Commentary on Candidate Evidence

Statistics (Advanced Higher)

Question 3(a) (4 marks)

Last year it was claimed that pianists were awarded lower marks than violinists for their performance in the exams offered by a particular Music Exam Board.

(a) (i) Give a reason why obtaining a sample of such exam marks might not be possible.

(ii) Assuming that this problem has been overcome, you are asked to obtain a random sample of around 15% of pianists from the 20 centres in which the Exam Board operates. Outline how you would obtain such a sample, given that there is a strict budget which means that you must keep travelling expenses to an absolute minimum.

Marking Instruction		
Question	**Generic scheme**	**Illustrative scheme**
3 (a) (i)	•[1] appropriate reason	•[1] the Board may not be willing to release such confidential information
(ii)	•[2] appropriate sampling method •[3] appropriate strategy •[4] continue method	•[2] cluster sampling •[3] chose, say, 3 centres at random •[4] use all the data from the 3 centres

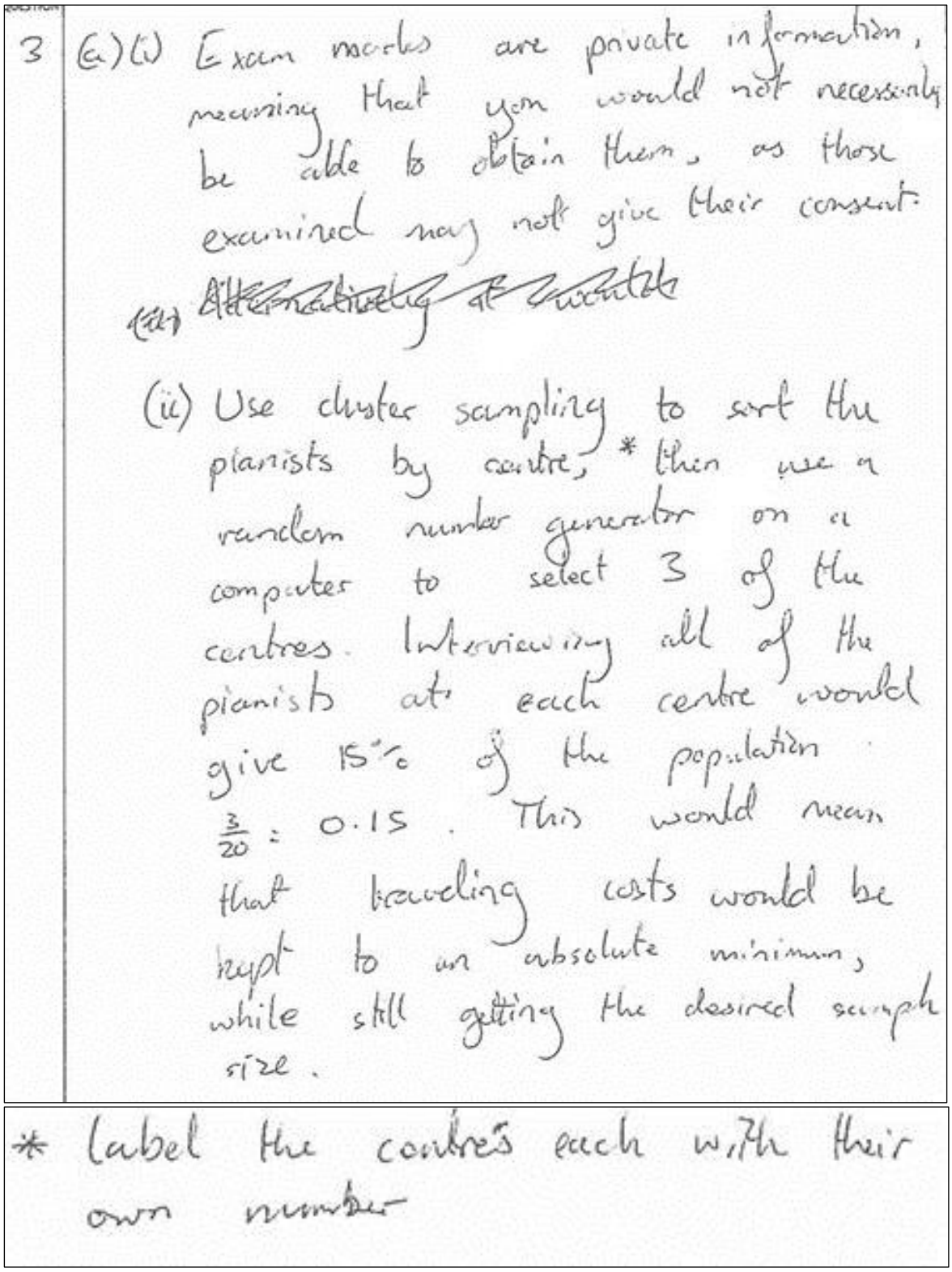
Candidates were expected to:

1. comment on the likely confidentiality of the process
2. state the type of random sampling chosen to address the issue of minimum travel (not no travel eg email)
3. consider the c.15% requirement
4. briefly describe the sampling procedure

