

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCE in
Music Technology (6MT04)

Paper 1: Analysing and Producing

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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.

Question Number	Question	Mark
1(a)(i)	Listen to the hi-hats that begin in bar 10. Why did the drum programmer leave the hi-hat unquantised?	1
	Acceptable Answers	
	Groove / human feel / not mechanical / swing / shuffle (1) Already in time (1)	

Question Number	Question	Mark
1(a)(ii)	Identify the most appropriate quantise value for this part.	1
	Acceptable Answers	
	A 1/24	

Question Number	Question	Mark
1(b)	Notate the kick drum rhythm in bars 6-9 .	4
	Acceptable Answers	
	 <p>1 mark for each correct bar</p>	

Question Number	Question	Mark												
1(c)	Complete the table below. Identify the chords in bars 11 and 12. Identify the notes in each chord. An example is given.	4												
	Acceptable Answers													
	<table border="1"> <thead> <tr> <th>Bar</th> <th>Chord</th> <th>Notes in chord</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>Am</td> <td>A C E</td> </tr> <tr> <td>11</td> <td>Dm / D minor (1)</td> <td>D F A (1)</td> </tr> <tr> <td>12</td> <td>F (major) (1)</td> <td>F A C (1)</td> </tr> </tbody> </table> <p>Accept inversions.</p>	Bar	Chord	Notes in chord	10	Am	A C E	11	Dm / D minor (1)	D F A (1)	12	F (major) (1)	F A C (1)	
Bar	Chord	Notes in chord												
10	Am	A C E												
11	Dm / D minor (1)	D F A (1)												
12	F (major) (1)	F A C (1)												

Question Number	Question	Mark
1(d)	Identify the filter added to the synth chords at the start of bar 10.	1
	Acceptable Answers	
	C Low pass filter	

Question Number	Question	Mark
1(e)(i)	An effect has been introduced to the synth chords at the start of bar 14. Identify this effect.	1
	Acceptable Answers	
	Flange / phaser / comb filtering (1)	

Question Number	Question	Mark						
1(e)(ii)	Describe the settings that would have been used	2						
	Acceptable Answers							
	<table border="1"> <thead> <tr> <th>Control</th> <th>Setting</th> </tr> </thead> <tbody> <tr> <td>Feedback %</td> <td>50-90 (1)</td> </tr> <tr> <td>LFO rate in Hz</td> <td>Less than 0.5 (Hz) (1)</td> </tr> </tbody> </table>		Control	Setting	Feedback %	50-90 (1)	LFO rate in Hz	Less than 0.5 (Hz) (1)
	Control		Setting					
Feedback %	50-90 (1)							
LFO rate in Hz	Less than 0.5 (Hz) (1)							

Question Number	Question	Mark
2(a)	<p>Create a bass sound that matches the timbre "bass example.wav".</p> <ul style="list-style-type: none"> • Ensure that the octave matches the example (1) • Use a saw wave with no effects (1) • Ensure the pitchbend range matches the example (1) • Copy the amplitude envelope (1) • Copy the filter envelope (4) 	8
	Acceptable Answers	
	<p>"bass example" was 0:57-1:08 (or an equivalent location for candidate responses with more/less silence at the start of the CD track).</p>	
	"bass" timbre	
	<p>(i) Correct octave and pitches throughout with both octaves sounding (1)</p>	
	<p>(ii) Wave (1): Square wave timbre. Allow saw or pulse. <i>Award 0 if any FX (excluding tasteful reverb) are added.</i></p>	
<p>(iii) Pitchbend range is 2 octaves (1) Check at 0:15 & 0:48</p>		
<p>(iv) Amplitude & pitch envelope (1): A=0, (D=max, S=max) R=0. AND No portamento / glide</p>		
<p>(v) LPF with low cut-off and medium resonance (1) LPF envelope: Fast attack AND cut-off decays audibly on the short notes (1) Cut-off rises again and holds on longer notes (1) Timing of filter envelope matches example giving off-beat feel on the crotchets (1). Give credit even if the decay is missing and the rising cut-off still gives an off-beat feel.</p>		
<p>If "bass" is not soloed, has effects, the metronome is switched on, or only present in task 3 assess what can be heard clearly. If instrument is not a synthesiser (e.g. bass guitar/piano) then award max 1 (for pitches). If there is no evidence of the bass timbre outside of bars 24-29 then award 0.</p>		

