Mark Scheme (Results)

November 2020

Pearson Edexcel GCE
Music Technology (9MT0)
Paper 4: Producing & Analysing

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Autumn 2020
Publications Code 9MT0_04_2010_MS

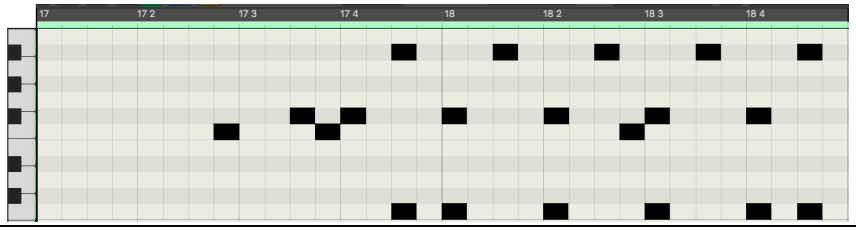
General Marking Guidance

- 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.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom

Question Number	Answer	Mark
1(a)	**D** Reverse A is incorrect because there is no distortion on the cymbal B is incorrect because there is no flange on the cymbal C is incorrect because the drum levels are low	1

Question Number	Answer	Mark
1(b)	Bar: **21** (1)	1

Question Number	Answer	Mark
1(c)	1 mark for each correct rhythm: kick on C tom on F closed hi-hat on F# open hi-hat on A# Allow swapped kick and open hi-hat.  	4

Question Number	Answer	Mark
(d)	QP: Drums shifted late 1 semiquaver + 57 ticks 'MS q1.wav' shows the edit for full marks. Check drum timing by lining up the candidate track and 'MS q1.wav'. If it flanges/unison then it's in time, if flams then it's out of time. Drums are in time during 23-29 and are playing the correct rhythm, including cymbals and fills (1). An edit has been attempted and the drums remain in time and no further glitches introduced in 4-22 & 30:2-33 (1). Bar 22-23: There are no clearly audible glitches/changes in level. (1) Bar 30: The kick drum has been replaced (1). Bar 29-30: There are no clearly audible glitches/changes in level. The kick drum is in time (1). [unison or flanging with MS audio, not audible delay] If the drums are not soloed / metronome left on, glitches score 0. If incomplete drum track bounced, assess from Q5 mix audio; max 2 mark.	5

Question Number	Answer	Mark
2(a)		2

Bar	Highest modulation value in decimal	Highest modulation value in binary
24	110	01101110
25	111 (1)	01101111 / 1101111 (1)

Question Number	Answer	Mark
2(b)	"synth fills example.wav" was bars 27-28.	6

"Synth fills" timbre
Correct octave and pitches throughout with polyphony (1)
Square wave (1). Allow saw or pulse. *Award 0 if any FX are added.*
Pitch bend range is 7 semitones (1) Check the final note is C (as in 'MS q2.wav')
Amplitude & pitch envelope (1): A=0, D=max, S=max, R=0 [allow some drop in sustain on longer notes if it's not clearly audible in bars 27-28] AND No portamento
Matching LPF with no resonance in bars 22, 24, 26, 28 (1) Bright with no filtering and no resonance on low pitched bars 23, 25, 27, 29 (1)
Ignore any vibrato. If synth fills part is not soloed, has effects, or the metronome is switched on, assess what can be heard clearly. If instrument is not a synthesiser (e.g. bass guitar/piano) then award max 2 (for pitches and pitch bend only).