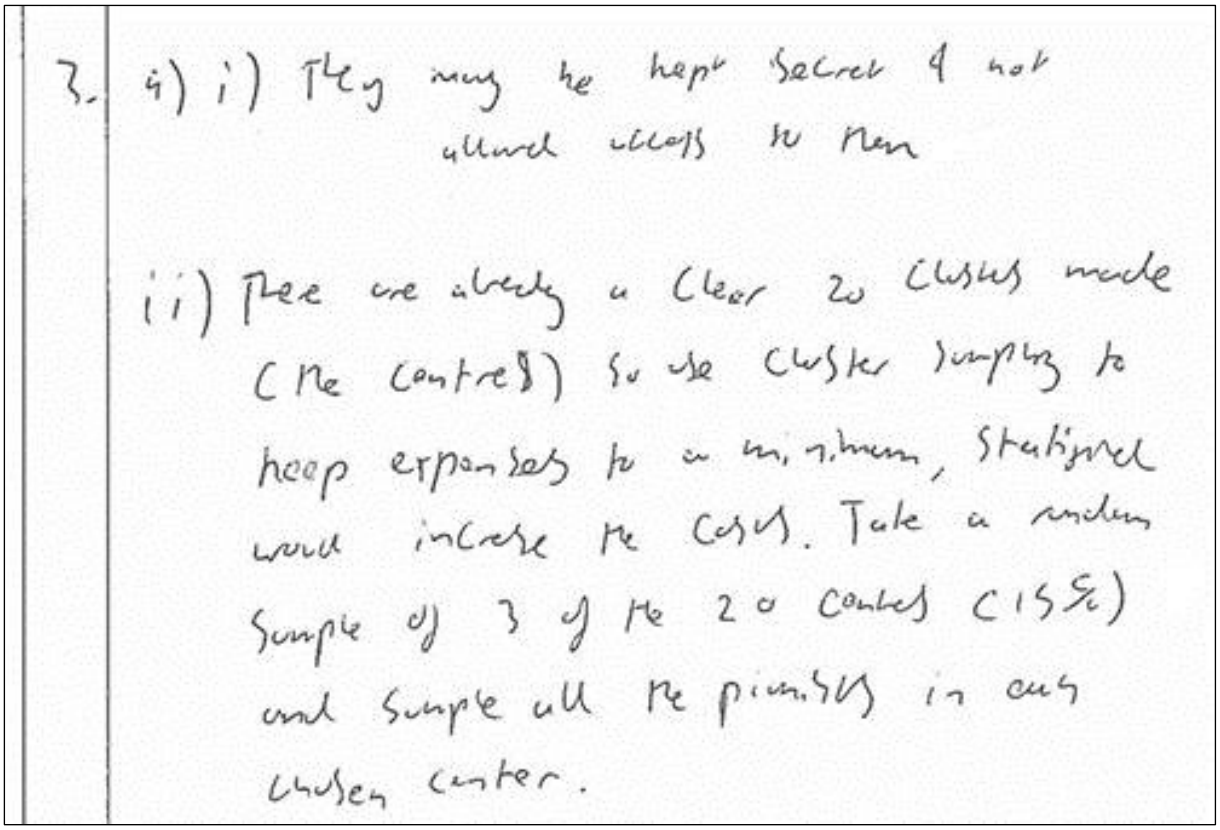
Candidate 1 and 2

The following two candidates were each awarded 4 marks for covering the 4 aspects of the desired response.

Candidate 1



Candidate 2


3. a) i) They may be kept secret & not allowed access to them

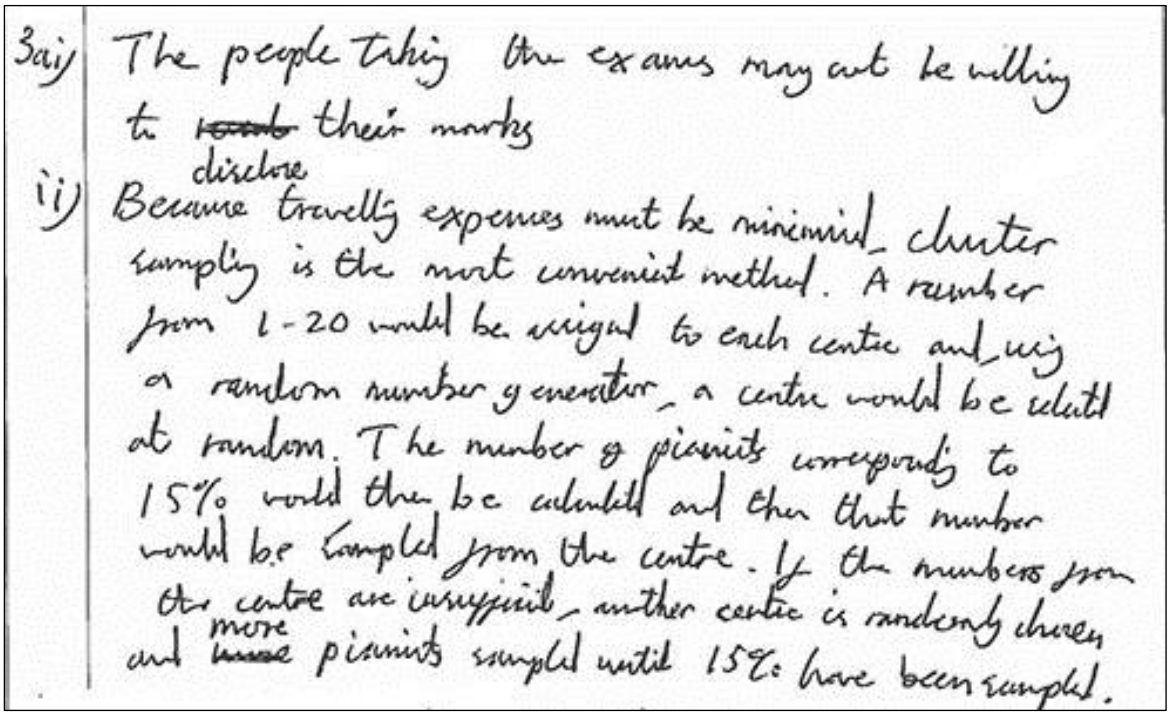
ii) There are already a clear 20 clusters made (the centres) so use cluster sampling to keep expenses to a minimum, stratified would increase the costs. Take a random sample of 3 of the 20 centres (15%) and sample all the pigmies in each chosen center.

