read the question: This client has been seen by ENT for many years. We do not need to refer her.
6. Unilateral loss is not the same as binaural hearing! Both thought and rewording is needed if you wish to list some binaural advantages.

3A1

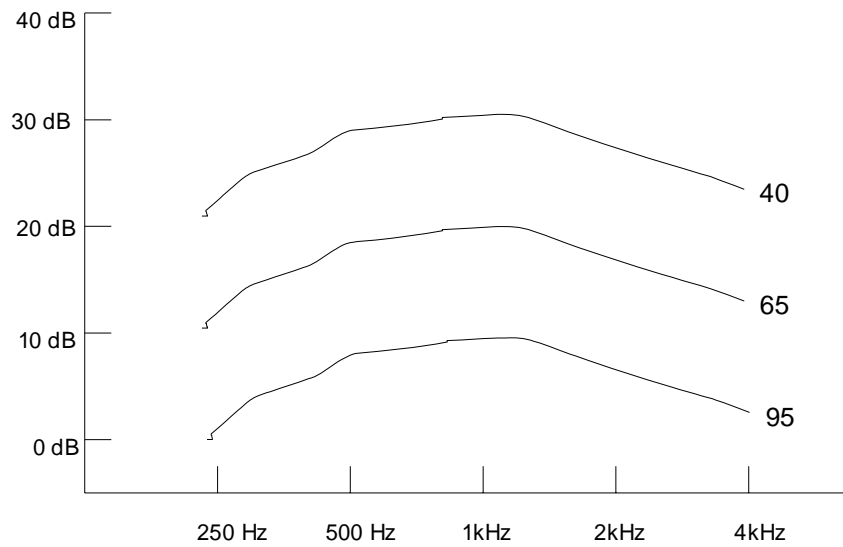
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See 2A1

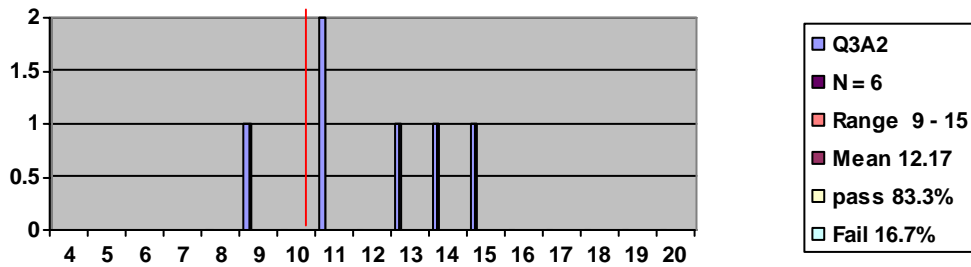
3A2



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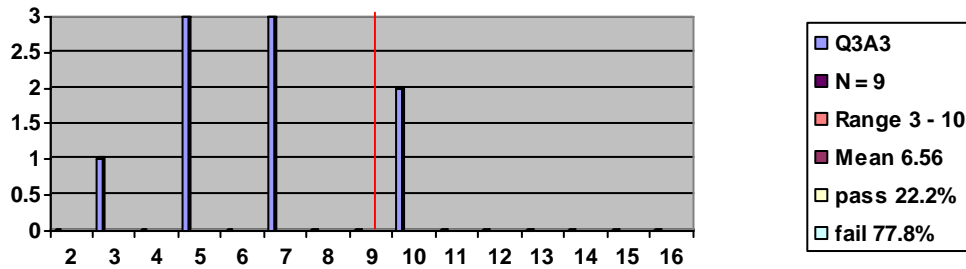
Sketch an input/output chart for this aid at 1kHz and *estimate* its compression ratio.



See 2A2

3A3

- a) Explain what is meant by the occlusion effect in association with hearing aids. 6
Explain which features of earmould and shell design affect occlusion. 6
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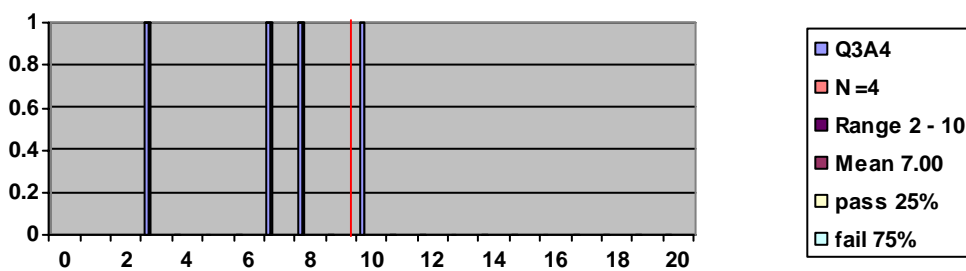


