Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE Applied in Information and Communication Technology (6953) Paper 01

Unit 3: The Knowledge Worker

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Applied GCE ICT Unit 3 – Mark Scheme – June 2017						
Activity		**ANSWER**			**POSS. MARK**	**MAX**
Activity 1		**Understanding the Situation**				
(a)	A1	That **best duplicates (**sound like**)** the **top octave** of **Ruth's voice** (sound like it used to be)			**1**	
	A2	Work out the **settings** (of the distortions) to use			**1**	
						(2)
(b)		Any 10 of				
	B1	Ruth's voice **was** F(2) to F(6)			**1**	
	B2	Ruth's voice is **now** F(2) to F(5) (allow can no longer reach top octave)			**1**	
	B3	**4** controls of the device to adjust (**relative magnitude** of) the			**1**	
	B4	Each control has 12 positions (0-11)			**1**	
	B5	Over 20,000 possible settings			**1**	
	B6	5th control changed frequency (of sound wave).			**1**	
	B7	Controls 1 and 2 affect distortions A, F and L			**1**	
	B8	Controls 3 and 4 affect distortions L, R and V			**1**	
	B9	Frequency set first			**1**	
	B10	Changing frequency affects the distortions			**1**	
	B11	Ruth's original voice data inputted			**1**	
	B12	Readings from synthesiser incorporated			**1**	
	B13	Gain of each dominant distortion measured/incorporated			**1**	
	B14	For each note			**1**	
	B15	Device could (**identify** and) **isolate** 20 different sources of distortion			**1**	
	B16	In Ruth's voice the dominant distortion sources were the ones labelled A, F, L, R and V				
						10
(c)		For the 3rd column any valid evaluative statement can be accepted; those in the mark scheme are examples. Only one comment is necessary for the mark.				
		Source	**Data provided**	**Evaluation**		
	C1	Graduates	Ruth's old voice data	Measured from a recording not the actual voice, recording equipment may have added distortion Measurements taken some years ago Ruth's voice may have changed.	**1,1,1**	

Applied GCE ICT Unit 3 – Mark Scheme – June 2017						
Activity		**ANSWER**			**POSS. MARK**	**MAX**
		Sound engineer	Distortion readings	Sound engineer is unfamiliar with the working of the box Source of the reading was not Ruth's voice so may not be accurate	**1,1,1**	
						6
				Total Marks for Activity		**18**

Activity		Completing the model		
		NFR (Ruth)		

	A	B	C	D	E	F	G	H	I	J
9	Note	Frequency	WaveLength	A	F	G	L	R	T	V
10	F2	87.31	395.16	5.5288	1.4076	0	0.8409	1.7046	0	1.1206
11	F#2/Gb2	92.5	372.98	5.5438	3.4024	0	2.8564	0.935	0	3.3305
12	G2	98	352.04	4.3493	6.2656	0	3.1746	0.205	0	4.5652
13	G#2/Ab2	103.83	332.29	1.8598	9.2521	0	5.1033	1.9557	0	0.1477
14	A2	110	313.64	4.5848	3.1636	0	5.5145	0.685	0	2.5025
15	A#2/Bb2	116.54	296.03	3.1659	8.2488	0	1.6268	2.5161	0	1.5583
16	B2	123.47	279.42	2.5921	5.2344	0	1.111	0.2723	0	0.4678
17	C3	130.81	263.74	2.6096	8.1556	0	1.2175	0.1144	0	5.0887
18	C#3/Db3	138.59	248.93	0.6526	3.1969	0	4.3553	2.3887	0	5.1713
19	D3	146.83	234.96	1.4309	2.5056	0	3.2621	2.3568	0	4.6537
20	D#3/Eb3	155.56	221.77	0.8491	3.1969	0	4.7749	1.7211	0	2.791
50	A5	880	39.2	5.872	6.1121	0	7.9686	4.9719	0	3.6852
51	A#5/Bb5	932.33	37	0.9003	6.9033	0	4.1157	5.1819	0	4.3259
52	B5	987.77	34.93	7.5252	4.4703	0	4.5071	2.5558	0	1.12
53	C6	1046.5	32.97	4.2454	3.202	0	3.9961	2.8547	0	1.3708
54	C#6/Db6	1108.73	31.12	8.796	1.8052	0	4.9166	3.4273	0	3.9051
55	D6	1174.66	29.37	6.9316	5.7941	0	6.714	8.7362	0	2.0309
56	D#6/Eb6	1244.51	27.72	7.7001	6.7959	0	3.7153	6.7891	0	2.0553
57	E6	1318.51	26.17	1.1469	3.8206	0	0.7192	5.1564	0	1.1302
58	F6	1396.91	24.7	2.637	2.2726	0	2.2149	1.8169	0	1.5251

