

1)

Q7	<p>(a) $m \wedge (s \vee d)$ <i>(A1) for $m \wedge$</i> <i>(A1) for $(s \vee d)$</i> <i>(A1)(A0) if brackets are missing</i></p> <p>OR</p> <p>$(m \wedge s) \vee (m \wedge d)$ <i>(A1) for both brackets correct, (A1) for disjunctive "or"</i> <i>(A1)(A0) if brackets are missing.</i></p>	(A2)																					
	<p>(b) If you choose a salad then you do not choose a dessert. <i>(A1) for "if ...then..."</i> <i>(A1) for salad and no dessert in the correct order.</i></p> <p>OR</p> <p>If you choose a salad you do not choose a dessert.</p>	(A2)	(C2)																				
	<p>(c)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>s</th> <th>d</th> <th>$\neg s$</th> <th>$\neg s \Rightarrow d$</th> </tr> </thead> <tbody> <tr> <td>T</td> <td>T</td> <td>F</td> <td>T</td> </tr> <tr> <td>T</td> <td>F</td> <td>F</td> <td>T</td> </tr> <tr> <td>F</td> <td>T</td> <td>T</td> <td>T</td> </tr> <tr> <td>F</td> <td>F</td> <td>T</td> <td>F</td> </tr> </tbody> </table> <p><i>(A1) for each correct column</i></p>	s	d	$\neg s$	$\neg s \Rightarrow d$	T	T	F	T	T	F	F	T	F	T	T	T	F	F	T	F	(A1)(A1)(ft)	(C2)
s	d	$\neg s$	$\neg s \Rightarrow d$																				
T	T	F	T																				
T	F	F	T																				
F	T	T	T																				
F	F	T	F																				
		[6 marks]																					

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2)

Q4	<p>(a) Both are 'p or q', the first is 'but not both' <i>Note: Award mark for clear understanding if wording is poor.</i></p>	(A1)	(C1)															
	<p>(b)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>$\neg q$</th> <th>$p \vee q$</th> <th>$\neg p \vee \neg q$</th> <th>$p \vee q \Rightarrow \neg p \vee \neg q$</th> </tr> </thead> <tbody> <tr> <td></td> <td>F</td> <td></td> <td>T</td> </tr> <tr> <td>T</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>F</td> <td></td> </tr> </tbody> </table> <p><i>Note: Follow through is for final column.</i></p>	$\neg q$	$p \vee q$	$\neg p \vee \neg q$	$p \vee q \Rightarrow \neg p \vee \neg q$		F		T	T						F		(A1)(A1)(ft) (A1)
$\neg q$	$p \vee q$	$\neg p \vee \neg q$	$p \vee q \Rightarrow \neg p \vee \neg q$															
	F		T															
T																		
		F																
	<p>(c) Tautology.</p>	(A1)(ft)	(C1)															
			[6 marks]															

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3)

Q2	(a) “Dany (either) goes to the cinema or studies for the test but not both.” <i>Award (A1) for correct propositions with or, (A1) for “but not both”.</i>	(A1)(A1)	(C2)
	(b) (i) $p \Rightarrow \neg q$ <i>Award (A1) for “$p \Rightarrow$”, (A1) for “$\neg q$”.</i>	(A1)(A1)	(C2)
	(ii) $q \Rightarrow \neg p$ <i>Award (A1) for “$q \Rightarrow$”, (A1) for “$\neg p$”.</i>	(A1)(ft)(A1)(ft)	(C2)
			[6 marks]

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4)

Q4	(a) If I am wearing my hat (then) the sun is not shining. <i>(A1) for if with or without then (A1) for both correct statements with implication in correct direction Use of ‘therefore’ is incorrect.</i>	(A1)(A1)	(C2)																				
	(b) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>p</th> <th>q</th> <th>$\neg p$</th> <th>$q \Rightarrow \neg p$</th> </tr> </thead> <tbody> <tr> <td>T</td> <td>T</td> <td>F</td> <td>F</td> </tr> <tr> <td>T</td> <td>F</td> <td>F</td> <td>T</td> </tr> <tr> <td>F</td> <td>T</td> <td>T</td> <td>T</td> </tr> <tr> <td>F</td> <td>F</td> <td>T</td> <td>T</td> </tr> </tbody> </table> <p style="text-align: center;"><i>(A1) (A1)(ft)</i></p>	p	q	$\neg p$	$q \Rightarrow \neg p$	T	T	F	F	T	F	F	T	F	T	T	T	F	F	T	T	(A1)(A1)(ft)	(C2)
	p	q	$\neg p$	$q \Rightarrow \neg p$																			
T	T	F	F																				
T	F	F	T																				
F	T	T	T																				
F	F	T	T																				
(c) $\neg p \Rightarrow q$ (or $q \Leftarrow \neg p$) <i>Do not split the (A2) Accept only these two statements.</i>	(A2)	(C2)																					
			[6 marks]																				

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5)

QUESTION 11

p	q	$\neg q$	$(p \wedge \neg q)$	$(p \vee q)$	$(p \wedge \neg q) \Rightarrow (p \vee q)$
T	T	F	F	T	T
T	F	T	T	T	T
F	T	F	F	T	T
F	F	T	F	F	T

(A1) (A1) (A2) (A4) (C8)

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6)

QUESTION 6

- (a) If the train arrives on time then I am not late for school. (A2) (C2)

Note: Award (A1) for “If...then” in correct order and (A1) for “not”.

- (b) $\neg p \wedge \neg q$ (A2) (C2)

Note: Award (A1) for both \neg symbols and (A1) for \wedge .

- (c) missing elements are

T	F	F
		F

(A3) (C3)

- (d) The implications are **not** logically equivalent. (A1) (C1)

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7)

QUESTION 3

- (a) If Sarah eats lots of carrots, then she can see well in the dark. (A1)(A1) (C2)

- (b) Sarah does not eat lots of carrots and she can see well in the dark. (A1)(A1) (C2)

Note: Award (A1)(A0) if “and” is replaced with “or” but everything else is correct.

- (c) $\neg q \Rightarrow \neg p$ (A1)(A1)(A1) (C3)

- (d) It is the contrapositive of $p \Rightarrow q$. (A1) (C1)

M04/530/S(1)