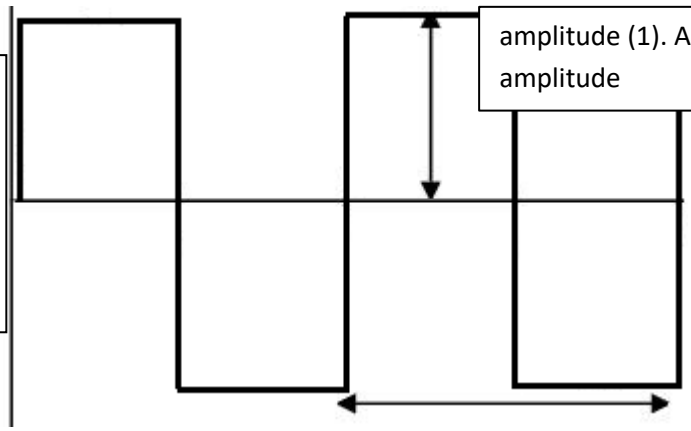
Question Number	Answer	Mark
2(c)	Pitch and rhythm are correct in bar 22 (1). Pitch and rhythm are correct in bar 24 (1). If the pitch and rhythm has been corrected in bars 22 AND 24 but further pitch and rhythm errors are introduced then award max 1. If the synth fills part is not soloed, has effects, or the metronome is switched on, assess what can be heard clearly.	2

Question Number	Answer	Mark
3(a)(i)	**C** Square A is incorrect because the volume is not fading smoothly B is incorrect because the volume is not fading smoothly D is incorrect because the volume is not random	1

Question Number	Answer	Mark
3(a)(ii)	**D** Volume A is incorrect because the brightness of the sound does not vary B is incorrect because there is no vibrato C is incorrect because there is no pulse width modulation	1

Question Number	Answer	Mark
3(a)(iii)	**B** Tremolo A is incorrect because the tuning is not altered C is incorrect because the pitch is not altered D is incorrect because the filtering is not altered	1

Question Number	Answer	Mark
3(a)(iv)	(Crochet divided by 2:) 0.5s÷2 (1) (Quaver) = 0.25s (1) 1÷length of a quaver / 1÷0.25s (1) 4Hz (1) OR Minim equals 1 second (1) Minim equals 1Hz (1) Crochet equals 2Hz (1) Quaver equals 4Hz (1) OR 4Hz (4)	4

Question Number	Answer	Mark
3(a)(v)	 waveform (1) period (1) Allow square wave which is just in positive or negative. Note: Accept the waveform that matches what was given in part (a)(i).	5

Gain / voltage / V / displacement / volume / level / amplitude / dB / depth (1)
Accept appropriate digital numbering: e.g. 0-65535

amplitude (1). Allow peak to peak amplitude

s / ms / time (1)

Question Number	Answer	Mark
3(b)	14 (1)	1

Question Number	Answer	Mark
3(c) (i)	13 (1) 29 (1) 33 (1)	2

Question Number	Answer	Mark
3(c)(ii)	Bars 6-12, 14-28: The bass plays in time and unison with no bass in bars 1-5 (1). The bass plays in time and unison with no bass in bars 1-5 and some attempt has been made to reduce the volume of the loop point click (1) The bass plays in time and unison with no bass in bars 1-5 with clicks <= “MS q3 minor click” or no clicks, and no intrusive fading (1). Bar 13: The Ab on 13:4:1 has correct pitch and rhythm (1). The Eb on 13:4:3 has correct pitch and rhythm (1). Bar 13 has correct pitch and with clicks <= “MS q3 minor click” or no clicks, and no intrusive fading (1). Bar 29-33: Correct including the rest on 29:4 (1). Correct including the rest on 29:4 with clicks <= “MS q3 minor click” or no clicks, and no intrusive fading (1). If the ‘bass.wav’ audio is not used, assess the pitch and rhythm but not clicks/glitches. If the bass is not soloed, then assess pitch and rhythm (if clearly audible) but not clicks/glitches.	8

Question Number	Answer	Mark
4(a)	Cut breaths (1) Chattering gate (1)	1

Question Number	Answer	Mark
4(b)	Lossy compression **discards/removes/loses/extrapolates/corrupts/changes** (not compresses) (1) some of the data, so there is a **reduction/loss** (1) in sound quality. A benefit of lossy compression is that the file size would be **less/smaller** (1) than an uncompressed file. Allow equivalent words.	3