(a)	A1	Imported correctly	**1**	
				1
(b)		**DistA**		

	A	B	E
23	DistA	Control 1	Control 4
24	='NFR(Ruth)'!A47	=VLOOKUP($A24,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A24,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
25	='NFR(Ruth)'!A48	=VLOOKUP($A25,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A25,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
26	='NFR(Ruth)'!A49	=VLOOKUP($A26,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A26,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
27	='NFR(Ruth)'!A50	=VLOOKUP($A27,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A27,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
28	='NFR(Ruth)'!A51	=VLOOKUP($A28,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A28,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
29	='NFR(Ruth)'!A52	=VLOOKUP($A29,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A29,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
30	='NFR(Ruth)'!A53	=VLOOKUP($A30,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A30,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
31	='NFR(Ruth)'!A54	=VLOOKUP($A31,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A31,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
32	='NFR(Ruth)'!A55	=VLOOKUP($A32,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A32,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
33	='NFR(Ruth)'!A56	=VLOOKUP($A33,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A33,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
34	='NFR(Ruth)'!A57	=VLOOKUP($A34,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A34,DistA!$A$9:$M$22,'O5'!N$22, FALSE)
35	='NFR(Ruth)'!A58	=VLOOKUP($A35,DistA!$A$9:$M$22,'O5'!K$22, FALSE)	=VLOOKUP($A35,DistA!$A$9:$M$22,'O5'!N$22, FALSE)

		=VLOOKUP($A24,DistA!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		=VLOOKUP($A11,DistA!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		Alternative		
		=INDEX(DistA!$A$9:$M$22,MATCH($A24,DistA!$A$9:$A$22,0),'O		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
		=INDEX(DistA!$A$9:$M$22,MATCH($A11,DistA!$A$9:$A$22,0),'O 5'!K$22)		

		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
	B1	Correct formulae in B24 and E35 (Formulae must work correctly.	**1**	
	B2	Correct range used (accept named ranges) DistA!$A$9:$M$22 or ($A$10:$M$22 or $A$11:$M22) in B24 and E35	**1**	
	B3	Offset taken from O5!K22 and O5!N22 in B24 and E35	**1**	
	B4	A24 and A35 used to lookup value (not the literal F#5/Gb5 and F6) in B24 and E35 respectively)	**1**	
	B5	Full absolute addressing used on (correct) range in both B24 and E35	**1**	
	B6	Row absolute addressing used on (correct) lookup values in both B24 and E35	**1**	
	B7	Column absolute addressing used on (correct) offset values in both	**1**	
	B8	Formula in B24 fully replicatable (accept any fully replicatable	**1**	
				8

(c) **DistF**

	A	B	E
23	DistF	Control 1	Control 4
24	='NFR(Ruth)'!A47	=VLOOKUP($A24,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A24,$A$9:$M$22,'O5'!N$22,FALSE)
25	='NFR(Ruth)'!A48	=VLOOKUP($A25,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A25,$A$9:$M$22,'O5'!N$22,FALSE)
26	='NFR(Ruth)'!A49	=VLOOKUP($A26,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A26,$A$9:$M$22,'O5'!N$22,FALSE)
27	='NFR(Ruth)'!A50	=VLOOKUP($A27,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A27,$A$9:$M$22,'O5'!N$22,FALSE)
28	='NFR(Ruth)'!A51	=VLOOKUP($A28,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A28,$A$9:$M$22,'O5'!N$22,FALSE)
29	='NFR(Ruth)'!A52	=VLOOKUP($A29,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A29,$A$9:$M$22,'O5'!N$22,FALSE)
30	='NFR(Ruth)'!A53	=VLOOKUP($A30,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A30,$A$9:$M$22,'O5'!N$22,FALSE)
31	='NFR(Ruth)'!A54	=VLOOKUP($A31,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A31,$A$9:$M$22,'O5'!N$22,FALSE)
32	='NFR(Ruth)'!A55	=VLOOKUP($A32,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A32,$A$9:$M$22,'O5'!N$22,FALSE)
33	='NFR(Ruth)'!A56	=VLOOKUP($A33,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A33,$A$9:$M$22,'O5'!N$22,FALSE)
34	='NFR(Ruth)'!A57	=VLOOKUP($A34,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A34,$A$9:$M$22,'O5'!N$22,FALSE)
35	='NFR(Ruth)'!A58	=VLOOKUP($A35,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A35,$A$9:$M$22,'O5'!N$22,FALSE)

