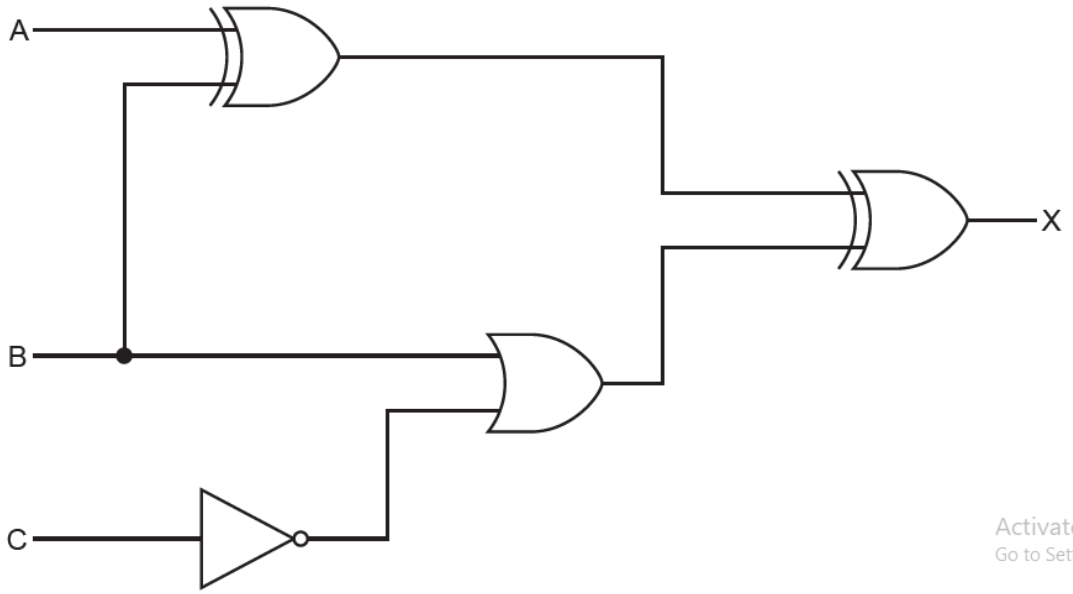
YEAR: MAY/JUNE 2015

(a) Complete the truth table for the following logic circuit:



Activate \
Go to Settin

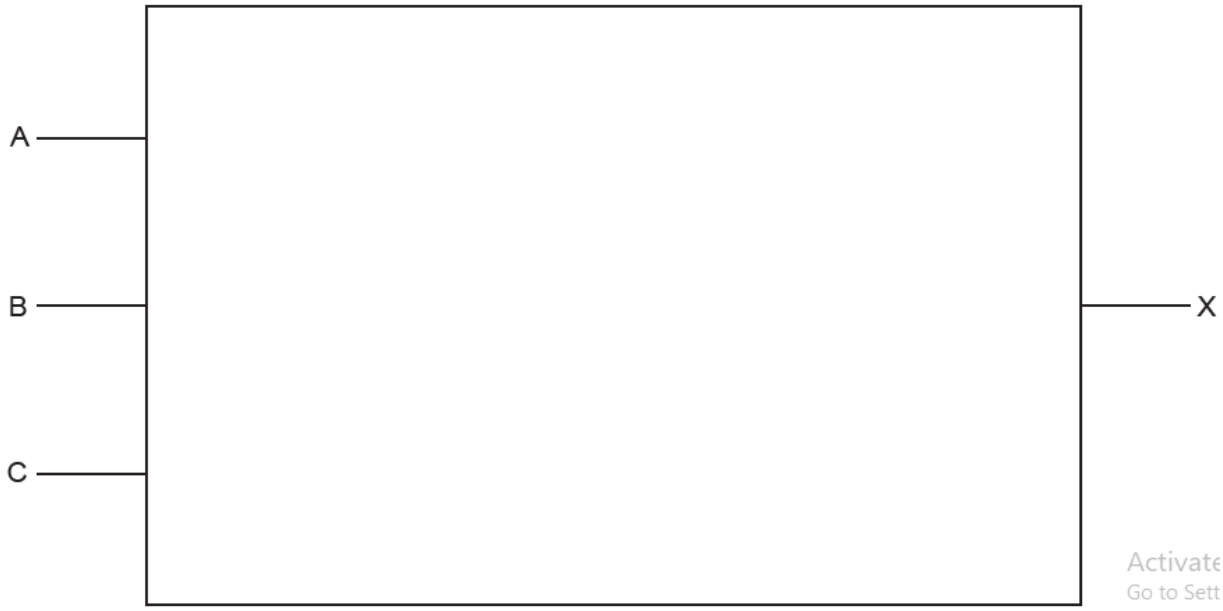
A	B	C	Workspace	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