Question Number	Answer	Mark
4(c)	<table><tr><th></th><th></th></tr><tr><td>Best</td><td>3. CD</td></tr><tr><td>Second best</td><td>1. AAC at 320kbps</td></tr><tr><td>Third best</td><td>4. mp3 at 160kbps</td></tr><tr><td>Worst</td><td>2. AIFF with a sample rate of 44.1kHz, bit depth of 4 bits</td></tr></table> Award total 3 if all are in the correct order. Award total 2 if any three are consecutively in the correct order. Award total 1 if only two are consecutively in the correct order and/or if one/two of best/worst is correct.	3

Question Number	Answer	Mark
4(d)(i)	Artefacts (1) Accept: Distortion (1)) (not clipping) Aliasing (1)	1

Question Number	Answer	Mark
4(d)(ii)	**B** 40 kbps A is incorrect because the vocal would be indecipherable C is incorrect because there will be fewer artefacts D is incorrect because artefacts will be inaudible	1

Question Number	Answer	Mark
4(e)	1 mark for each feature to a maximum of 4 (AO3). 1 mark for each analysis to a maximum of 4 (AO4). e.g.	8

AO3	AO4
Frequency response	
CD: flat/wide frequency response (1).	True to sound source (1). Bright (1). Sound is present even above the human hearing range (1).
AAC has a reduction in the volume of high frequencies / above 16kHz (1). AAC doesn't reproduce high frequencies above 18.5kHz (1).	Sound dull/muffled (1). This is right at the top end of the human hearing range (1) so won't be (significantly) heard (1).
Noise	
CD noise floor is at -130dB (1). CD signal to noise ratio is 90dB (according to the graphs) (1). CD has low level noise (1). CD noise is equal at all frequencies (1).	CD noise unnoticeable/inaudible (1). CD has less noise than AAC / AAC has more noise than CD (1).
AAC noise floor is between -75dB and -100dB depending on frequency (1). AAC signal to noise ratio is about 40-50dB (1). AAC has medium noise level (1). AAC noise is louder at mid-high frequencies (1)	AAC noise will be mostly masked in electronic/pop music (1) because narrow dynamic range (1). More noise audible with music with a wide dynamic range (1), acoustic/classical music (1). Reverb tails could be noisy (1). AAC: The increase in noise is above 8kHz so a lot of this noise is above where the ear is sensitive (1) so it may not be heard by most people (1).

Question Number	Answer		Mark
5(a)	Listen to the synth riff bars 4-5 (second half of intro).		3
		Management & control of the synth riff panning automation
	3	L – R as directed
	2	R – L OR C – R OR L – C OR Audible moving panning of synth riff OR Not hard panned. OR Glitch / click / change of volume on the edit
	1	Erratic panning AND/OR Synth riff panned in a single position other than centre. AND/OR Synth riff do not reset to centre in bar 6. AND/OR Synth riff panned but other parts panned noticeably off-centre
	0	There is no audible panning automation on the synth riff. OR No mix present on CD.

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5(b)</td><td>Listen to the synth riff bars 10-13 (second half of verse).
<table>
<tr><td></td><td>Management & control of synth riff filtering</td></tr>
<tr><td>3</td><td>The cut-off frequency of the low pass filter smoothly rises throughout the second half of the verse. The cut-off in bar 10 matches bar 9.</td></tr>
<tr><td>2</td><td>The cut-off frequency of the low pass filter smoothly rises throughout the second half of the verse
BUT
There is an audible join between sections.
OR
The cut-off in bar 10 does not match bar 9.
OR
No sense of crescendo in bar 13 / cut-off rises too quickly / not the full frequency range used
OR
No sense of crescendo/synth inaudible in bar 10 / cut-off rises too slowly</td></tr>
<tr><td>1</td><td>A variable low pass filter is used to create some sense of crescendo/contrast
BUT
Static or movement is jerky
OR
Low-shelving EQ
OR
Other bars of the synth riff are affected by the filtering.
OR
Synth riff is correctly filtered but other instruments have noticeable filtering / EQ in bars 10-13.</td></tr>
<tr><td>0</td><td>There is no clearly audible low pass filtering on the synth riff in bars 10-13.
OR
Wrong filter type
OR
No mix present on CD.</td></tr>
</table></td><td>3</td></tr>
</table>

