GCSE

Electronics

44301

Mark scheme

4430

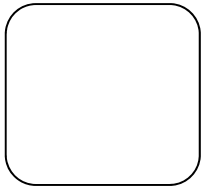
June 2015

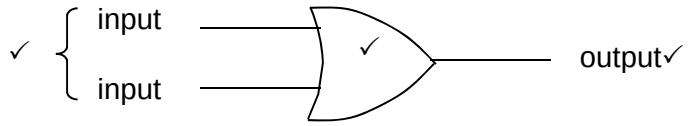
Version 1.1: Final mark scheme

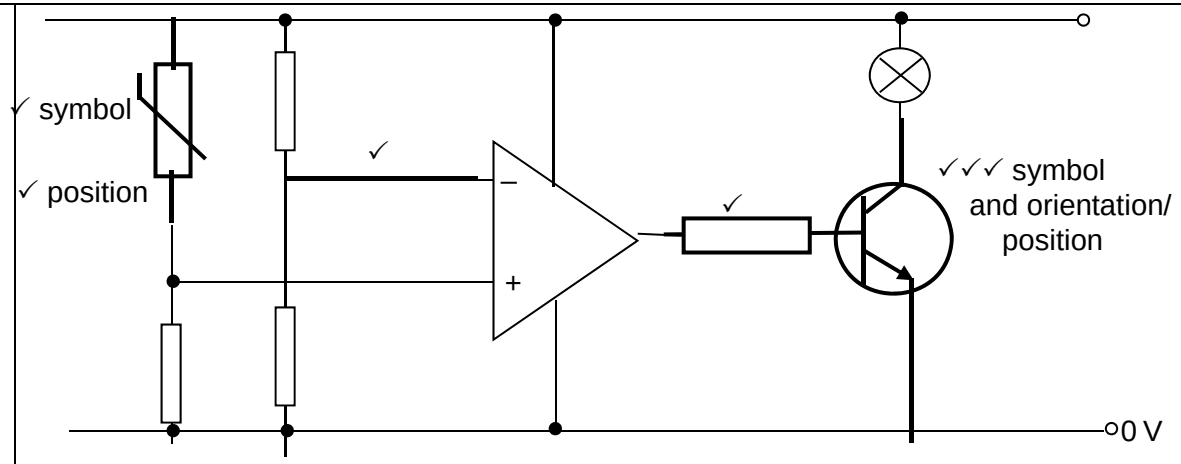
Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

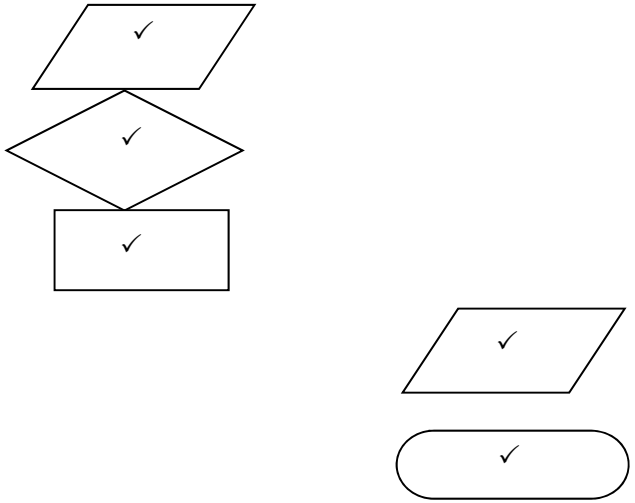
It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from aqa.org.uk

Q	Part	Sub part	Marking Guidance	Mark	Comment
1	a		Earth✓ Neutral✓ Live✓  Fuse✓ Flex grip/cord grip/cable grip etc.✓	5	
1	b		To prevent✓ too much current flowing✓ To protect✓ the supply✓/device from overheating✓ / To protect installation wiring	2	
1	c		P=VI✓ = 13 × 230✓ = 2 990✓ W✓	3	
2			C✓ J✓ G✓ F✓ D✓ H✓ E✓ A✓ B✓ I✓	10	
3	a		moisture detector✓ buzzer✓ comparator✓ OR gate✓	1 1 1 1	
3	b		driver✓	1	
3	c	i	comparator✓	1	
3	c	ii	driver✓	1	