		=VLOOKUP($A24,DistF!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		=VLOOKUP($A11,DistF!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		Alternative		
		=INDEX(DistF!$A$9:$M$22,MATCH($A24,DistF!$A$9:$A$22,0),'O		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
		=INDEX(DistA!$A$9:$M$22,MATCH($A11,DistF!$A$9:$A$22,0),'O		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
	C1	Correct formulae in B24 and E35 (Formulae must work correctly give correct answers absolute addressing is not necessary for mark.)	**1**	
	C2	Formula in B24 fully replicatable (do not allow if $K$22 used in	**1**	

		offset, correct formula only)		
				2

(d) **DistL**

	A	B	E
23	DistL	Control 1	Control 4
24	='NFR(Ruth)'!A47	=VLOOKUP($A24,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A24,$A$9:$M$22,'O5'!N$22,FALSE)
25	='NFR(Ruth)'!A48	=VLOOKUP($A25,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A25,$A$9:$M$22,'O5'!N$22,FALSE)
26	='NFR(Ruth)'!A49	=VLOOKUP($A26,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A26,$A$9:$M$22,'O5'!N$22,FALSE)
27	='NFR(Ruth)'!A50	=VLOOKUP($A27,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A27,$A$9:$M$22,'O5'!N$22,FALSE)
28	='NFR(Ruth)'!A51	=VLOOKUP($A28,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A28,$A$9:$M$22,'O5'!N$22,FALSE)
29	='NFR(Ruth)'!A52	=VLOOKUP($A29,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A29,$A$9:$M$22,'O5'!N$22,FALSE)
30	='NFR(Ruth)'!A53	=VLOOKUP($A30,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A30,$A$9:$M$22,'O5'!N$22,FALSE)
31	='NFR(Ruth)'!A54	=VLOOKUP($A31,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A31,$A$9:$M$22,'O5'!N$22,FALSE)
32	='NFR(Ruth)'!A55	=VLOOKUP($A32,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A32,$A$9:$M$22,'O5'!N$22,FALSE)
33	='NFR(Ruth)'!A56	=VLOOKUP($A33,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A33,$A$9:$M$22,'O5'!N$22,FALSE)
34	='NFR(Ruth)'!A57	=VLOOKUP($A34,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A34,$A$9:$M$22,'O5'!N$22,FALSE)
35	='NFR(Ruth)'!A58	=VLOOKUP($A35,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A35,$A$9:$M$22,'O5'!N$22,FALSE)

		=VLOOKUP($A24,DistL!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		=VLOOKUP($A11,DistL!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		Alternative		
		=INDEX(DistL!$A$9:$M$22,MATCH($A24,DistF!$A$9:$A$22,0),'O		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
		=INDEX(DistA!$A$9:$M$22,MATCH($A11,DistF!$A$9:$A$22,0),'O 5'!K$22)		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH function		
	D1	Correct formula in B24 and E35 (Formulae must work correctly give correct answers absolute addressing is not	**1**	
	D2	Formula in B24 fully replicatable (do not allow if $K$22 used in offset, correct formula only)	**1**	
				2

(e) **DistR**

	A	B	E
23	DistR	Control 1	Control 4
24	='NFR(Ruth)'!A47	=VLOOKUP($A24,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A24,$A$9:$M$22,'O5'!N$22,FALSE)
25	='NFR(Ruth)'!A48	=VLOOKUP($A25,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A25,$A$9:$M$22,'O5'!N$22,FALSE)
26	='NFR(Ruth)'!A49	=VLOOKUP($A26,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A26,$A$9:$M$22,'O5'!N$22,FALSE)
27	='NFR(Ruth)'!A50	=VLOOKUP($A27,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A27,$A$9:$M$22,'O5'!N$22,FALSE)
28	='NFR(Ruth)'!A51	=VLOOKUP($A28,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A28,$A$9:$M$22,'O5'!N$22,FALSE)
29	='NFR(Ruth)'!A52	=VLOOKUP($A29,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A29,$A$9:$M$22,'O5'!N$22,FALSE)
30	='NFR(Ruth)'!A53	=VLOOKUP($A30,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A30,$A$9:$M$22,'O5'!N$22,FALSE)
31	='NFR(Ruth)'!A54	=VLOOKUP($A31,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A31,$A$9:$M$22,'O5'!N$22,FALSE)
32	='NFR(Ruth)'!A55	=VLOOKUP($A32,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A32,$A$9:$M$22,'O5'!N$22,FALSE)
33	='NFR(Ruth)'!A56	=VLOOKUP($A33,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A33,$A$9:$M$22,'O5'!N$22,FALSE)
34	='NFR(Ruth)'!A57	=VLOOKUP($A34,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A34,$A$9:$M$22,'O5'!N$22,FALSE)
35	='NFR(Ruth)'!A58	=VLOOKUP($A35,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A35,$A$9:$M$22,'O5'!N$22,FALSE)