Question Number	Answer	Mark
5(c)	Listen to the synth riff 31-33 (outro) **Management and control of synth riff tremolo** Tremolo present (1) Mono and 1/8 note rate and in phase with bar 30 (1) Mono and square wave LFO and full depth (1) Max 1 if only bar 32 with tremolo because copy and pasted from 30. Max 2 if wrong bars or not all of 31-33 are affected. Glitches/clicks present that are louder than “MS q5.wav”, max 2. Change in volume compared with rest of song, max 2.	3

Question Number	Answer	Mark
5(d)	Listen to the vocal in bar 25 (‘parts’ in the chorus) **Management and control of vocal pitching** ‘parts’ has been re-pitched (1). ‘parts’ is pitched to F (1). ‘parts’ is repitched to F and there are no intrusive artefacts / glitches / volume changes / other words re-pitched (1).	3

Question Number	Answer	Mark
5(e)	Listen to the vocal throughout **Management and control of vocal side chained gated reverb** For responses where there is a side-chained gate on the reverb and the dry signal is not gated: Reverb: Reverb is added (1). Reverb time is very long at approximately 5 seconds (1). No extra reverb is added to bars 6-7, the reverb send level matches, and there are no clicks, glitches or volume change at the end of bar 7 (1). Gate: The reverb gate is gated (1). The reverb gate is side chained to the drums (1). The reverb gate attack, release and threshold are set so that the rhythm is similar to bars 6-7 (1). --- For unsuccessful attempts: Award 1 mark total if there is a side-chained gate on the dry vocal (including when reverb applied too). Award 1 mark total if some reverb is applied.	6

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5(f)</td><td>On CD ROM:
synth riff loudest
vocals mid volume
drums are quietest
synth fills is MIDI
<table>
<tr><th></th><th>Balance and blend</th></tr>
<tr><td>3</td><td>Balanced and blended across all parts of the mix. Vocals sit on top of mix and drums are significantly increased from drums.wav.</td></tr>
<tr><td>2</td><td>Most tracks are balanced with some masking. A few misjudgements, e.g. bass under / drums under</td></tr>
<tr><td>1</td><td>Balanced so that one track is barely audible. E.g. drums <= ‘MS q5 unbalanced’.
OR
Not all of a track present affecting balance
OR
Additional tracks.
OR
Erratic volume changes.</td></tr>
<tr><td>0</td><td>No mix on CD
OR
Not all tracks present</td></tr>
</table>
Ignore previously assessed work e.g. vocal reverb gating (if possible), synth fills velocity shaping.</td><td>3</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>5(g)</td><td>
<table>
<tr><th></th><th>Presentation of mix</th></tr>
<tr><td>3</td><td>Beginning and end of mix does not cut out music or tails. The beginning and end have less than 1 second of silence. The mix output is near normalised with no distortion.</td></tr>
<tr><td>2</td><td>Beginning and end of mix do not cut out. The beginning and/or end have a silence of greater than one second.
OR
The mix output is too low OR is compressed OR there is some slight distortion OR is louder than “q5 mixed”.
OR
Mono/mp3 or other compressed format
OR
Cut delay/reverb/drum tail</td></tr>
<tr><td>1</td><td>Obviously chopped start or ending (not including tails).
OR
The mix output is unacceptably low or too high (distorted)
OR
excessive use of mix compression causes pumping
OR
Metronome has not been turned off.
OR
Any part is noticeably out of sync / out of tune / missing
OR
Any additional intrusive FX / processing / EQ