Candidate 3, 4 and 5

The following candidates were each awarded 3 marks.

Candidate 3

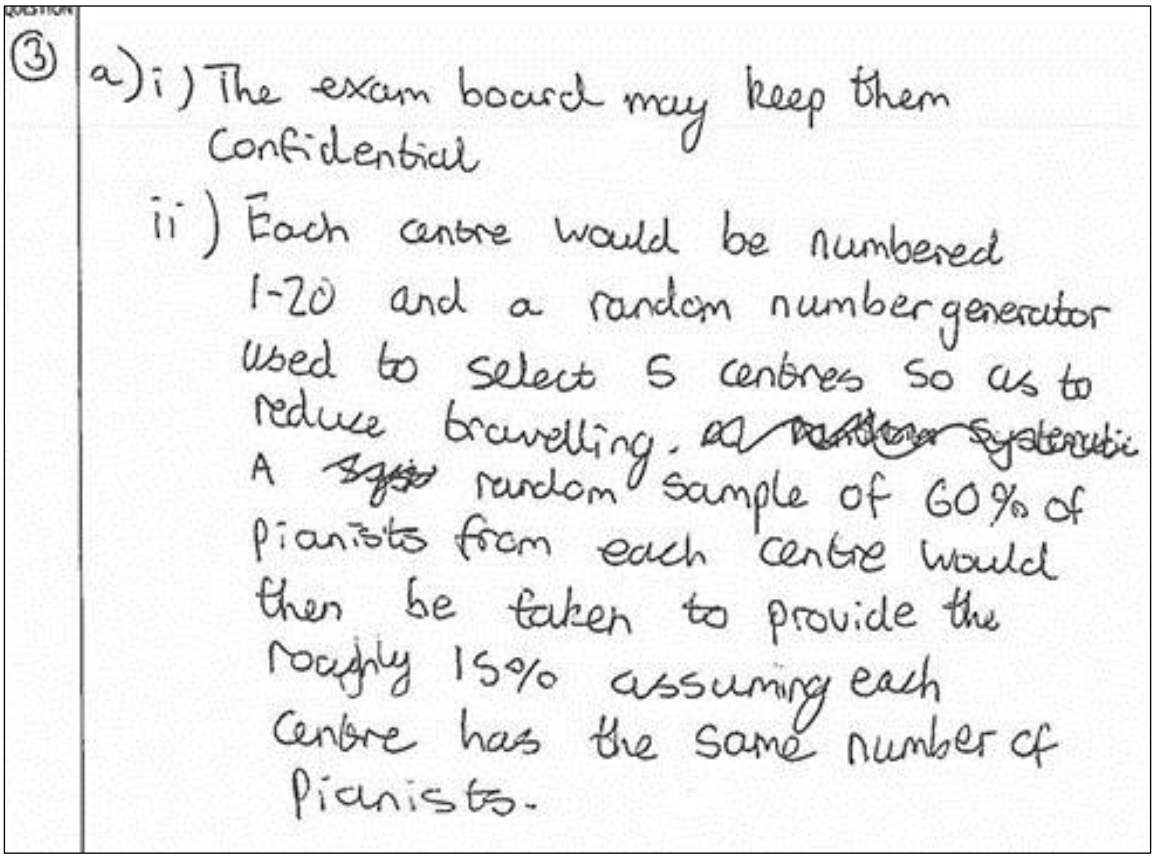
This candidate missed the idea of sampling every pianist from 3 randomly chosen centres – it is not perhaps realistic to hope that one centre would provide 15% of the pianists.


3ai) The people taking the exams may not be willing to ~~tell~~ disclose their marks

ii) Because travelling expenses must be minimised, cluster sampling is the most convenient method. A number from 1-20 would be assigned to each centre and using a random number generator, a centre would be selected at random. The number of pianists corresponding to 15% would then be calculated and then that number would be sampled from the centre. If the numbers from the centre are insufficient, another centre is randomly chosen and more pianists sampled until 15% have been sampled.

Candidate 4

This candidate's method of sampling is unusual but reasonable and the only flaw is travelling to 5 centres when 3 would probably do, and this does not wholly address the issue of minimal travelling.