		=VLOOKUP($A24,DistR!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		=VLOOKUP($A11,DistR!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		Alternative		
		=INDEX(DistR!$A$9:$M$22,MATCH($A24,DistR!$A$9:$A$22,0),'O		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH		
		=INDEX(DistA!$A$9:$M$22,MATCH($A11,DistR!$A$9:$A$22,0),'O 5'!K$22)		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH function		
	E1	Correct formula in B24 and E35 (Formulae must work correctly give correct answers absolute addressing is not	**1**	
	E2	Formula in B24 fully replicatable (do not allow if $K$22 used in offset, correct formula only)	**1**	
				2

(f) **DistV**

	A	B	E
23	DistV	Control 1	Control 4
24	='NFR(Ruth)'!A47	=VLOOKUP($A24,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A24,$A$9:$M$22,'O5'!N$22,FALSE)
25	='NFR(Ruth)'!A48	=VLOOKUP($A25,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A25,$A$9:$M$22,'O5'!N$22,FALSE)
26	='NFR(Ruth)'!A49	=VLOOKUP($A26,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A26,$A$9:$M$22,'O5'!N$22,FALSE)
27	='NFR(Ruth)'!A50	=VLOOKUP($A27,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A27,$A$9:$M$22,'O5'!N$22,FALSE)
28	='NFR(Ruth)'!A51	=VLOOKUP($A28,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A28,$A$9:$M$22,'O5'!N$22,FALSE)
29	='NFR(Ruth)'!A52	=VLOOKUP($A29,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A29,$A$9:$M$22,'O5'!N$22,FALSE)
30	='NFR(Ruth)'!A53	=VLOOKUP($A30,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A30,$A$9:$M$22,'O5'!N$22,FALSE)
31	='NFR(Ruth)'!A54	=VLOOKUP($A31,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A31,$A$9:$M$22,'O5'!N$22,FALSE)
32	='NFR(Ruth)'!A55	=VLOOKUP($A32,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A32,$A$9:$M$22,'O5'!N$22,FALSE)
33	='NFR(Ruth)'!A56	=VLOOKUP($A33,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A33,$A$9:$M$22,'O5'!N$22,FALSE)
34	='NFR(Ruth)'!A57	=VLOOKUP($A34,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A34,$A$9:$M$22,'O5'!N$22,FALSE)
35	='NFR(Ruth)'!A58	=VLOOKUP($A35,$A$9:$M$22,'O5'!K$22,FALSE)	=VLOOKUP($A35,$A$9:$M$22,'O5'!N$22,FALSE)

		=VLOOKUP($A24,DistV!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		=VLOOKUP($A11,DistV!$A$9:$M$22,'O5'!K$22,FALSE)		
		Allow above with ranges $A$10:$M$22 or $A$11:$M22		
		Alternative		
		=INDEX(DistV!$A$9:$M$22,MATCH($A24,DistV!$A$9:$A$22,0),'O5'!K$22)		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH function		
		=INDEX(DistA!$A$9:$M$22,MATCH($A11,DistV!$A$9:$A$22,0),'O5'!K$22)		
		Allow above with ranges $A$10:$A$22 or $A$11:$A22 in MATCH function		
	F1	Correct formula in B24 and E35 (Formulae must work correctly give correct answers absolute addressing is not necessary for mark.)	**1**	
	F2	Formula in B24 fully replicatable (do not allow if $K$22 used in offset, correct formula only)	**1**	
				2