Question Number	Question	Mark						
2(b)	In the table below, identify the velocity of each note indicated in bar 32. An example has been given.	2						
	Acceptable Answers							
	<table border="1"> <thead> <tr> <th>Position</th> <th>Velocity</th> </tr> </thead> <tbody> <tr> <td>Bar 32, beat 1</td> <td>127</td> </tr> <tr> <td>Bar 32, beat 2</td> <td>125 (1)</td> </tr> <tr> <td>Bar 32, beat 3</td> <td>126 (1)</td> </tr> </tbody> </table>		Position	Velocity	Bar 32, beat 1	127	Bar 32, beat 2	125 (1)
Position	Velocity							
Bar 32, beat 1	127							
Bar 32, beat 2	125 (1)							
Bar 32, beat 3	126 (1)							

Question Number	Question	Mark
2(c)	Identify the lowest pitch bend value in bar 18.	1
	Acceptable Answers	
	-4224 -33 31 3968	

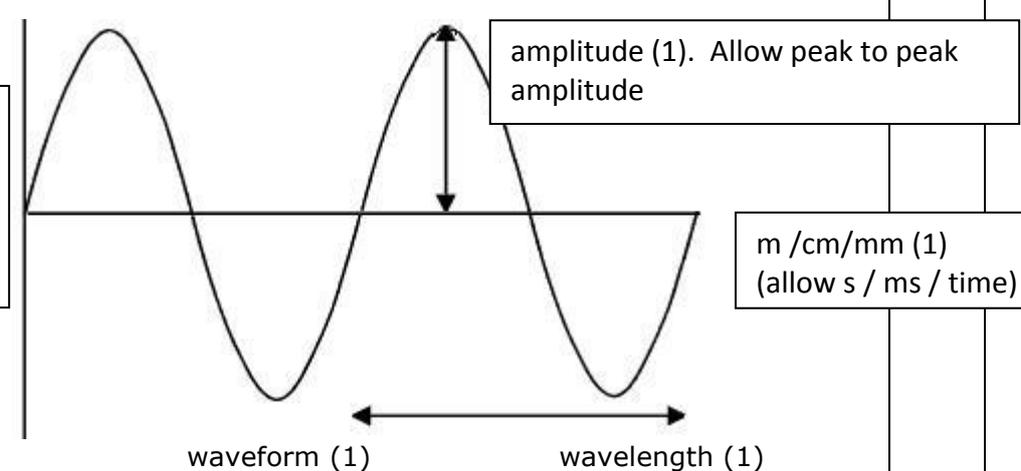
Question Number	Question	Mark
2(d)	What key is the music in?	1
	Acceptable Answers	
	A minor Am A aeolian A ⁻ NOT A major / A	

Question Number	Question	Mark
3(a)	Reverb has been added to the vocal. Identify the reverb time.	1
	Acceptable Answers	
	C 2.0 seconds	

Question Number	Question	Mark
3(b)(i)	What is the main advantage of placing the vocalist close to the microphone?	1
	Acceptable Answers	
	Less spill / less reverb / less noise / better signal to noise ratio / wider dynamic range / more control over effects/ambience in mixing (1) Proximity effect (1)	

Question Number	Question	Mark
3(b)(ii)	Identify two problems close mic'ing the vocal could introduce to the recording. How could these problems be reduced during the mix?	4
	Acceptable Answers	
	<p>Uneven dynamics (1): compression (1).</p> <p>Too dry (1): add reverb / delay (1)</p> <p>Loud breaths / lip smacks (1): expander / gate / cut breaths out / volume automation (1)</p> <p>Plosives / pops / p (& b) (1): HPF/100Hz filter / low shelf cut / volume automation / dynamic EQ reducing LF / multiband compression reducing LF / cut plosives out (1)</p> <p>Sibilance / s (& t) (1): de-esser / EQ with high mid cut with narrow band / high cut EQ on reverb / volume automation / multiband compression reducing high mids / dynamic EQ reducing high mids (1) NOT LPF / just 'EQ'</p> <p>Proximity effect (1): HPF/100Hz filter / low shelf cut / dynamic EQ reducing LF / multiband compression reducing LF (1)</p> <p><u>Headphone</u> spill (1): gate / expander / cut spill out manually between vocal phrases (1)</p> <p>Max 2 for problems. Max 2 for solutions.</p>	