Activate Wir
Go to Settings t

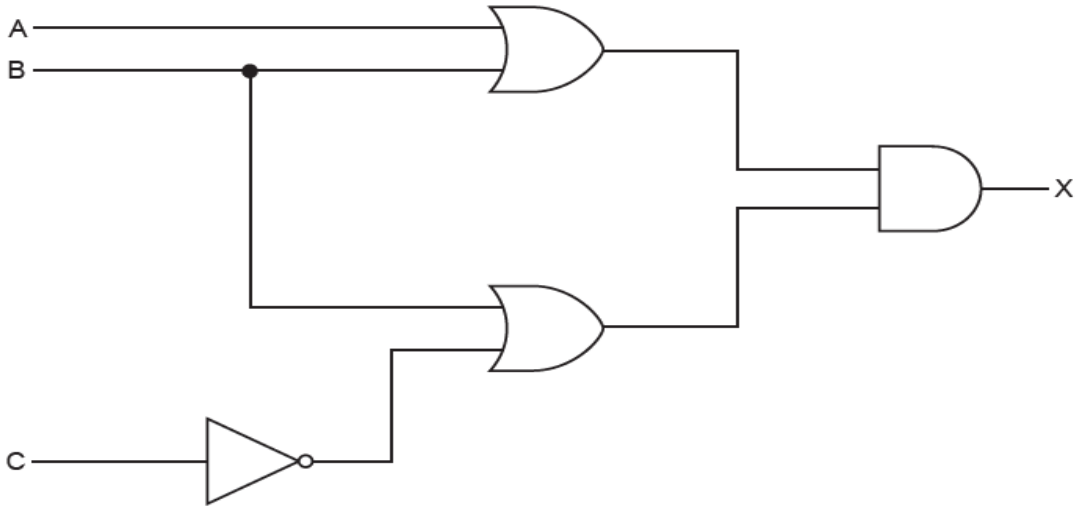
(b) Draw a logic circuit which corresponds to the following logic statement:

X = 1 if ((A is **NOT** 1 **OR** B is 1) **AND** C is 1) **OR** (B is **NOT** 1 **AND** C is 1)



Activate
Go to Sett

(c) Write a logic statement which corresponds to the following logic circuit:



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.....

.....

Activ
Go to

[3]

A gas fire has a safety circuit made up of logic gates. It generates an alarm (X = 1) in response to certain conditions.

Input	Description	Binary value	Conditions
G	gas pressure	1	gas pressure is correct
		0	gas pressure is too high
C	carbon monoxide level	1	carbon monoxide level is correct
		0	carbon monoxide level is too high
L	gas leak detection	1	no gas leak is detected
		0	gas leak is detected

The output X = 1 is generated under the following conditions:

gas pressure is correct **AND** carbon monoxide level is too high

OR

carbon monoxide level is correct **AND** gas leak is detected

(a) Draw a logic circuit for this safety system.

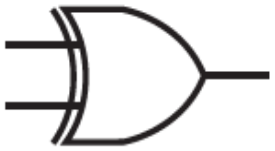
[5]

(b) Complete the truth table for the safety system.

G	C	L	Workspace	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

(c) Complete the truth table for the XOR gate:



A	B	C
0	0	
0	1	
1	0	
1	1	

YEAR: MAY/JUNE 2016

A computer-controlled machine produces plastic sheets. The thickness of each sheet must be within a certain tolerance. The sheets are kept below 50 °C as they move over rollers at 10 metres per second.

Three parameters need to be monitored all the time.