(g) **Difference**

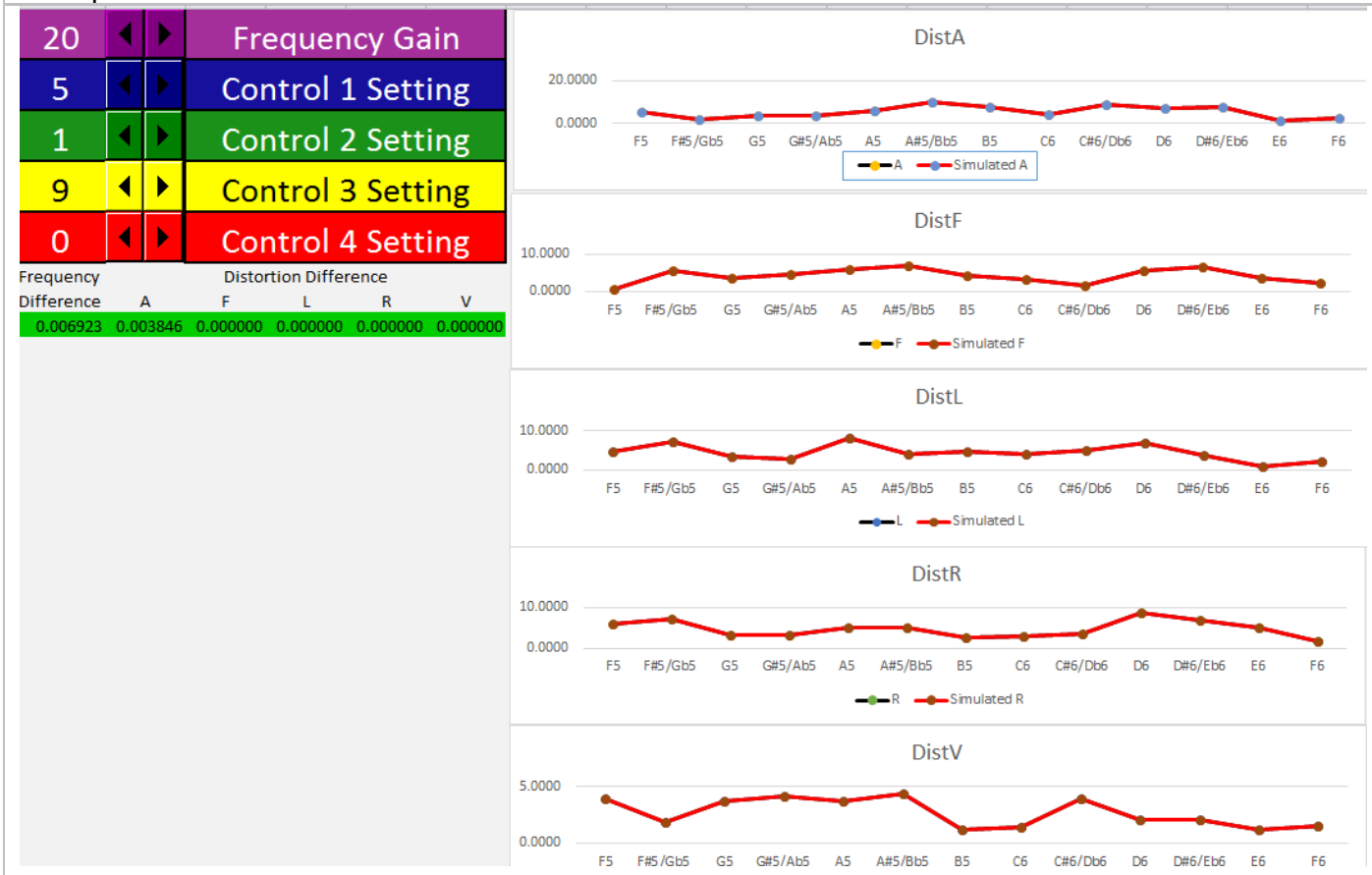
	A	B	C	D	G
9		Frequency Variance	DistA Variance	DistF Variance	DistV Variance
10	='O5'!A10	=SQRT(('O5'!B10-'O5'!B23)^2)	=SQRT(('O5'!D10-'O5'!D23)^2)	=SQRT(('O5'!E10-'O5'!E23)^2)	=SQRT(('O5'!H10-'O5'!H23)^2)
11	='O5'!A11	=SQRT(('O5'!B11-'O5'!B24)^2)	=SQRT(('O5'!D11-'O5'!D24)^2)	=SQRT(('O5'!E11-'O5'!E24)^2)	=SQRT(('O5'!H11-'O5'!H24)^2)
12	='O5'!A12	=SQRT(('O5'!B12-'O5'!B25)^2)	=SQRT(('O5'!D12-'O5'!D25)^2)	=SQRT(('O5'!E12-'O5'!E25)^2)	=SQRT(('O5'!H12-'O5'!H25)^2)
13	='O5'!A13	=SQRT(('O5'!B13-'O5'!B26)^2)	=SQRT(('O5'!D13-'O5'!D26)^2)	=SQRT(('O5'!E13-'O5'!E26)^2)	=SQRT(('O5'!H13-'O5'!H26)^2)
14	='O5'!A14	=SQRT(('O5'!B14-'O5'!B27)^2)	=SQRT(('O5'!D14-'O5'!D27)^2)	=SQRT(('O5'!E14-'O5'!E27)^2)	=SQRT(('O5'!H14-'O5'!H27)^2)
15	='O5'!A15	=SQRT(('O5'!B15-'O5'!B28)^2)	=SQRT(('O5'!D15-'O5'!D28)^2)	=SQRT(('O5'!E15-'O5'!E28)^2)	=SQRT(('O5'!H15-'O5'!H28)^2)
16	='O5'!A16	=SQRT(('O5'!B16-'O5'!B29)^2)	=SQRT(('O5'!D16-'O5'!D29)^2)	=SQRT(('O5'!E16-'O5'!E29)^2)	=SQRT(('O5'!H16-'O5'!H29)^2)
17	='O5'!A17	=SQRT(('O5'!B17-'O5'!B30)^2)	=SQRT(('O5'!D17-'O5'!D30)^2)	=SQRT(('O5'!E17-'O5'!E30)^2)	=SQRT(('O5'!H17-'O5'!H30)^2)
18	='O5'!A18	=SQRT(('O5'!B18-'O5'!B31)^2)	=SQRT(('O5'!D18-'O5'!D31)^2)	=SQRT(('O5'!E18-'O5'!E31)^2)	=SQRT(('O5'!H18-'O5'!H31)^2)
19	='O5'!A19	=SQRT(('O5'!B19-'O5'!B32)^2)	=SQRT(('O5'!D19-'O5'!D32)^2)	=SQRT(('O5'!E19-'O5'!E32)^2)	=SQRT(('O5'!H19-'O5'!H32)^2)
20	='O5'!A20	=SQRT(('O5'!B20-'O5'!B33)^2)	=SQRT(('O5'!D20-'O5'!D33)^2)	=SQRT(('O5'!E20-'O5'!E33)^2)	=SQRT(('O5'!H20-'O5'!H33)^2)
21	='O5'!A21	=SQRT(('O5'!B21-'O5'!B34)^2)	=SQRT(('O5'!D21-'O5'!D34)^2)	=SQRT(('O5'!E21-'O5'!E34)^2)	=SQRT(('O5'!H21-'O5'!H34)^2)
22	='O5'!A22	=SQRT(('O5'!B22-'O5'!B35)^2)	=SQRT(('O5'!D22-'O5'!D35)^2)	=SQRT(('O5'!E22-'O5'!E35)^2)	=SQRT(('O5'!H22-'O5'!H35)^2)
23	Average	=AVERAGE(B10:B22)	=AVERAGE(C10:C22)	=AVERAGE(D10:D22)	=AVERAGE(G10:G22)

