

1	(a)	when temperature rises resistance falls (or v.v.)	M1
		p.d. across it falls or equivalent (or v.v.)	A1
		idea of causes transistor to switch on lamp (or lamp off)	A1 [3]
	(b)	change value of R_1 /use variable res/swap R_1 with something	B1
		brief explanation in terms of potential divider	B1 [2]
	(c)	fire alarm/refrigerator fail light/other automatic lighting system	B1 [1]
			[Total: 6]

2	(a)	(i) low/0/off/no output	B1
		(ii) low/0/off/no output	B1
	(b)	(i) temp sensor to NOT gate input, correct symbol	B1
		output of NOT gate (condone incorrect symbol) and humidity	B1
		sensor to AND inputs (condone labelled box for AND gate)	B1
		(ii) NOT low in, high out	B1
		AND both inputs high, high output	B1
		Note: B0, B0 for states on wrong diagram.	
			[Total: 6]

6	(a)	Analogue, continuously increasing / decreasing readings Digital, readings increase / decrease by one unit	B1 B1	2
	(b)	(i) Transistors + other components such as resistors (ii) Standard symbol, must have labeled inputs and output (iii) Both inputs 0 (off), or either one input 0 (off), output 0 (off) Both inputs 1 (on), output 1 (on) OR correct truth table drawn (C1) Some explanation of what truth table shows (A1)	B1 B1 B1 B1	4
				[6]

7	(a)	(i) switch, relay or amplifier	1	
		(ii) any one of the three versions below, each 2 marks		
		1. vary base current transistor switches on for $V_{be} > 0.6 \text{ V}$	1 1	
		2. small change in base current produces a large change in collector/emitter current	1 1	
		3. vary potential divider connected to transistor base transistor switches on for $V_{be} > 0.6 \text{ V}$	1 1	3
	(b)	(i) standard symbol with 2 inputs and an output labelled	1	
		(ii) one or both inputs 1, output 1 (accept on, high for 1) both inputs 0, output 0 (accept off, low for 0)	1 1	3
				(6)