

Review exercise

Oxford ch.9

Paper 1 style questions

EXAM-STYLE QUESTION

- 1 a Copy and complete the truth table to show that $\neg(p \vee q) \Rightarrow \neg p \wedge \neg q$ is a valid argument.

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

- b Using the results of a, rewrite the following statement without using the phrase 'It is not true ...'
'It is not true that she dances well, or sings beautifully.'

- 2 The following propositions are given.

p : The train leaves from gate 2.

q : The train leaves from gate 8.

r : The train does not leave today.

- a Write a sentence, in words, for the following logic statement:

$$p \Rightarrow (\neg r \wedge \neg q).$$

- b Write the following sentence as a logic statement using p , q , r and logic notation:

'The train leaves today if and only if it leaves from gate 2 or from gate 8.'

- 3 a Copy and complete the truth table.

p	q	$p \Rightarrow q$	$\neg p$	$\neg q$	$\neg q \vee p$	$\neg p \vee q$
T	T					
T	F					
F	T					
F	F					

- b What identity is shown by the truth table?

- 4 a Copy and complete the following truth table for

$$p: x > 3$$

$$q: x^2 > 9$$

p	q	$\neg p$	$\neg p \vee q$
T	T		
T	F		
F	T		
F	F		

- b Using the results of part a, and explaining your reasoning, is $\neg p \vee q$ true, or false, when

i $x > 3$ and $x^2 \not> 9$?

ii $x \not> 3$ and $x^2 > 9$?

[Note: the symbol $\not>$ denotes 'not greater than'.]

6 The following propositions are given.

p : Picasso painted picture A.

q : Van Gogh painted picture A.

a Write a sentence in words to define the logic statements

i $p \vee \neg q$ ii $\neg p \wedge q$.

b Copy and complete the following truth table.

p	q	$\neg p$	$\neg q$	$p \vee \neg q$	$\neg p \wedge q$
T	T				
T	F				
F	T				
F	F				

~~X~~ Draw two Venn diagrams and shade the area represented by $p \vee \neg q$ on the first diagram and $\neg p \wedge q$ on the second diagram.

d Deduce the truth values of the logic statement

$$(p \vee \neg q) \Leftrightarrow (\neg p \wedge q)$$

i using the truth table

~~ii using the Venn diagrams.~~

Explain your answers clearly in words.

e Write down the name given to a logic statement such as

$$(p \vee \neg q) \Leftrightarrow (\neg p \wedge q).$$

7 The following propositions are given.

p : x is a multiple of 5.

q : x is a multiple of 3.

r : x is a factor of 90.

a Write a sentence, in words, for the statement: $(q \vee r) \wedge \neg p$.

b Write the following sentence as a logic statement using p , q , r and logic notation:

If x is a factor of 90 then x is either a multiple of 5 or x is not a multiple of 3.

c Use truth tables to determine the truth values of each of the following two statements:

$$(q \vee r) \wedge \neg p \quad \text{and} \quad r \Rightarrow (p \vee \neg q).$$