		The formula asked for is =SQRT(('O5'!B10-'O5'!B23)^2) **Alternative: =(SQRT(POWER('O5'!B10-'O5'!B23,2)))**		

		=SQRT(('O5'!B10-'O5'!B23)*('O5'!B10-'O5'!B23))		
		The difference can be calculated using an 'if' statement, for example; =IF('O5'!B10-'O5'!B23)>=0, 'O5'!B10-'O5'!B23, 'O5'!B23-'O5'!B10) or =ABS('O5'!B10-'O5'!B23) This is not what they were asked to do although it is a working formula. Would not be awarded G2, G3, G4 **Allow O5'!B10-'O5'!B23 as a working formula**		
	G1	B10 contains a working formula	**1**	
	G2	B10 contains value correctly squared (multiplying it by itself is allowed)	**1**	
	G3	B10 contains ^2 for square (award if POWER used)	**1**	
	G4	B10 contains the square root (award if SQRT or ^0.5 used)	**1**	
	G5	Working formula replicated to cell B22	**1**	
	G6	Working formulae in cells C10:G22	**1**	
	G7	Working method of rendering all numbers positive (e.g. SQRT and ^2, ABS, IF) used throughout cells C10:G22	**1**	
	G8	Working formulae in cells B23, C23, D23 and G23 (adding up values and dividing by 13 is allowed)	**1**	
	G9	Average function used		9

(h) **Using the Model**

Example



Only allow marks below if formulae for difference are awarded G1 and G6. If the distortion / frequency differences are negative check the value on row 21. For each distortion award one mark only in each case if the cell is green / yellow and the value is negative.				
	H1	-1<Frequency Difference < 1 (Green) (row 21)	**1**	
Formulae for DistA all correct to award H2 and H3				
	H2	-10<Distortion A Difference < 10 (Yellow or Green)	**1**	
	H3	Distortion A Difference < 1 (Green) (no mark if negative)	**1**	
Formulae for DistF all correct to award H4 and H5				
	H4	-10<Distortion F Difference < 10 (Yellow or Green)	**1**	
	H5	Distortion F Difference < 1 (Green) no mark if negative)	**1**	
Formulae for DistL all correct to award H6 and H7				
	H6	-10<Distortion L Difference < 10 (Yellow or Green)	**1**	
	H7	Distortion L Difference < 1 (Green) (no mark if negative)	**1**	
Formulae for DistR all correct to award H8 and H9				
	H8	-10<Distortion R Difference < 10 (Yellow or Green)	**1**	
	H9	Distortion R Difference < 1 (Green) (no mark if negative)	**1**	
Formulae for DistV all correct to award H4 and H5				
	H10	-10<Distortion V Difference < 10 (Yellow or Green)	**1**	
	H11	Distortion V Difference < 1 (Green) (no mark if negative)	**1**	
				11

		Printouts		
		All printouts and no more in right order are required to be eligible for the following marks		
	I1	Row and Column headings and Gridlines on (**All 7 worksheets**)	**1**	
	I2	Correct header & footer (**All 7 worksheets**)	**1**	
	I3	Correct rows and columns printed (do not award if no row and column headings) (**All 7 worksheets**)	**1**	
				3
		Total Marks for Activity 2		**40**