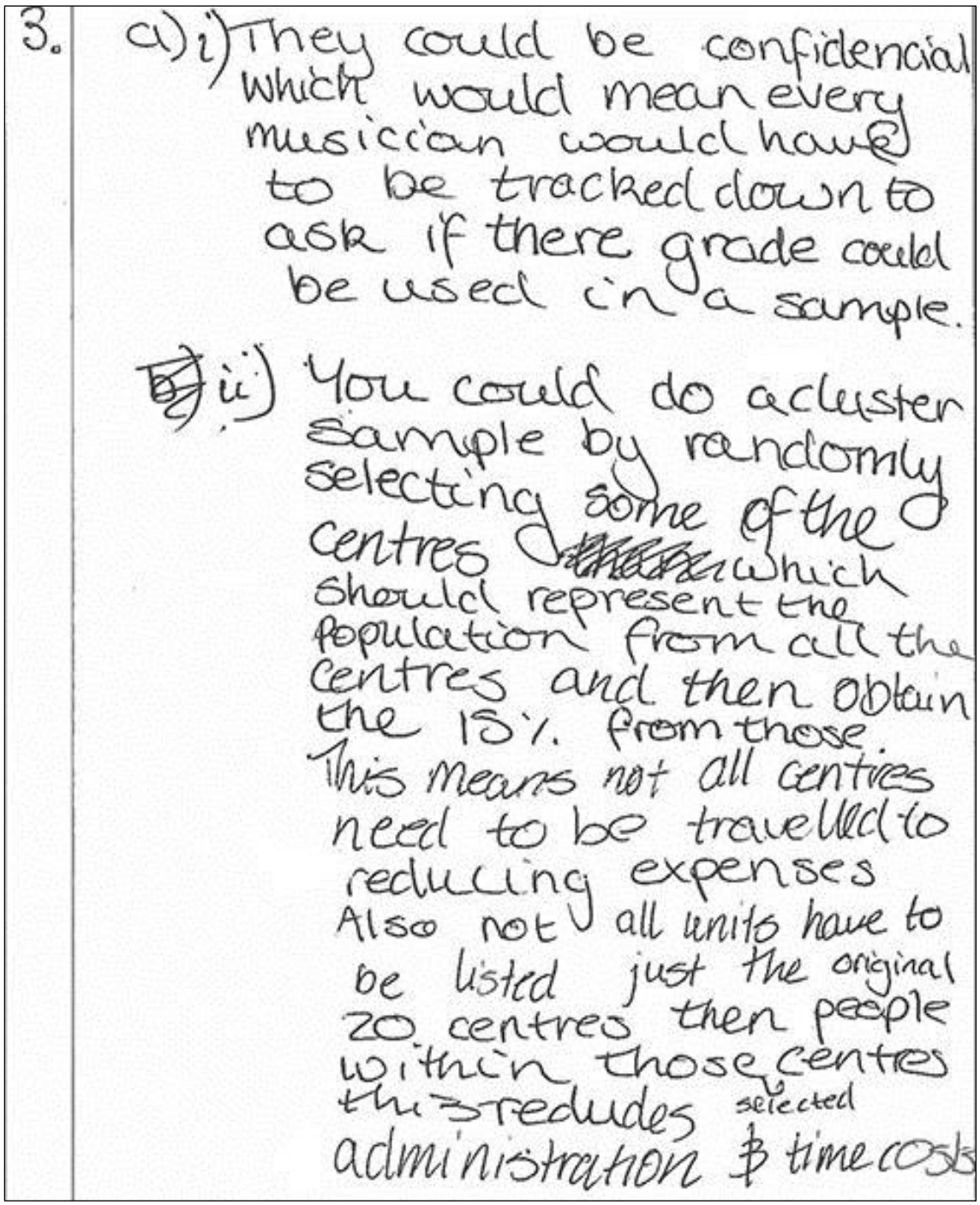


③ a) i) The exam board may keep them confidential

ii) Each centre would be numbered 1-20 and a random number generator used to select 5 centres so as to reduce travelling. ~~a random or systematic~~ A ~~systematic~~ random sample of 60% of pianists from each centre would then be taken to provide the roughly 15% assuming each centre has the same number of pianists.

Candidate 5

This candidate response could only have been awarded 2 marks due to the slight lack of detail, but the cost of the travelling aspect has certainly been addressed and 'cluster' is up front and so 3 marks were awarded.


3. a) i) They could be confidencial which would mean every musician would have to be tracked down to ask if there grade could be used in a sample.