See 2A3

3A4

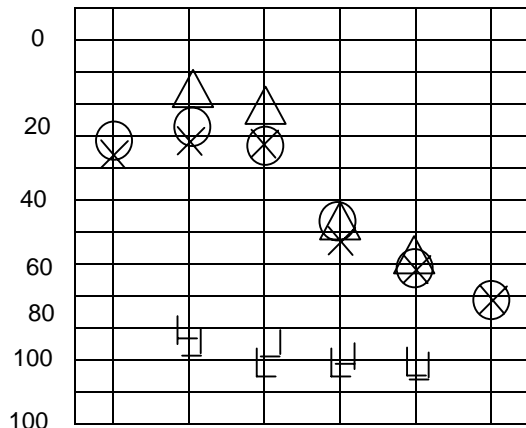
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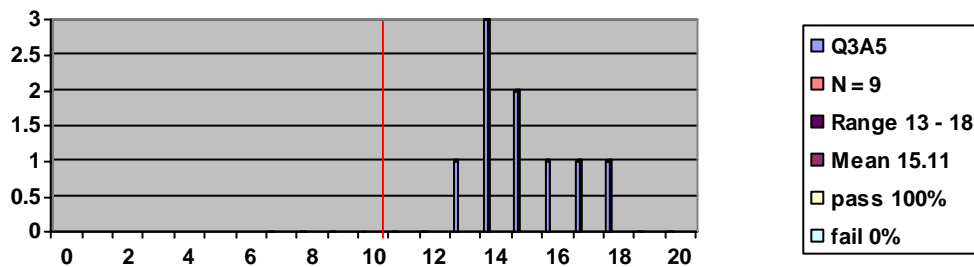
See 2A4

3A5



Study the audiogram above.

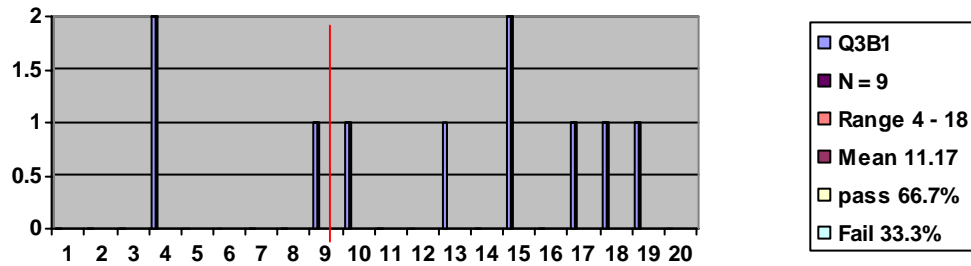
- a) Based on this audiogram how would you expect the client to describe their hearing difficulties? 3
- b) Explain the frequency response you are aiming to achieve through a hearing aid fitting and what you want to avoid. 4
- c) In the case of a BTE fitting:
 1. Give four reasons why you would choose a binaural fitting 4
 2. Give four reasons why you would choose to fit monaurally 4
 3. State what earmould style and material you would select and why 3
 4. State what tubing you would use and why 2



This question was answered well as can be seen from the scores. Marks were dropped for failing to mention all typical comments from a client like this, but just saying “can’t hear well” rather than explaining discrimination issues and noise related effects. Other marks were lost for not considering the need to ensure that the upward spread of masking was avoided and exploring the use of libby horns and open fittings.

3B1

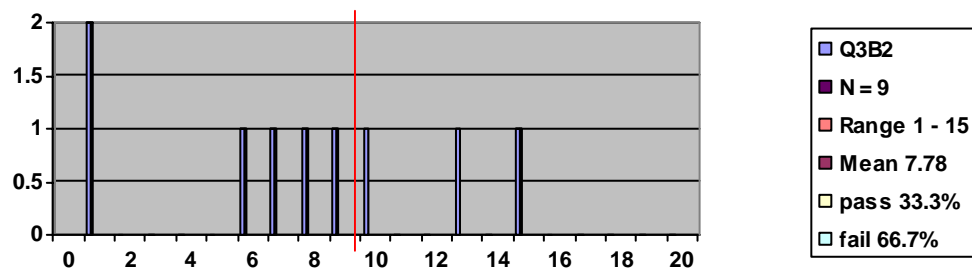
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- d) What are the duties of a supervisor of a trainee who is an applicant for registration undergoing an adaptation period? (clause 29)? 2



See 2B1

3B2

- a) Under clause 19 of the Hearing Aid Council’s Code of Practice what must a dispenser do regarding the manufacturer’s warranty when fitting a new hearing aid? 16
- b) How does this protect the consumer? 4



Some candidates did well here, having studied the Code thoroughly and understood its intention. However other answers were very poor, showing insufficient attention to detail.

PRACTICAL EXAMINATION

Total 78 Pass 43 Fail 25 (36.76%) (Includes aptitude candidates)

Medical Aspects

Candidates showed a satisfactory level of hygiene and were careful to brace when examining the eardrum. Most were able to describe their findings adequately and were able to recognise abnormalities from pictures.