Activity 3		**DistG (Rick)**		
(a)				

	A	N	Q
9	DistG (Rick)	Control 1	Control 4
10	='O (Rick)'!A11	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
11	='O (Rick)'!A12	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
12	='O (Rick)'!A13	=VLOOKUP($A12,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A12,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
55	='O (Rick)'!A56	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
56	='O (Rick)'!A57	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
57	='O (Rick)'!A58	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
58	='O (Rick)'!A59	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)

		=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$10:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$11:$M$58,'O (Rick)'!N$23,FALSE)		
		Alternative		
		=INDEX($A$9:$M$22,MATCH($A10,DistG(Rick)!$A$9:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistG(Rick)!$A$10:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistG(Rick)!$A$11:$A$58,0),'O(Rick)'!N$23)		
	A1	Correct formula in N10 and Q58 (Formulae must work correctly give correct answers absolute addressing is not necessary for mark.) Accept named range	**1**	
	A2	Correct formula in N10 fully replicatable (don't accept 'O(Rick)'!$N$23)	**1**	
				2

(b)		**DistL (Rick)**		

	A	N	Q
9	='NFR(Ruth)'!A9	Control 1	Control 4
10	='O (Rick)'!A11	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
11	='O (Rick)'!A12	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
55	='O (Rick)'!A56	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
56	='O (Rick)'!A57	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
57	='O (Rick)'!A58	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
58	='O (Rick)'!A59	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)

		=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$10:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$11:$M$58,'O (Rick)'!N$23,FALSE)		
		Alternative		
		=INDEX($A$9:$M$22,MATCH($A10,DistL(Rick)!$A$9:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistL(Rick)!$A$10:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistL(Rick)!$A$11:$A$58,0),'O(Rick)'!N$23)		
	B1	Correct formula in N10 and Q58 (Formulae must work correctly give correct answers absolute addressing is not necessary for mark.) Accept named range	**1**	

	B2	Correct formula in N10 fully replicatable (don't accept 'O(Rick)'!$N$23)	**1**	
				2

(c)		**DistT (Rick)**		

	A	N	Q
9	='NFR(Ruth)'!A9	Control 1	Control 4
10	='O (Rick)'!A11	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
11	='O (Rick)'!A12	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A11,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
55	='O (Rick)'!A56	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A55,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
56	='O (Rick)'!A57	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A56,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
57	='O (Rick)'!A58	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A57,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)
58	='O (Rick)'!A59	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!N$23,FALSE)	=VLOOKUP($A58,$A$9:$M$58,'O (Rick)'!Q$23,FALSE)

		=VLOOKUP($A10,$A$9:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$10:$M$58,'O (Rick)'!N$23,FALSE)		
		=VLOOKUP($A10,$A$11:$M$58,'O (Rick)'!N$23,FALSE)		
		Alternative		
		=INDEX($A$9:$M$22,MATCH($A10,DistT(Rick)!$A$9:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistT(Rick)!$A$10:$A$58,0),'O(Rick)'!N$23)		
		=INDEX($A$9:$M$22,MATCH($A10,DistT(Rick)!$A$11:$A$58,0),'O(Rick)'!N$23)		
	C1	Correct formula in N10 and Q58 (Formulae must work correctly give correct answers absolute addressing is not necessary for mark.) Accept named range	**1**	
	C2	Correct formula in N10 fully replicatable (don't accept 'O(Rick)'!$N$23)	**1**	
				2

(d)		**Difference (Rick)**		

	B	E
9	Frequency Variance	DistT Variance
10	=SQRT(('O (Rick)'!B11-'O (Rick)'!J11)^2)	=SQRT(('O (Rick)'!E11-'O (Rick)'!M11)^2)
11	=SQRT(('O (Rick)'!B12-'O (Rick)'!J12)^2)	=SQRT(('O (Rick)'!E12-'O (Rick)'!M12)^2)
55	=SQRT(('O (Rick)'!B56-'O (Rick)'!J56)^2)	=SQRT(('O (Rick)'!E56-'O (Rick)'!M56)^2)
56	=SQRT(('O (Rick)'!B57-'O (Rick)'!J57)^2)	=SQRT(('O (Rick)'!E57-'O (Rick)'!M57)^2)
57	=SQRT(('O (Rick)'!B58-'O (Rick)'!J58)^2)	=SQRT(('O (Rick)'!E58-'O (Rick)'!M58)^2)
58	=SQRT(('O (Rick)'!B59-'O (Rick)'!J59)^2)	=SQRT(('O (Rick)'!E59-'O (Rick)'!M59)^2)
59	=AVERAGE(B10:B58)	=AVERAGE(E10:E58)

The formula asked for is =SQRT(('O5'!B10-'O5'!B23)^2)
Alternative: =(SQRT(POWER('O5'!B10-'O5'!B23,2))) can be awarded full marks
=SQRT(('O5'!B10-'O5'!B23)*('O5'!B10-'O5'!B23))
The difference can be calculated in other ways; e.g. using an 'if' statement, or ABS
=IF('O5'!B10-'O5'!B23)>=0, 'O5'!B10-'O5'!B23, 'O5'!B23-'O5'!B10)
or
=ABS('O5'!B10-'O5'!B23)
This is **not** what they were asked to do although it is a working formula. Would not be awarded D2.