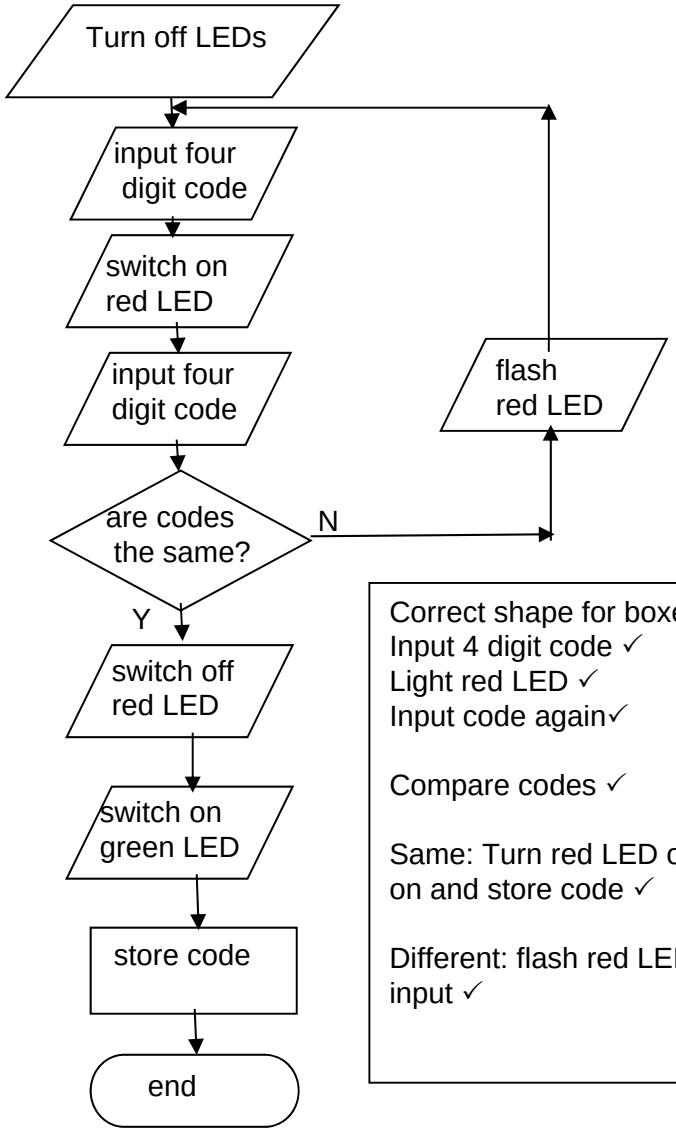
3	d		output of OR gate goes high✓ driver amplifies/boosts signal✓ alarm sounds✓	3 (max)	
4	a	i	10 ✓	1	
4	a	ii	01 ✓	1	
4	a	iii	11 ✓	1	
4	b	i	First different from rest✓ , then 0 1 1 1 second mark✓ i.e 1 0 0 0 gains one mark	2	
4	b	ii	OR ✓	1	
4	b	iii		3	