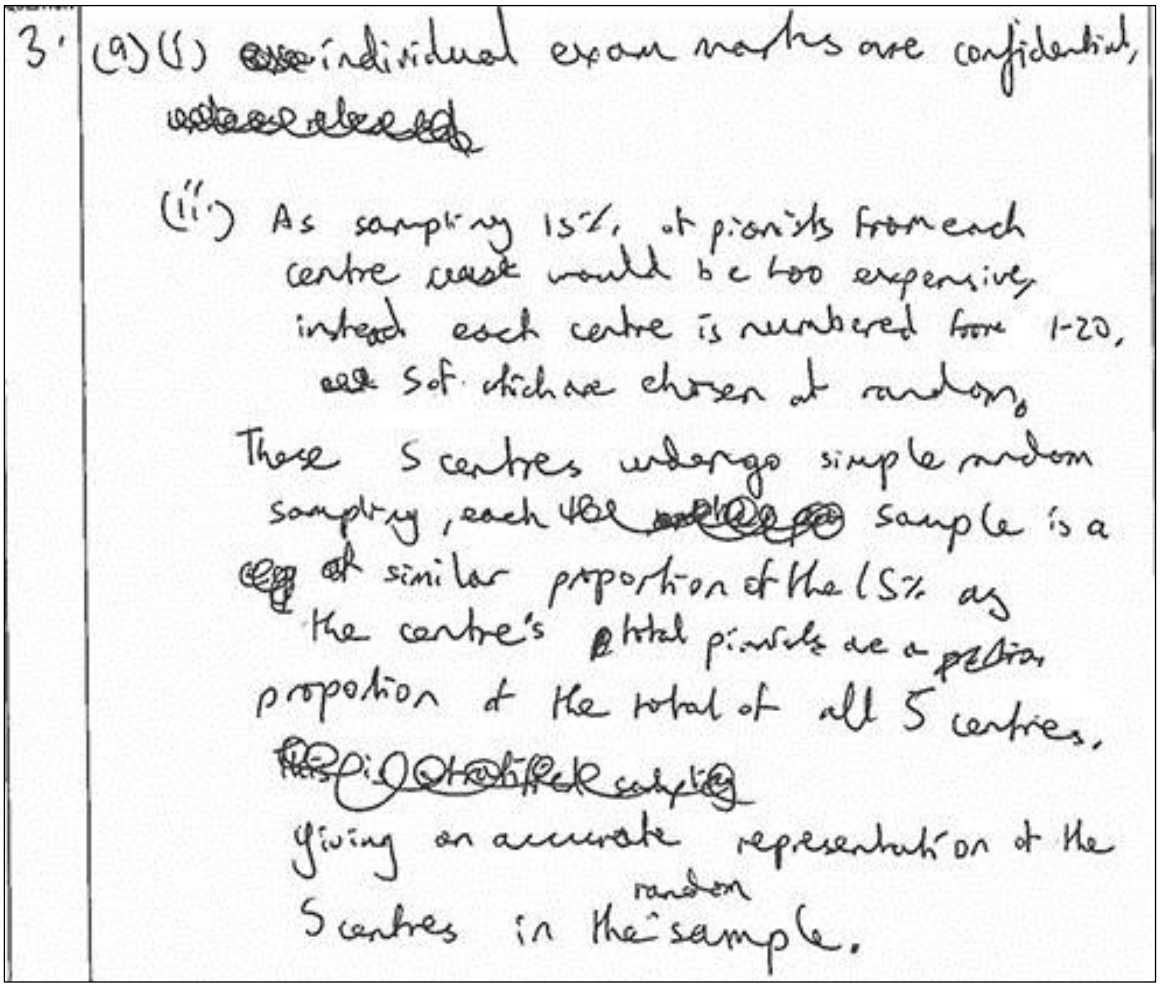
ii) You could do a cluster sample by randomly selecting some of the centres which should represent the population from all the centres and then obtain the 15%. from those. This means not all centres need to be travelled to reducing expenses Also not all units have to be listed just the original 20 centres then people within those centres selected this reduces admin istration & time costs

Candidate 6, 7 and 8

The following candidates were each awarded 2 marks.

Candidate 6

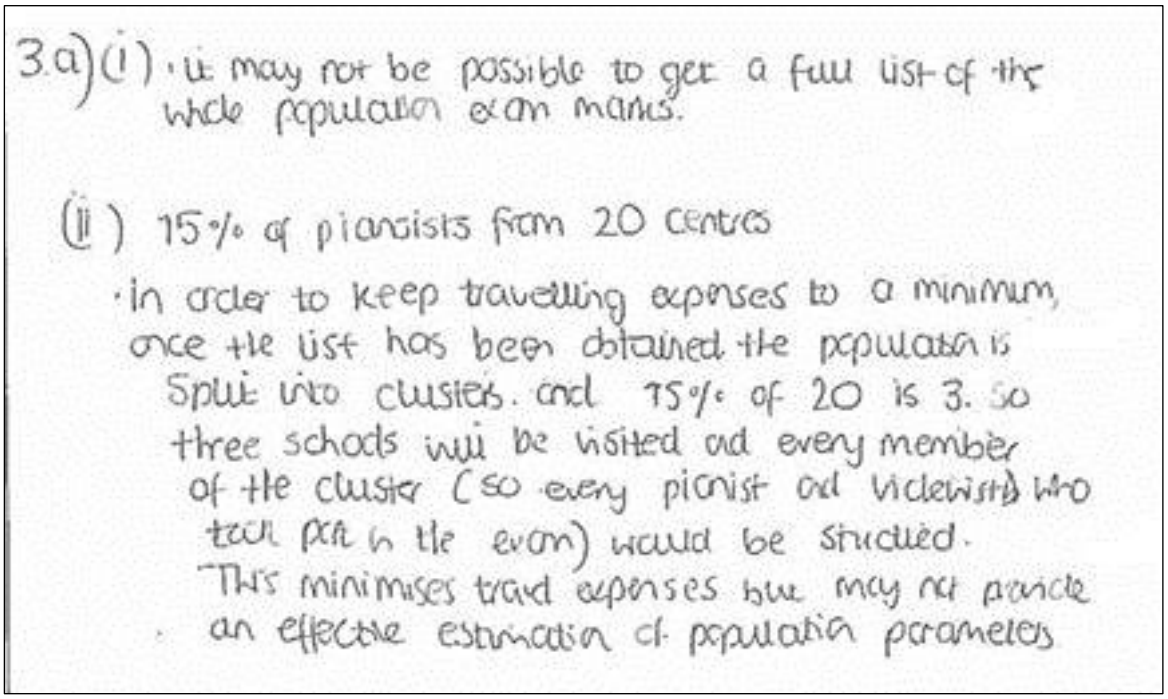
This candidate has made no mention of ‘cluster’ and it is not clear why 5 centres were chosen when 3 might be enough. The gathering of 15% is not very clear.