Most knew the list of referable conditions but some mixed up a sudden hearing loss and a worsening of hearing. A few forgot the limit of 90 days when describing some of the items on the list.

Knowledge of the anatomy of the cochlea was satisfactory and there was a noticeable improvement in the ability of candidates to describe the anatomy and physiology of the vestibular system.

On the whole candidates were more knowledgeable about post-natal causes of hearing impairment than congenital causes. Although some were aware of the action levels in industrial noise legislation, there was uncertainty regarding the intensity with which each action level was triggered.

Impression Taking

The standard was variable, with some of the Aptitude Test candidates being particularly poor. All candidates and trainers should note the following:

- o Candidates must adhere to the BSA Recommended Procedure for Impression Taking.
- o Candidates should study and adhere to the HAC's guidelines for Open Jaw Impressions. This document is available from the HAC's web site
- o Candidates must have a range of speculum sizes available and use the correct one. It is also important to select the correct size of otoblock. Candidates who realise that the wrong size has been selected are not penalized if they change it.
- o Candidates must advise the 'patient' of the cough reflex and feeling of fullness etc that may be experienced when the otoblock and impression material are introduced to the ear canal
- o The correct otoblock depth is important. Some were too shallow although some candidates tried to insert it as far as possible rather than stopping just beyond the second bend. This causes unnecessary discomfort and potential for injury.
- o Candidates are reminded that the pinna must not be pulled when the impression material is being syringed into the ear.
- o Some candidates did not use sufficient care when measuring the impression materials
- o Some candidates were very poor at re-tubing earmoulds and did not know when re-tubing should be performed.

Hearing Aid Technology

In order to make the 'Hearing Aid' section of this examination more practical and interactive, more emphasis is being placed on how the candidate can explain the practical aspects of hearing aid system fitting to a client. Most candidates did well when asked questions about the physical fitting aspects such as being able to identify models, batteries and how to fit them, although this still defeated some candidates. Understanding of multi channels, programmes, directional mics & various DSP processing strategies overall was also reasonably well understood. Candidates also generally did well with questions on verification of hearing aid system performance and benefit.

However this is only a part of the exam. Other areas include:

- Being able to explain the selection choice to the client;
- Relating the selection choice to the given case study life style & previous experience;
- Explaining how they would manage a client's expectations from a new hearing aid system to ensure that they were realistic;
- Explaining to a client how to become accustomed to their new hearing aid system.

Candidates that failed or bordered lacked these skills. Attention needs to be given to adapting rehabilitation approaches to the given case study and to the use of other listening devices other than just DSP aids. Many candidates found it very difficult to put their rehabilitation advice into simple and clear language suitable for an audiotically naïve client. Candidates also generally found it difficult to vary their advice for different clients and often presented the same information in the same manner.

When dealing with case studies, candidates are asked sometimes to compare two cases which have significant differences. Too often candidates were slow to take account of differences in lifestyle and, therefore, of the hearing handicap when considering what hearing aid system recommendations they would make which, in the words of the HAC Code of Practice, would be their "best possible advice".

Audiometry

One aspect of the audiometry practical that is heavily weighted and leads to failure is the lack of understanding the BSA rules of masking. The need to mask is a difficult concept to grasp but essential. True thresholds must be obtained for correct hearing aid prescription and the disclosure of referable cases. Rule 3 of masking and when it is necessary to mask the ear with the worse AC thresholds in Rule 2 appeared to be the stumbling block for quite a few candidates.

Most candidates did well at noting any referable cases; therefore it seemed a pity when one was missed, just because of improper consideration of masking.

Candidates regularly checked to see whether the BC transducer was correctly placed behind the ear after the test, but on a few occasions the transducer had slipped during the test procedure. Some candidates got over this problem by asking the client to state when the transducer had moved from its position. This seems good practice, as a tilted BC can lead to false readings and can be most uncomfortable for the client.

The aptitude candidates must be disappointed at the poor results in this practical examination. All will have passed their own professional practical examination, whose high standard of application is well recognised. Unfortunately, time and pressure of work may contribute to short cuts and deviation from the BSA recommended procedures. The examiners would advise candidates to read and adhere to the latest BSA recommended procedures for pure tone audiometry. If possible ask a professional assessor to put you through your paces and iron out any errors that might have crept in over the years. Please remember to take time over ensuring that your audiometer looks presentable before attending the practical examination – no twisted leads or poor tension of the headbands.

PRACTICAL EXAMINATIONS PARTIAL RESITS

A total of 6 candidates attended for partial practical resits. 3 sat Medical Aspects, 2 Audiometry, 2 Hearing Aid Technology and 1 Impressions.

5 candidates passed and one failed.

In general the few weeks between the first and second examinations has been put to good use by the candidates with a marked improvement in standard.