Parameter	Description	Binary value	Conditions
D	sheet thickness	1	thickness of sheet in tolerance
		0	thickness of sheet out of tolerance
S	roller speed	1	roller speed = 10 metres/second
		0	roller speed <> 10 metres/second
T	temperature	1	temperature < 50 °C
		0	temperature >= 50 °C

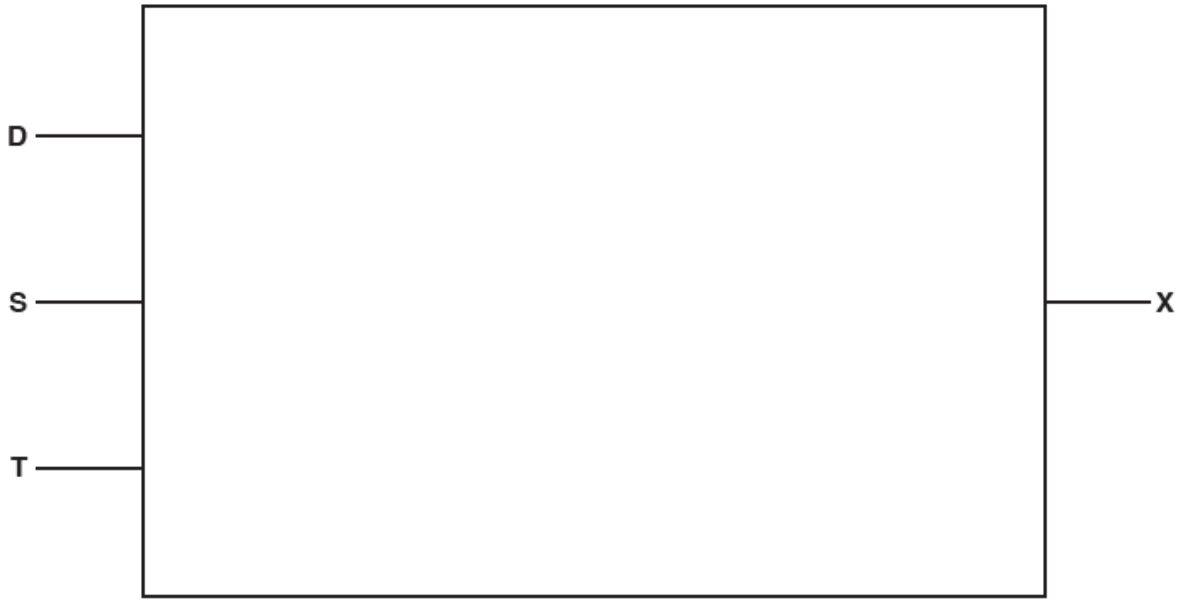
An alarm, **X**, will sound if:

thickness is in tolerance AND (roller speed <> 10 metres/second OR temperature >= 50 °C)

OR

roller speed = 10 metres/second AND temperature >= 50 °C

(a) Draw a logic circuit to represent the above monitoring system.



[6]