3. (a)(i) individual exam marks are confidential,

(ii) As sampling 15%, of pixels from each centre would be too expensive, instead each centre is numbered from 1-20, 5 of which are chosen at random. These 5 centres undergo simple random sampling, each the sample is a of similar proportion of the 15% as the centre's total pixels are a portion proportion of the total of all 5 centres, giving an accurate representation of the random 5 centres in the sample.

Candidate 7

The issues of confidentiality and randomness have not been addressed adequately by this candidate. What 'schools'?

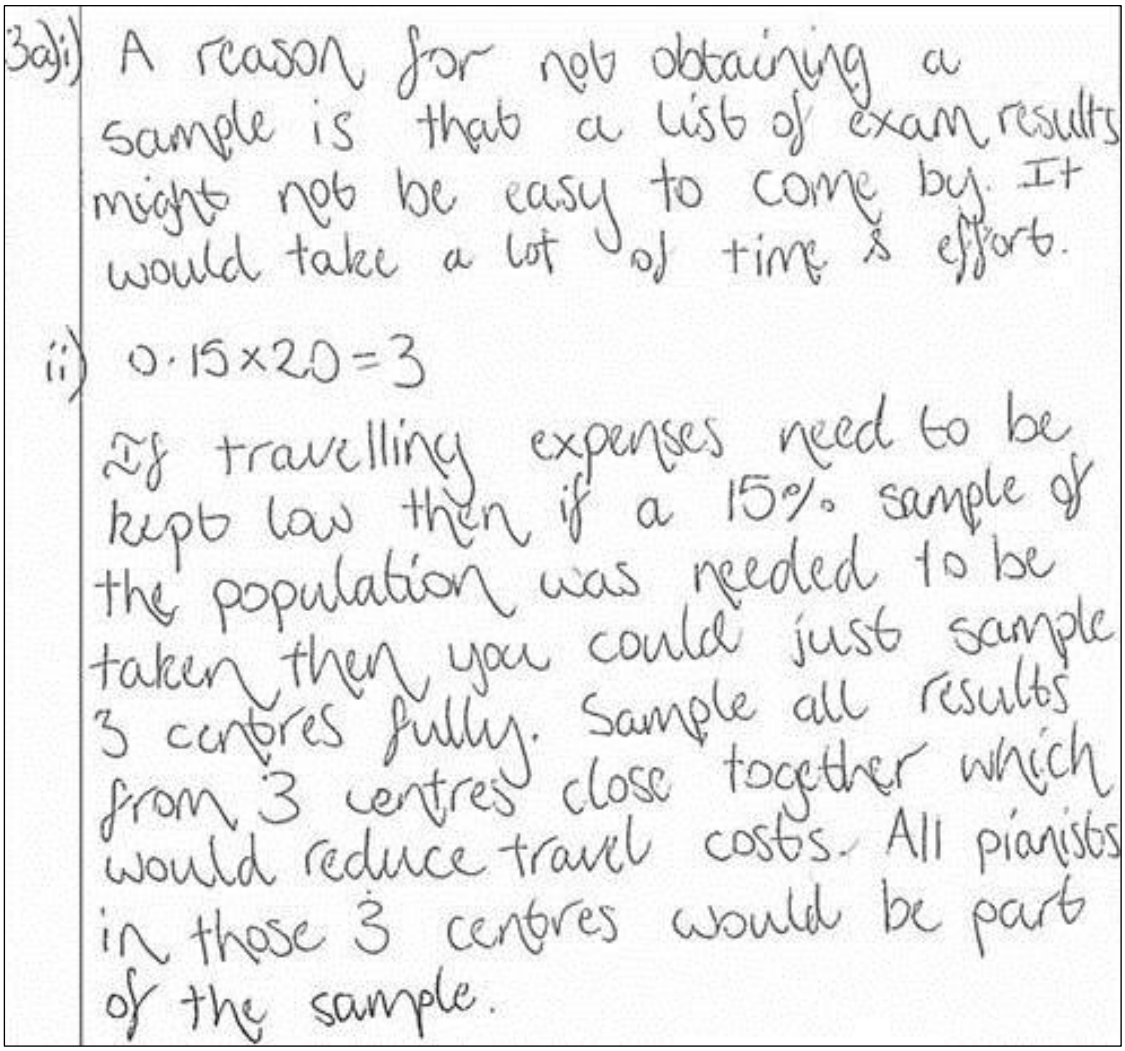

3.a)(i) · it may not be possible to get a full list of the whole population exam marks.