Question Number	Question	Mark
3(c)	An unwanted tone has been recorded starting at the third beat of bar 14. Identify the waveform of this tone.	1
	Acceptable Answers	
	C Sine	

Question Number	Question	Mark
3(d)	(i) On the graph below, draw the waveform identified in part (c). (ii) Label the axes. (iii) Label the amplitude of the wave. (iv) Label the wavelength of the wave.	5
	Acceptable Answers	
	 <p>amplitude (1). Allow peak to peak amplitude</p> <p>m / cm / mm (1) (allow s / ms / time)</p> <p>waveform (1) wavelength (1)</p> <p>Note: If not a sine wave, accept a waveform that matches what was given in part (c).</p>	

Question Number	Question	Mark
3(e)	On the blank graph below, draw the same wave with the phase inverted.	1
	Acceptable Answers	
	Credit graph of the same waveform in (d) but in opposite phase (1).	

Question Number	Question	Mark
3(f)	Describe what would happen if the waveforms from parts (d) and (e) were added together.	1
	Acceptable Answers	
	Silence / destructive interference / cancel out / phase cancellation (1)	

Question Number	Question	Mark
3(g)	Describe a situation where it is important to check the phase of recorded signals.	2
	Acceptable Answers	
	<p>Multiple mics/stereo pair (1) used to record the same source (1) (multi-mic'ing) drum kit (1), snare top and bottom / other valid drum example (1) Combining a mic signal and DI signal (2) Mics facing different directions (1) Mics are different distances from sound source (1) Mid-side configuration (1) using a figure of 8 and a cardioid/omni (1)</p>	

Question Number	Question	Mark
3(h)	Use "wave.wav" from the CD ROM to remove the unwanted tone from the vocal track so that only the singing can be heard.	4
Acceptable Answers		
Listen to 0:25 of task 2, just before "I know I'll stay".		
Mark	Preparation of vocal track – removing unwanted waveform	
4	The waveform is quieter than or equal to MS audio. The singing is intact without any sections cut out or clicks.	
3	The waveform is quieter than or equal to MS audio. The singing is intact but reverb is cut and/or clicks present.	
2	The waveform is quieter than QP audio but louder than MS audio. OR The waveform is quieter than QP audio. However there is subtle EQ.	
1	The waveform has been cut out in between the singing but the waveform remains under the singing. AND/OR Intrusive gating/fading/EQ AND/OR There are audible timing errors AND/OR Wrong vocal phrase AND/OR Waveform is louder	
0	No attempt at cutting out any waveform / completely silent track	
Note: If vocal is not soloed or the metronome is switched on, assess what can be heard clearly up to max. 2.		

Question Number	Question	Mark
4(a)	<p data-bbox="389 266 1254 333">Give an overview of the processes used during mastering. How has the sound of masters changed since 1970?</p> <p data-bbox="389 340 660 374">Acceptable Answers</p> <p data-bbox="389 414 927 445">Credit discussion of mixing up to max 3</p> <p data-bbox="389 479 1082 510"><u>Underlined technical terms must be spelt correctly.</u></p> <p data-bbox="389 544 531 575">GENERAL</p> <p data-bbox="389 577 1235 645">The final process after mixing (1). Cannot correct poor mixes, e.g. poor balance (1).</p> <p data-bbox="389 674 1254 770">Acoustically treated room (1) and multiple sets of speakers (1) credit reference to speaker type e.g. NS10, Auratone, full range speakers (1).</p> <p data-bbox="389 801 1139 833">Credit any correct reference to metering / analyser (1).</p> <p data-bbox="389 866 1179 934">Using commercial reference tracks to match EQ / dynamic range (1).</p> <p data-bbox="389 965 1166 1032">Pre-1980s analogue / tape (1). Modern / 1980s onwards digital / software (1).</p> <p data-bbox="389 1064 1241 1131">Many contemporary engineers will mix with mastering plug-ins / inserts on the main output (1).</p> <p data-bbox="389 1162 770 1193">ADC / DAC / converters (1).</p> <p data-bbox="389 1225 1187 1292">Analogue masters degrade over time (1); degrade on each copy (1).</p> <p data-bbox="389 1323 1134 1391">Valve / analogue equipment is warm [accept any other descriptor] (1).</p> <p data-bbox="389 1422 794 1453">MS / mid-side techniques (1).</p> <p data-bbox="389 1485 857 1516">Re-mastered (1) to re-release (1).</p> <p data-bbox="389 1547 1142 1615">Make mixes suitable for domestic playback equipment / playback equipment of the era / credit example (1).</p> <p data-bbox="389 1646 1190 1713">Different masters for different formats (cassette, vinyl, CD, mp3) (1).</p> <p data-bbox="389 1744 576 1776">PROCESSES:</p> <p data-bbox="389 1778 687 1809">Noise reduction (1):</p> <p data-bbox="389 1812 967 1843">Reduce hiss / clicks / hum / drop-outs (1).</p> <p data-bbox="389 1845 1249 1912">Particularly necessary for analogue recordings / recordings pre-2000 (1)</p> <p data-bbox="389 1915 1238 1982"><u>Dolby</u> (1) boosts HF on recording then reduces HF on playback (1).</p>	16