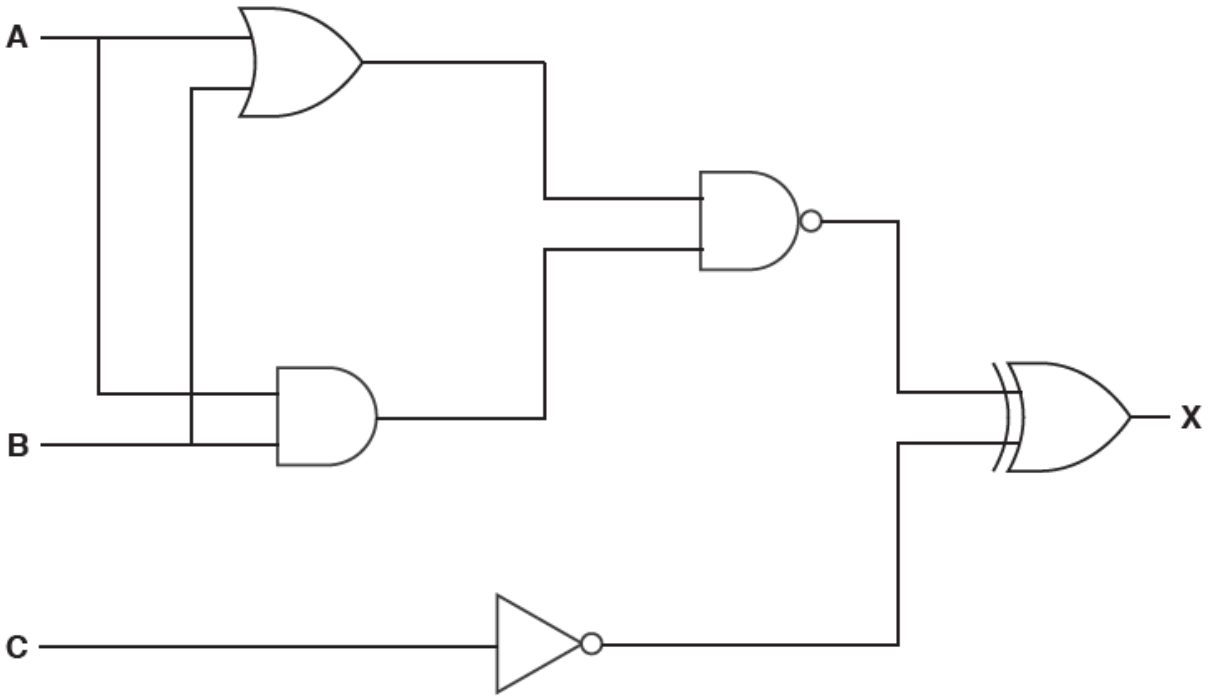
YEAR: MAY/JUNE 2016

(b) Complete the truth table for the monitoring system.

D	S	T	Working Space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

(a)



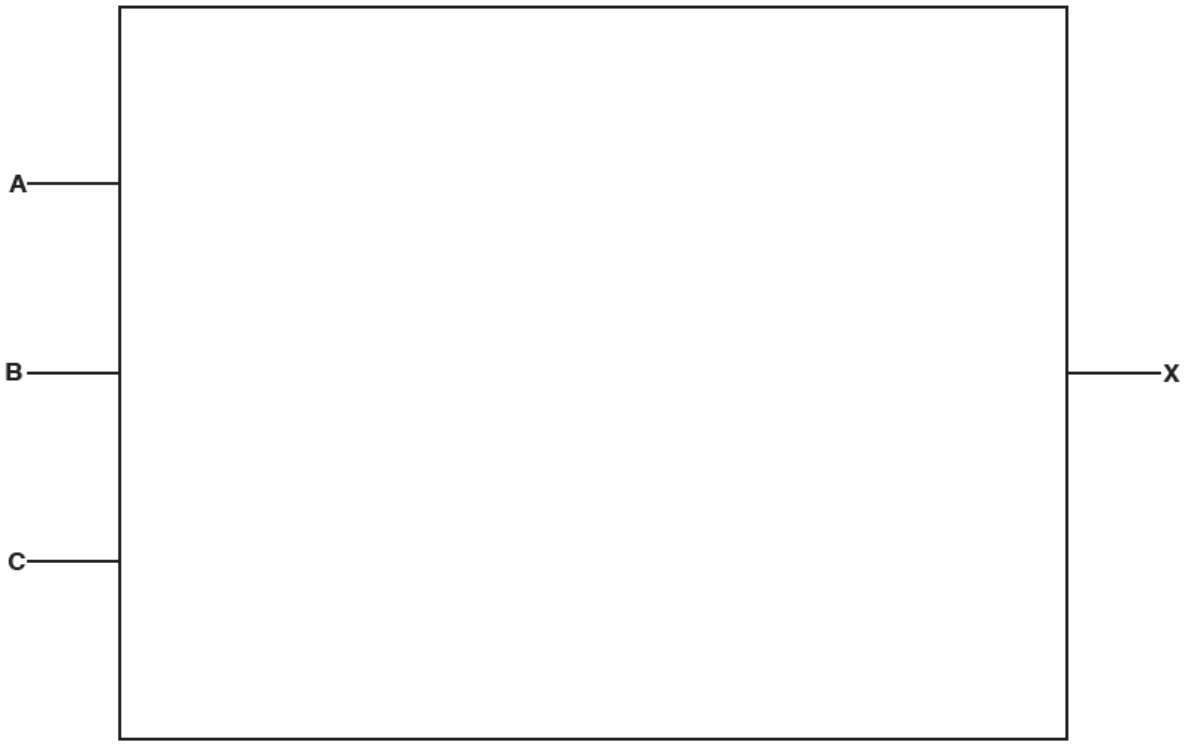
Complete the truth table for this logic circuit.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