(ii) 15% of pianists from 20 centres

· in order to keep travelling expenses to a minimum, once the list has been obtained the population is split into clusters. and 15% of 20 is 3. So three schools will be visited and every member of the cluster (so every pianist and videowitch who took part in the exam) would be studied. This minimises travel expenses but may not provide an effective estimation of population parameters

Candidate 8

The issues of confidentiality and randomness have not been addressed adequately by this candidate.


3a)i) A reason for not obtaining a sample is that a list of exam results might not be easy to come by. It would take a lot of time & effort.

ii) $0.15 \times 20 = 3$

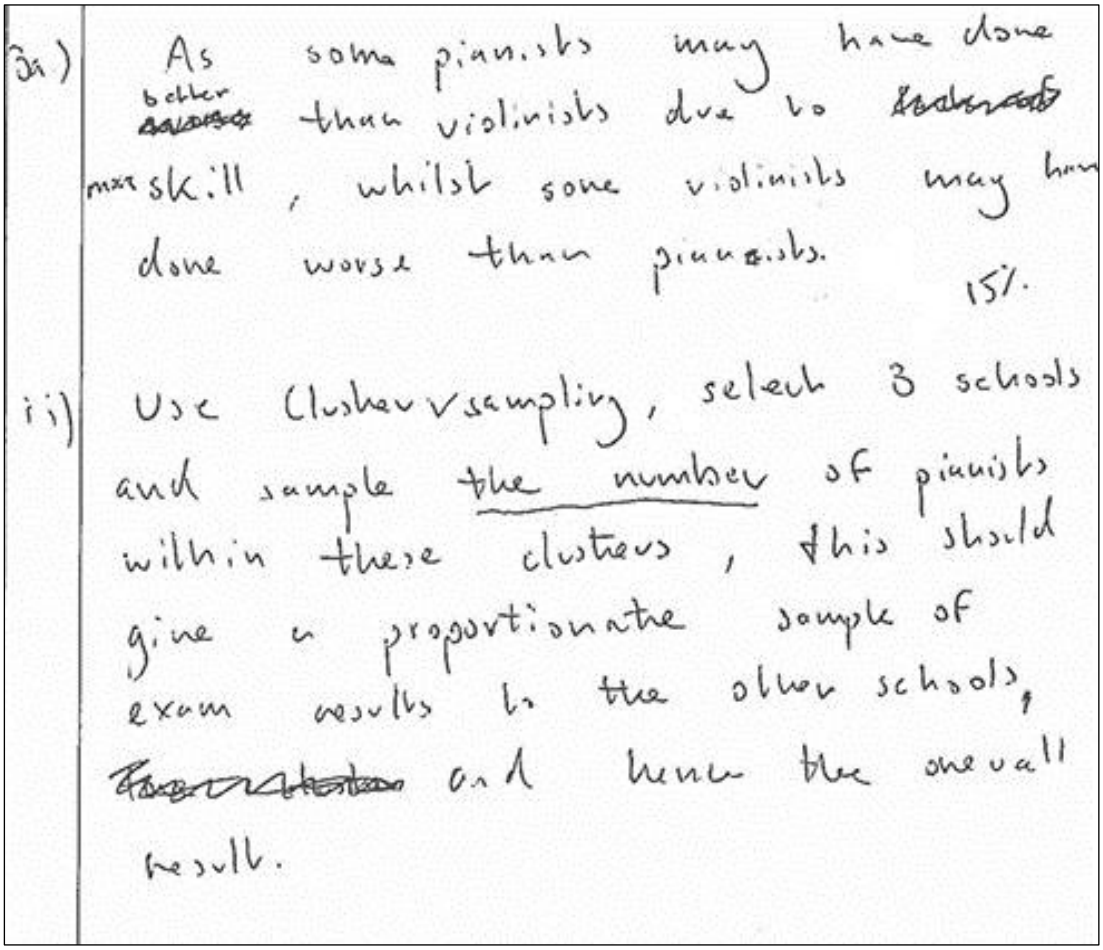
If travelling expenses need to be kept low then if a 15% sample of the population was needed to be taken then you could just sample 3 centres fully. Sample all results from 3 centres close together which would reduce travel costs. All pianists in those 3 centres would be part of the sample.

Candidate 9, 10 and 11

The following candidates were each awarded 0 or 1 mark.