Adjust stereo width (1):

1960s stereo mixes are re-released in mono (1) because stereo is too wide / polarised (1).

Stereo reverb (1)

EQ each side differently (1).

Reverb / Ambience (1):

Makes it sound like it's in a real space / glue elements of mix together (1).

Difficult / impossible to remove reverb (1).

EQ / Equalisation (1):

Linear phase (1)

Dynamic EQ (1)

Adjusts volume of particular frequencies / frequency spectrum / frequency response (1).

Masters in 1970s warm EQ / less UM and HF (1).

Masters in 1980s had more UM and HF / were bass-light (compared with today) (1).

Masters in 2000s/modern are LF and HF heavy (compared with older masters) (1).

EQ brightens sound post compression (1).

Loudness EQ (1)

Match EQ between different tracks on an album (1).

Vinyl masters need LF reduced (1).

Rumble filter / HPF to remove rumble (1) less than 35Hz / inaudible sub-bass (1) to get a louder master / reduce compression pumping (1).

Notch filter to remove resonances / hum (1).

Exciter (1):

Adds extra harmonics (1). Restores missing (1) high frequencies (1) from analogue recordings (1).

Introduced in 1970s / heavily used in the 1980s (1).

(Multi-band) Compression (1) / Limiting (1):

Reduces dynamic range (1).

Increases (average) volume / perceived loudness (1).

Bring quieter sections of music up to mask noise (1) especially for cassette / vinyl (1).

Prevents distortion / peaking (1).

More modern recordings are louder / "loudness wars" / less dynamic range (1) to make stand out on radio (1); be audible on phone / laptop / small speakers (1); better for low quality streamed audio (1).

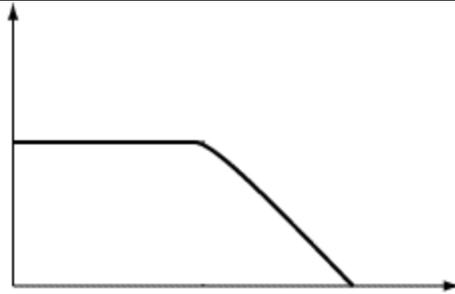
Modern recordings about -13dB RMS (1).

Brickwall / ∞ :1 (1) limiter at end of chain (1) to prevent clipping / going above threshold (1) peaking at around -0.1dB to -1dB / not maximum (1) to allow headroom (1).