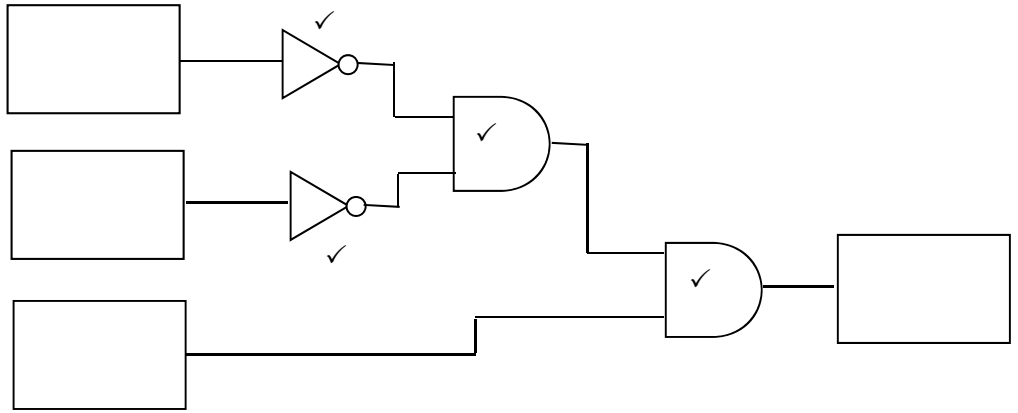
5	a			7	
5	b		6V✓✓	2	
5	c		yellow✓ violet✓orange✓gold✓	4	

6	a			5	

6	b		decision – either diamond shaped box✓ input - input four digit code box ✓ loop - either upward set of arrows ✓ output – turn off red LED/Turn on green LED/Open lock✓ process – wait 30 minutes or either of the given rectangular boxes✓	5	

6	c		Safe will not allow code to be entered again✓ for 30 minutes✓ Or wait 30 minutes✓ enter codes again/start again✓ Or after 30 minutes✓ counter resets✓	2	

6	d		 Correct shape for boxes✓ Input 4 digit code ✓ Light red LED ✓ Input code again✓ Compare codes ✓ Same: Turn red LED off, turn green LED on and store code ✓ stop/end ✓ Different: flash red LED and loop to either input ✓	8	8 max – no loop minus 1 – no input boxes minus 2 – no decision box minus 1

7	a		LM386 ✓	1	
7	b		1 W ✓	1	
7	c		30 Hz – 15 kHz ✓	1	
7	d		Gain = 3/0.150 ✓ = 20 ✓	2	
7	e		V_P = 1.414 × 3 ✓ = 4.2(4) V ✓	2	
7	f		I = 3/8✓ = 0.375/0.38✓ A ✓	3	(two marks for 0.5 A)
7	g		Aerial/Antenna✓ Demodulator/Detector✓ Loudspeaker/Speaker/LS✓	3	
7	h		Less prone to noise. ✓	1	
7	i		Constant amplitude✓changing frequency✓change of freq consistent with audio signal. ✓	3	
8	a			4	

8	b	i						2	
						1	✓		
				1	1		✓		

8	b	ii	motion sensor	position sensor	passenger switch	X	Y	Z	motor to open doors	4	
			0	0	0	1	0	1	0		
			0	0	1	1	0	0	1		
			0	1	0	0	1	1	0		
			0	1	1	0	1	0	0		
			1	0	0	0	1	1	0		
			1	0	1	0	1	0	0		
			1	1	0	0	1	1	0		
			1	1	1	0	1	0	0		
						✓	✓	✓	✓		