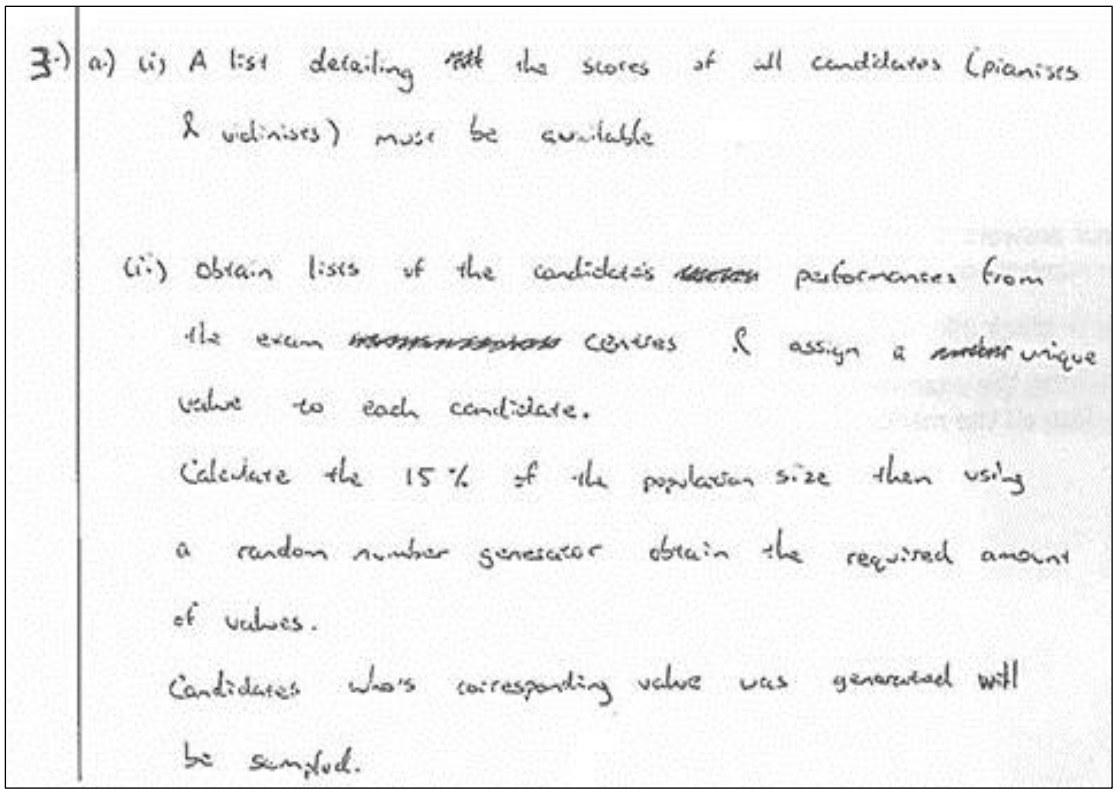
Candidate 9

This candidate response is lacking in clarity – what is meant by 'the number'? What 'schools'? There is also no mention of randomness or the reason for 3. The candidate was therefore awarded 1 mark.



Candidate 10

It is difficult to award this candidate response any marks and so 0 marks were awarded.

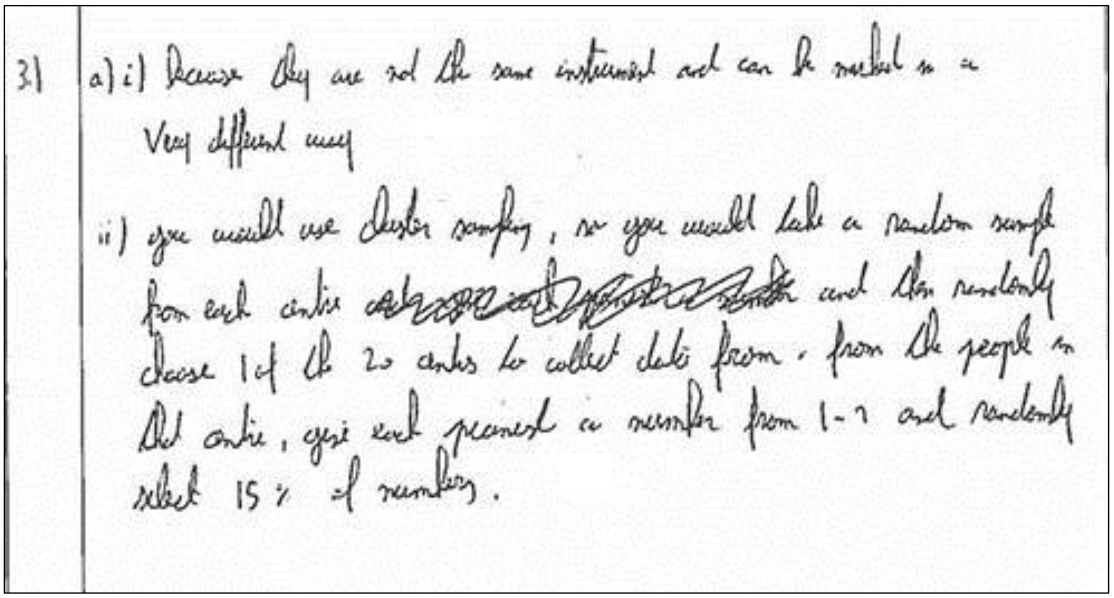


3.) a.) (i) A list detailing the scores of all candidates (pianists & violinists) must be available

(ii) Obtain lists of the candidates performances from the exam scores & assign a unique value to each candidate.
Calculate the 15% of the population size then using a random number generator obtain the required amount of values.
Candidates who's corresponding value was generated will be sampled.

Candidate 11

This candidate response is vague, which suggests that the candidate has no coherent idea about random sampling and has taken a guess at cluster sampling. It is difficult to see the relevance of giving pianists a number from 1 – 2. The candidate was therefore awarded 0 marks.



3) a) i) because they are not the same instrument and can be marked in a very different way

ii) you would use cluster sampling, so you would take a random sample from each entire and then randomly choose 1 of the 2 ones to collect data from. from the people in that entire, you each present a number from 1-7 and randomly select 15% of numbers.