Multi-band compressors are a form of EQ / splits in to separate frequency bands (1)

<p>Volume: Match volume between different tracks on album (1)</p> <p>Dithering (1): Digital masters (1) Adds layer of noise (1) to make sound more natural (1).</p> <p>Sample rate/bit depth (1): CD (1) use <u>Red book standard</u> (1) High definition audio (1) uses higher sample rate (1) and higher bit depth (1) Credit any valid sample rate and bit depth e.g. 44.1kHz (1) 16 bit (1) [must relate to correct format].</p> <p>CD track markers / index / table of contents / TOC (1). Metadata / ISRC (1).</p> <p>Truncating / Topping and tailing (1). Don't cut off reverb tail / end (1). Fades / cross-fades (1).</p> <p>Sequencing tracks / putting tracks in right order on album (1)</p> <p>Silent gaps between tracks (1). Approximately 2 seconds (1).</p> <p>Radio edits (1) Shorter (1) any valid reference to what has been cut: e.g. lengthy introductions; long guitar solos (1).</p>	
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Question Number	Question	Mark
4(b)	<p data-bbox="389 271 1235 371">Figure 1 shows delay, wah-wah and distortion guitar pedals. Explain the function of the pedals and the controls that can be seen in the picture.</p> <p data-bbox="389 383 659 412">Acceptable Answers</p> <p data-bbox="389 454 1070 483"><u>Underlined technical terms must be spelt correctly</u></p> <p data-bbox="389 517 1110 546">All comments must relate to the correct knob/socket.</p> <p data-bbox="389 584 507 613">General:</p> <p data-bbox="389 618 1214 678">¼ inch / 6.3mm / jack / TS / patch cable (1). Short leads for less noise (1). Unbalanced (1).</p> <p data-bbox="389 712 1023 741">Battery / 9V / PP3 / external power supply (1).</p> <p data-bbox="389 775 1043 804">Electric guitars / pedals are high impedance (1).</p> <p data-bbox="389 842 695 871"><u>Analogue</u> / <u>analog</u> (1).</p> <p data-bbox="389 909 1158 938">Transistor / solid state (1) compact for guitar pedals (1).</p> <p data-bbox="389 972 1257 1099">Order of pedals is important (1). Distortion before wah because wah needs harmonically rich sound to filter (1). Delay after distortion to prevent sound becoming muddy (1). Daisy-chain (1).</p> <p data-bbox="389 1133 1150 1162">Foot operated so that guitarist can continue playing (1).</p> <p data-bbox="389 1196 464 1225">RAT:</p> <p data-bbox="389 1229 1129 1290">General description: harsh/gritty/brighter tone/used in rock/solos (1)</p> <p data-bbox="389 1294 775 1323">Narrower dynamic range (1)</p> <p data-bbox="389 1328 1038 1357">Hard (1) <u>clipping</u> (1). Adds extra harmonics (1)</p> <p data-bbox="389 1391 552 1420">Distortion:</p> <p data-bbox="389 1424 1166 1485">Gain / input / pre-amp / overdrive (1). Turn up for more distortion (1).</p> <p data-bbox="389 1518 1257 1579">Credit any correctly drawn clipped wave shape (1). No credit of axes because credited in Q3(d).</p> <p data-bbox="389 1612 480 1641">Filter:</p> <p data-bbox="389 1646 660 1675">Low pass (filter) (1)</p> <p data-bbox="389 1680 1027 1709">Controls the cut-off / frequency of the filter (1)</p> <p data-bbox="389 1713 903 1742">Removes high frequencies / treble (1)</p> <p data-bbox="389 1747 1018 1776">Warms up sound / rounds off hard clipping (1)</p>	16



y-axis: amplitude / gain / dB (1)

x-axis: frequency / Hz (1)

shape of frequency response (1)

Volume:

(Turns down) output / processed sound level (1) to compensate for added volume with distortion knob (1).

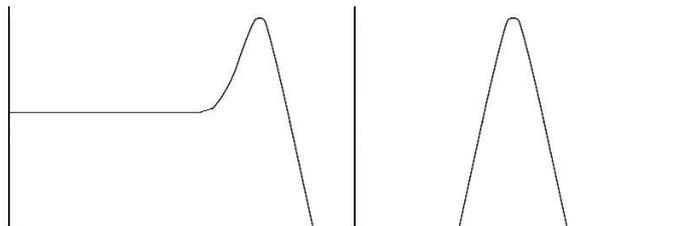
Bypass / on & off switch / wet / dry / in / out (1).

VOX WAH WAH:

General description:

Imitates (wah) mute on brass / voice-like effect / famously used by Jimi Hendrix / Eric Clapton / Theme from Shaft / disco / funk / solos / any other significant example (1).