Allow O5'!B10-'O5'!B23 as a working formula

	D1	Working formulae in B10:E58 (allow 'if' or similar)	**1**	
	D2	Sqrt and ^ used (Award for POWER)	**1**	
	D3	B59 and E59 working formulae	**1**	
				3

(e)		**Using the model**		
Example				

Only allow E marks if formulae for differences in Difference (Rick) are awarded D1.

	E1	-1<Frequency <1 (Green)	**1**	
		Formulae for DistG all correct to award E2		
	E2	-10<DistG < 10 (Yellow or Green)	**1**	
		Formulae for DistL all correct to award E3		
	E3	-10<DistL < 10 (Yellow or Green)	**1**	
		Formulae for DistT all correct to award E4		
	E4	-10<DistT < 10 (Yellow or Green)	**1**	
	E5	All values <1 (Green) **don't award if any values in the row are negative**	**1**	
				5
(f)		**Printouts**		
		All printouts and no more in right order are required to be eligible for the following marks		
	And	Row and Column headings and Gridlines on (All 3 worksheets)		
	And	Correct header & footer (All 3 worksheets)		
	And	Correct rows and columns printed (All 3 worksheets)		
				1

		Total Marks for Activity 3		**15**

Activity 4		**Report**		

Indicative content
In a report, not a memo or a letter.
Suitable title and section headers e.g. Voice Simulation Model. (A whole range of titles may be suitable)
Introduction describing the model what it does – how the settings work.
Candidate's recommendations for the device settings, with justifications, for Ruth's voice and Terry's guitar.
Graphical data to demonstrate the closeness of the simulations – diagram included and discussed
A value judgement of how close these simulations will be and justifications of the statement.
Some reasons which may mean that the simulations are not accurate
An evaluation of the model – functionality, effectiveness, ease of use
Suggestions for improvement; e.g. possibly some programming to go through all the possible settings to avoid trial and error or perhaps goal seek.

Level	Marks	
Level 0	0 marks	No rewardable content
Level 1	1-5	The report will have a title but this may not be fully appropriate. Section headings may not be used. The candidate will have made an attempt to describe what the model does. They will mention that the purpose of the model is to give suitable settings for the engineer to use so that Ruth's singing voice sounds like it did in the past. They may be confused and think this is the device. They will have made recommendations but would be unable to justify them. If graphical data is included it may not be relevant or used as a justification. If they suggest any issues they may be not relevant and there would be no sensible suggestions for improvement. Uses everyday language and response lacks clarity and organisation. Spelling, punctuation and the rules of grammar are used with limited accuracy
Level 2	6-10	The report will have an appropriate title and some section headings. The candidate will have described how the system works. They will refer to a comparison of Ruth's voice data and the simulated data. They will mention that the system is being used to enable her to sound like she has reached the fifth octave. They will understand that the model is not the device but a method of finding settings for the device They will have made recommendations and will have justified some of them. If graphical data are included they may be relevant but not referred to. They may suggest one or two issues such as Ruth's voice may have changed in the lower registers or that the original recordings were recorded on poor quality equipment. They will include some evaluation of the model – functionality, effectiveness, ease of use The candidate will have made at least one sensible suggestion for improvement, such as including more controls to fine tune the level of distortion. Uses some specialist terms and the response shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy.
Level 3	11-15	The candidate will have described how the system works and used terms such as

		frequency, note and distortion to do it. They will have a clear understanding that the model is not the device but a method of finding settings for the device. They will have made recommendations and will have justified them using suitable language and graphical data to do so. They will suggest one or two issues such as Ruth's voice may have changed in the lower registers and maybe a more esoteric argument with respect to the Stratocaster may not have the same dominant distortions as the Rickenbacker. An evaluation of the model – functionality, effectiveness, ease of use. The candidate will have made several sensible suggestions for improvement. Uses appropriate specialist terms consistently and the response shows good focus and organisation. Spelling, punctuation and the rules of grammar used with considerable accuracy.		
		Total Marks for Activity 4		**15**

SWW				
	S1	Authenticating Work (All WP pages have task number, Name, centre number).	**1**	
	S2	Appropriate Structure (Pages in correct order & Folder assembled correctly)	**1**	
		Total for SWW		**2**
		Total for Paper		**90**

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