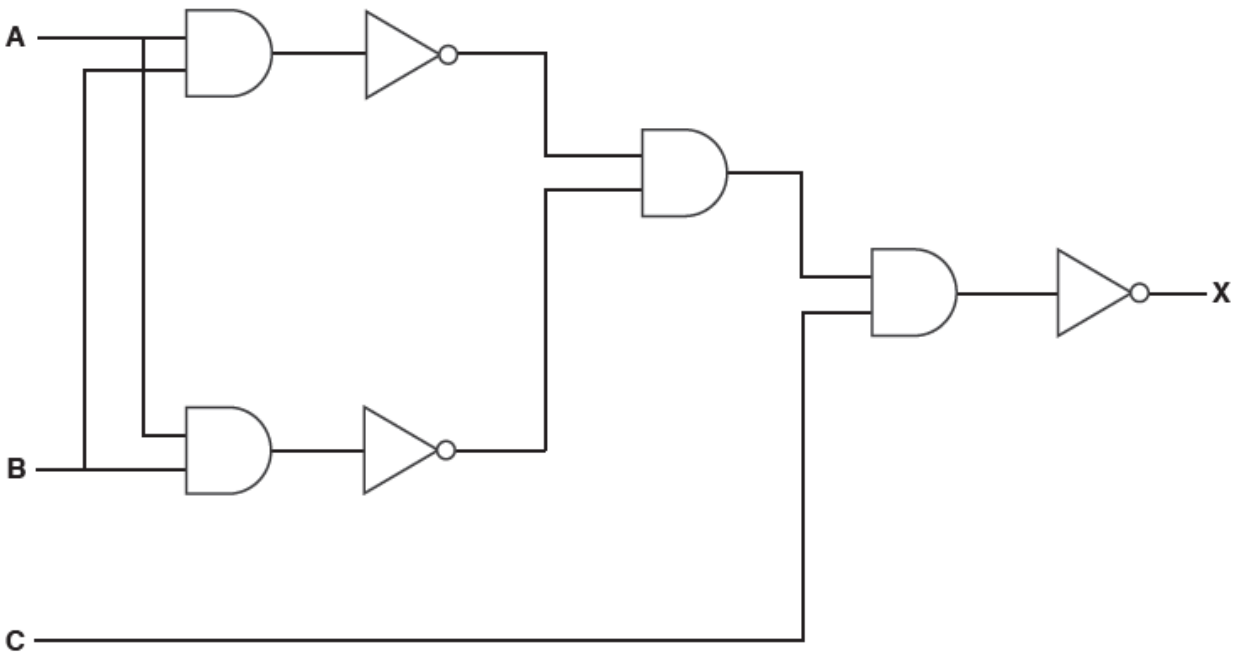
[4]

(b) Draw a logic circuit corresponding to the following logic statement:

X = 1 if ((A is 1 OR B is 1) AND (A is 1 AND B is 1)) OR (C is NOT 1)



(c) Re-draw the following logic circuit using NAND gates only.

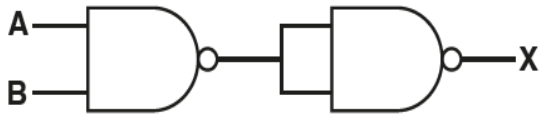


Logic circuit re-drawn:

[4]

(a) Complete the truth tables and name the single logic gate that could replace each logic circuit:

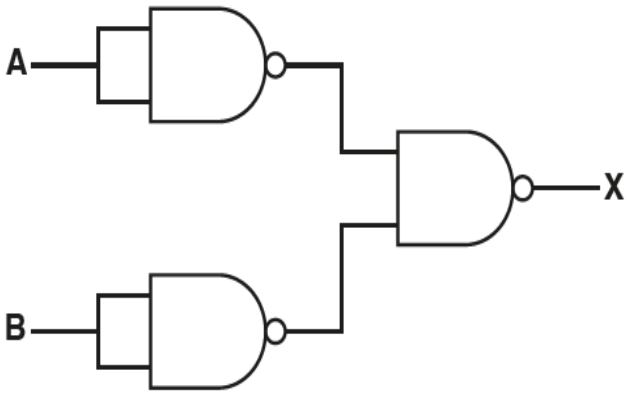
(i)