Variable (1). Cut-off / frequency (1). Band pass / resonant low pass / over-coupled low pass (1) filter (1). Note: frequency must be in context of filter, not pitch.



y-axis: amplitude / gain / dB (1) [don't double credit from RAT]

x-axis: frequency / Hz (1) [don't double credit from RAT]

shape of frequency response (1) [allow further credit from RAT because different curve].

Bright when forward (open) and dull when back (closed) / removes HF (1).

Pot / potentiometer / variable resistor (1).

Push hard forward for bypass (1).

MEMORY MAN

General description of delay: takes the dry sound, then repeats it / echo / adds depth/ambience / Pink Floyd / U2 / any other significant example (1)

General description of chorus: simulates multiple players / thickens the sound (1)

Bucket brigade (1) using capacitors (1).

	<p>Level: Gain / input / pre-amp (1) level. LED shows clipping / distortion (1).</p> <p>Blend: Wet/dry balance / how loud the delay signal is (1).</p> <p>Feedback: The amount of signal retained on each repeat / amount of delayed signal sent back to input (1). Number of repeats (1). High feedback leads to infinite delay/louder repeats (1) causing soft (1) distortion (1).</p> <p>Delay: (Delay) time / the time between each repeat (1). Can be adjusted whilst in use giving pitch shifted delays (1). No tempo delay time (1).</p> <p>Chorus-vibrato knob: Depth / send level (1). Amplitude (1) of LFO (1). Modulation (1); comb filtering / phase cancellation (1).</p> <p>Chorus-vibrato switch: Chorus is slow modulation / vibrato is fast modulation / changes modulation speed (1). Allow vibrato is a variation in pitch (1). Allow chorus is when the signal is duplicated and varied in pitch / delay time (1). Short delay times (1).</p> <p>Bypass / on & off switch (1) [<i>don't double credit from RAT</i>]</p> <p>Echo out / Direct out: Any correct discussion of wet / dry (1).</p>	
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Question Number	Question	Mark		
5(a)	Apply automated panning to the drums . <ul style="list-style-type: none"> • Only bars 4 and 5 should be affected; all other bars should be panned to the centre. • The hand clap in bar 4 should be panned hard left. • The hand clap in bar 5 should be panned hard right. • The bass drum should be panned centre throughout. 	3		
	Acceptable Answers			
	Management & control of the drums panning automation			
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30px; text-align: center;">3</td> <td>L - R Clap (and its reverb) pans hard left then hard right in bars 4-5. Bass drum remains centre.</td> </tr> </table>		3	L - R Clap (and its reverb) pans hard left then hard right in bars 4-5. Bass drum remains centre.
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Question Number	Question	Mark										
5(b)	Listen to the automated EQ on the vocals in bars 18-25 . Recreate that EQ in bars 2-9 .	3										
	Acceptable Answers											
	Listen to vocals at 0:02 to 0:16 (intro)											
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Ignore EQ already assessed in question 3(h).												

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5(c)	Compress the synth chords . <ul style="list-style-type: none"> • Only bars 18-25 should be affected. • The drums should trigger the side-chain of the compressor so that the synth chords part pumps in time with the bass drum. • The side-chained compression should suit the style of the music. 	3										
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Listen to 0:32-0:46												
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5(d)	Apply a mono delay effect to the synth chords . <ul style="list-style-type: none"> • Use a crotchet synced delay. • The delay should fill the gaps in the introduction. • The delay should be clearly audible. • Ensure that the delay is not intrusive. 	3										
Acceptable Answers												
Base any borderline decisions on the introduction at 0:01. Award up to 3 marks if delay is only in introduction.												
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5(e)	Balance the mix. <ul style="list-style-type: none"> • The balance should suit the style of the music. • Ensure that all of the tracks can be heard clearly. 	3										
	Acceptable Answers											
	On CD ROM: <ul style="list-style-type: none"> • synth chords loudest • vocals mid volume • drums quietest 											
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Ignore previously assessed work (e.g. vocal tone, automated EQ, compressed synth chords).												

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5(f)	Produce a final stereo mix. <ul style="list-style-type: none"> • Ensure that the mix output is at as high a level as possible. • It should be free from distortion. • Do not limit or compress the mix output. • Ensure that the beginning and the end of the music are not cut off. • Ensure that silences at the beginning and end do not exceed one second. 	3										
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