Logic 1

10. Consider the following statements about the quadrilateral ABCD

q: ABCD has four equal sides s: ABCD is a square

(a) Express in words the statement, $s \Rightarrow q$. *[2 marks]*

(b) Write down in words, the inverse of the statement, $s \Rightarrow q$. *[2 marks]*

(c) Determine the validity of the argument in (b). Give a reason for your decision. *[2 marks]*

Working:

Answers:

(a) .....

.....

(b) .....

.....

(c) .....

.....

Logic 2

2. [Maximum mark: 11]

Consider the following statements.

p: the land has been purchased
q: the building permit has been obtained
r: the land can be used for residential purposes

(a) Write the following argument in symbolic form.

"If the land has been purchased and the building permit has been obtained, then the land can be used for residential purposes." [3]

(b) **In your answer booklet**, copy and complete a truth table for the argument in part (a). Begin your truth table as follows.

p	q	r	
T	T	T	
T	T	F	
T	F	T	
T	F	F	
F	T	T	
F	T	F	
F	F	T	
F	F	F	

[2]

(c) Use your truth table to determine whether the argument in part (a) is valid. Give a reason for your decision. [2]

(d) Write down the inverse of the argument in part (a)

(i) in symbolic form;

(ii) in words. [4]

Logic 3

3. Consider each of the following statements

p: Alex is from Uruguay
q: Alex is a scientist
r: Alex plays the flute

(a) Write the following argument in words

$$\neg r \Rightarrow (q \vee p)$$

[3 marks]

(b) Complete the truth table for the argument in part (a) using the values below for p, q, r and $\neg r$. *[2 marks]*

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

(c) The argument $\neg r \Rightarrow (q \vee p)$ is invalid. State the reason for this. *[1 mark]*

Working:

Answers:

(a) .....

.....

.....

(c) .....

.....

Logic 4

3. Consider the three propositions p, q and r.

p: *The food is well cooked*
q: *The drinks are chilled*
r: *Dinner is spoilt*

(a) Write the following compound proposition in words.

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

[3]

(b) Complete the following truth table.

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

[3]

Working:

Answers:

(a) .....

.....

.....

.....

Logic 5

5. Consider the following statements

z: x is an integer
q: x is a rational number
r: x is a real number.

(a) (i) Write down, in words, $\neg q$.

(ii) Write down a value for x such that the statement $\neg q$ is true. [2]

(b) Write the following argument in symbolic form:
"If x is a real number and x is not a rational number, then x is not an integer". [3]

Phoebe states that the argument in part (b) can be shown to be valid, without the need of a truth table.

(c) Justify Phoebe's statement. [1]

Working:

Answers:

(a) (i) .....
.....

(ii) .....

(b) .....

(c) .....
.....
.....