IGNORE previously assessed work:
e.g. drums out of sync after bar 23.</td></tr>
</table>
</td><td>3</td></tr>
</table>

	0	No mix present on CD.

Question Number	Answer	Mark
6	**AO3 (5 marks)/AO4 (15 marks)** **Marking instructions** Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Responses that demonstrate only AO3 without any AO4 should be awarded marks as follows: • Level 1 AO3 performance: 1 mark • Level 2 AO3 performance: 2 marks • Level 3 AO3 performance: 3 marks • Level 4 AO3 performance: 4 marks • Level 5 AO3 performance: 5 marks **Indicative content guidance** The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:	20

AO3	AO4
Distortion	
	Rhythm guitar heavier/grittier than lead guitar.
EQ: all guitars	
Lo-cut/HPF/bass reduced on all guitar parts. Cut-off frequency approximately 100Hz.	Reduces rumble/hum/proximity effect. Reduces spill from bassy instruments. Removes handling noise. Makes space for kick drum/bass guitar. Reduces the power of the signal without reducing perceived volume. Low cut-off frequency wouldn't negatively affect the guitar tone.
EQ: Lead guitar	
(Approx) 3kHz/high mid boost. Low Q / wide bandwidth.	The EQ is 'opposite' to the rhythm guitar. Brighter. Will help the lead guitar cut through the mix/rhythm guitar. The lead guitar solo needs to be at the front of the mix. Makes lead guitar similar range to lead vocals. More natural / less resonant.
EQ: Rhythm guitar	
(Approx) 2kHz/high mid cut. Low Q / wide bandwidth. [don't double credit] Higher Q / narrower bandwidth than lead guitar.	Less harsh. Make space for lead guitar/other instruments/vocals in the mix.
Both left and right rhythm guitar have the same EQ.	Mix will be balanced. Different EQs would differentiate the rhythm guitars further.
Gate: all guitars	
Gate to reduce noise. Signal below the threshold is cut out. Attack time is the time taken for the gate to open after the signal has become louder than the threshold. Release time is the time taken for the gate to shut after the signal has fallen below the threshold.	Distorted guitars have high noise floor.

Gate: Lead guitar	
High threshold.	Threshold is set low enough to allow loud signal through. Threshold is set high enough to cut out noise. Suitable because narrow dynamic range.
Long/slow attack time. (not high)	Transients/beginning of notes could be cut out.
Long/slow release time. (not high)	Some noise could remain. Ends of notes won't be cut off. Sounds more natural.
Gate: Rhythm guitar	
Threshold	Threshold too high / should be lower. Gate will remain permanently shut. No signal will be heard.
Very short/fast attack. (not 0)	Causing clicks.
Very short/fast release. (not 0)	Causing clicks. [don't double credit] Cutting off the ends of notes. Unnatural.
Reverb	
Plate reverb	Bright / metallic. Dense reflections.
2 second reverb time.	Long reverb time. Could cloud/blur the mix.
Reverb is on an insert	All reverbs are the same. Guitars in same space / cohesive mix. An aux would be more suitable. Greater control of reverb amount.
Reverb after gate in signal chain.	Gate wont cut out reverb tails.
Routing	
Routed to stereo output	No subgroup for guitar mix is used. Using a subgroup for guitars could help balance all guitars against the rest of the mix.
Pan	
Lead guitar solo panned centre.	Important part / focus / main melody of the mix. Lead guitar solo needs to take the place of the lead vocal.
Rhythm guitars panned left and right / hard panned.	Double tracked guitar will have slight performance differences. Wide stereo. Opposite panning differentiates the two parts. Opposite panning leaves space in the middle for the: vocal. lead guitar.
Level	
All fader positions on 0/same.	Unity gain. Lead guitar should be louder than rhythm guitar.