9	a		Set Reset Data Clock 2 or 3 correct✓ 4 correct✓	2	

9	b					2	
				on	off	✓	
				off	on	✓	

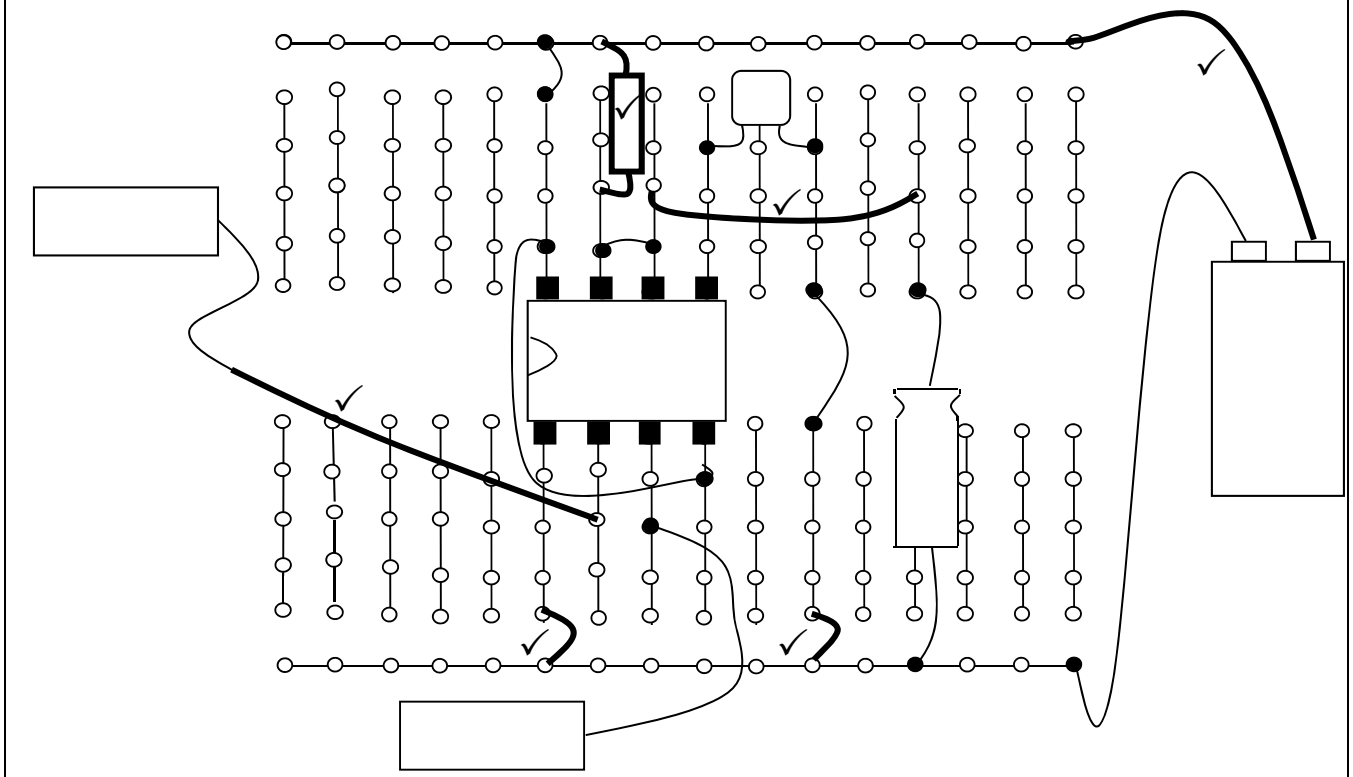
9	c	i							2
				1	1	0		0	
				✓		✓			

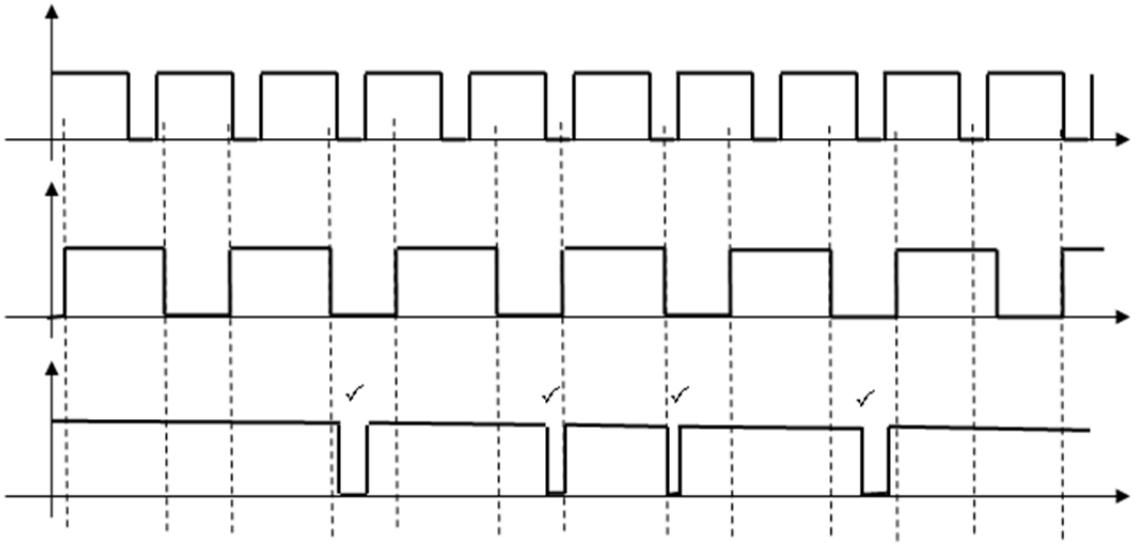
9	c	ii							2
			0			1	1	0	
			✓				✓		

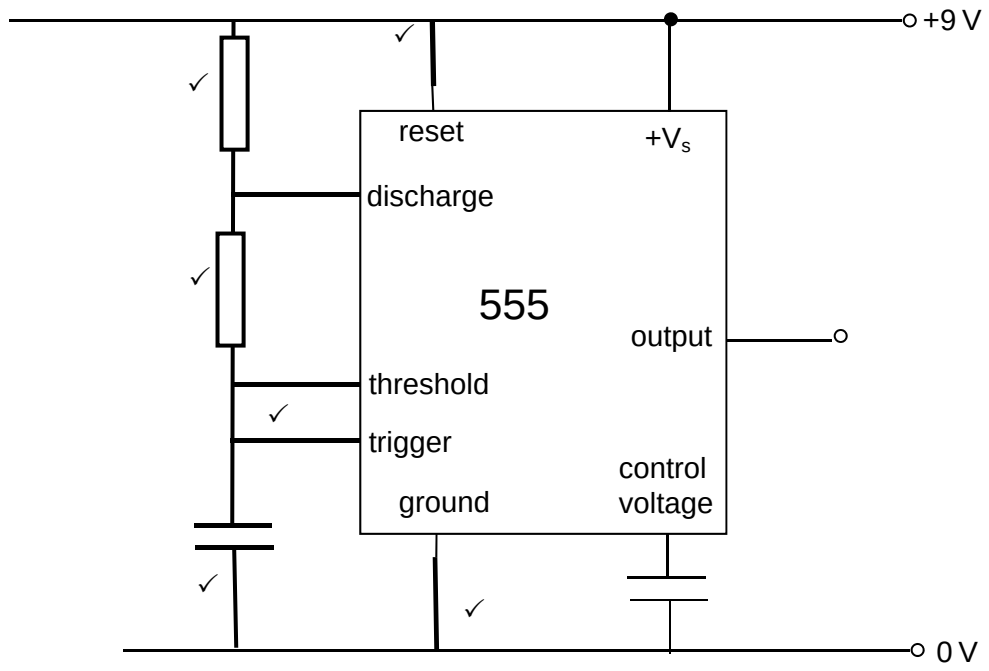
9	c	iii							2
			0			1	1	1	
			✓				✓		

9	c	iv			2
				yes ✓	
				yes ✓	

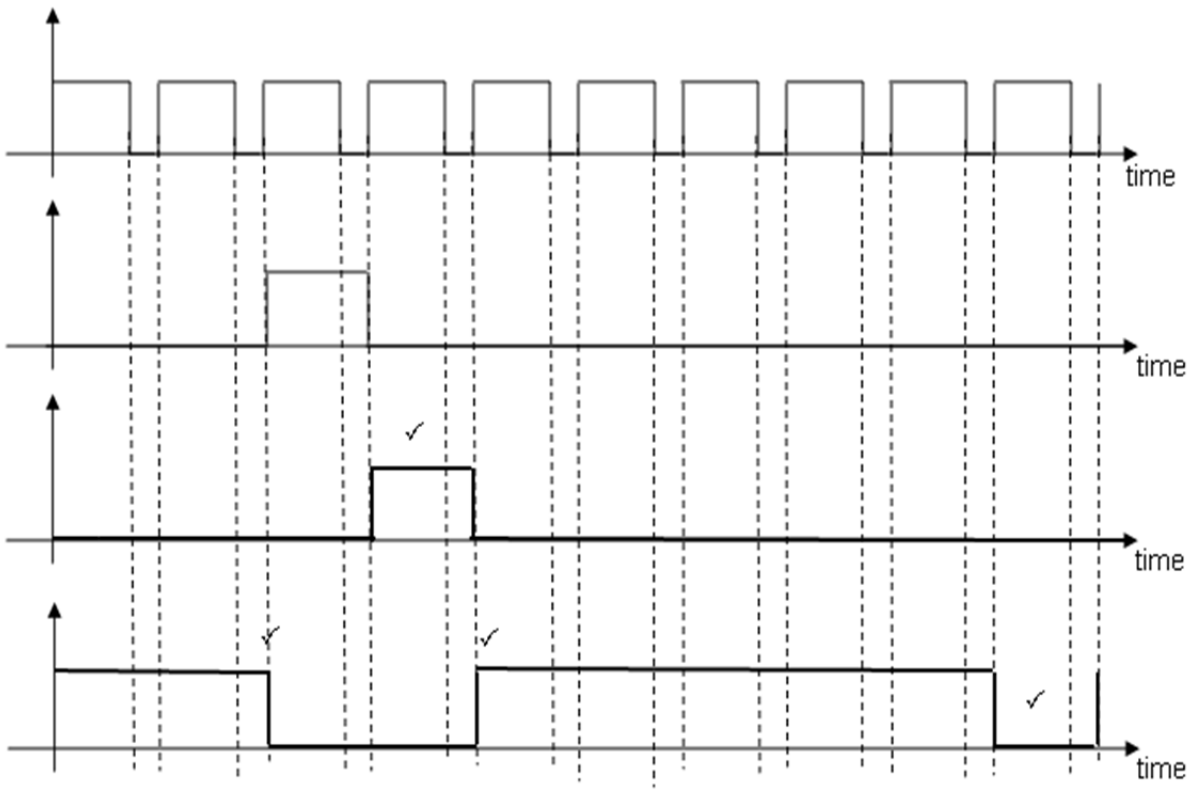
9	d		**Level** **Marks** **Descriptor** 3 4-5 -an answer will be expected to meet most of the criteria in the level descriptor - answer is full and detailed and is supported by an appropriate range of relevant points such as those given below - argument is well structured with minimal repetition or irrelevant points - accurate and clear expression of ideas with only minor errors in the use of technical terms, spelling, punctuation and grammar 2 2-3 - answer has some omissions but is generally supported by some of the relevant points below - the argument shows some attempt at structure - the ideas are expressed with reasonable clarity but with a few errors in the use of technical terms spelling, punctuation and grammar 1 0-1 - answer is largely incomplete, it may contain some valid points which are not clearly linked to an argument structure - unstructured answer - errors in the use of technical terms, spelling, punctuation and grammar or lack of fluency An example of the type of answer that may be produced would be: Using a microcontroller fewer components are required ✓ so the circuit is simpler✓ to construct. Using a microcontroller the combination is easier to change✓ because it can be changed using software✓ instead of changing the wiring. ✓	5	

9	e			6	

10	a			4	

10	b		 +9 V reset +V_s discharge 555 output threshold trigger control voltage ground 0 V	6	

10	c	i	1.5 × 0.2✓ = 0.3 s✓	2	
10	c	ii	2 × 0.2✓ = 0.4 s✓	2	
10	c	iii	1/0.4 ✓ = 2.5 Hz✓	2	
10	c	iv	1.8 × 5✓ = 9 V✓	2	
10	d		$T = (R_1 + 2R_2)C/1.44$✓ = $(30 + 2\times30)\times10^3\times10\times10^{-6}/1.44$✓ = 0.625✓(s)	3	
10	e	i	6.6 (V)✓	1	
10	e	ii	R = V/I or 6.6/0.005✓ = 1320 Ω✓ (allow 1500 Ω)	2	

10	f		 (4 marks)	4	