A	B	Working space	X
0	0		
0	1		
1	0		
1	1		

Single logic gate .....[3]

(ii)



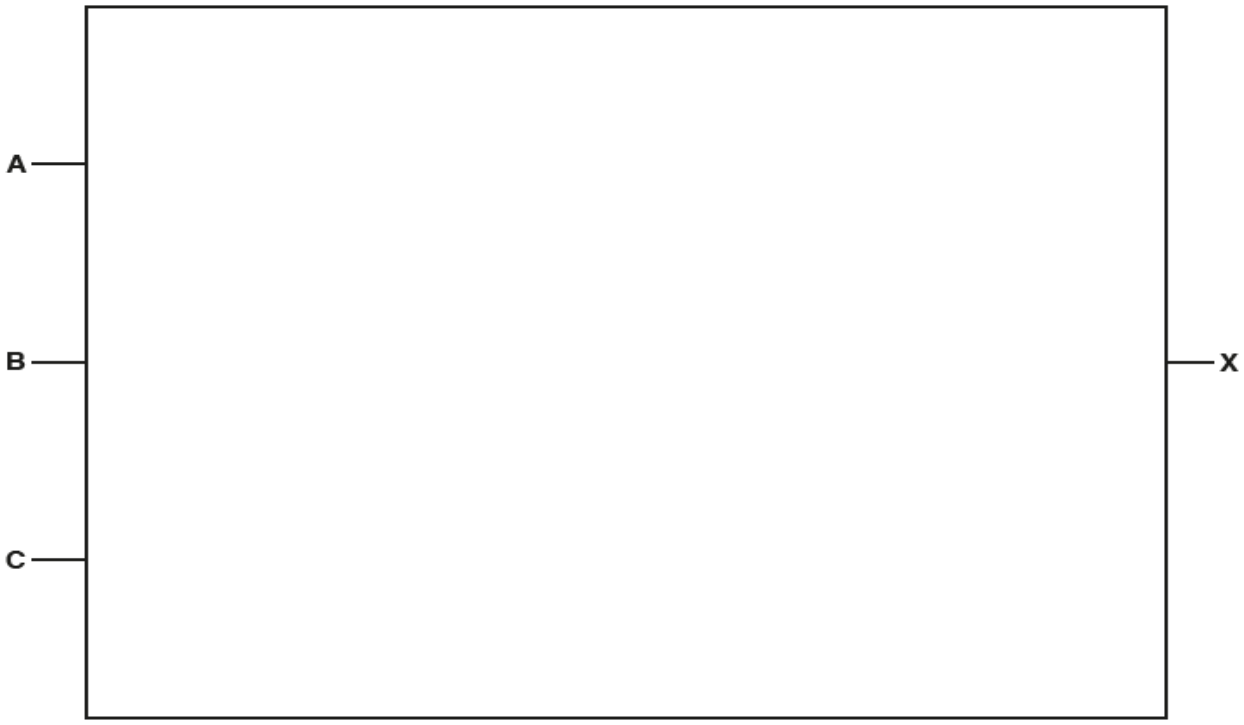
A	B	Working space	X
0	0		
0	1		
1	0		
1	1		

Single logic gate .....[3]

YEAR: OCT/NOV 2016

(b) (i) Draw a logic circuit to represent the following logic statement:

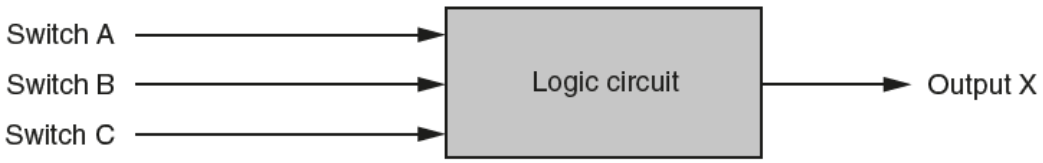
X = 1 if (A = 1 AND B = 1) OR ((B = NOT 1) AND C = 1)



(ii) Complete the truth table for the logic statement in **part (b)(i)**.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

Three switches, A, B and C, each send values of 0 or 1 to a logic circuit. Value X is output from the logic circuit.



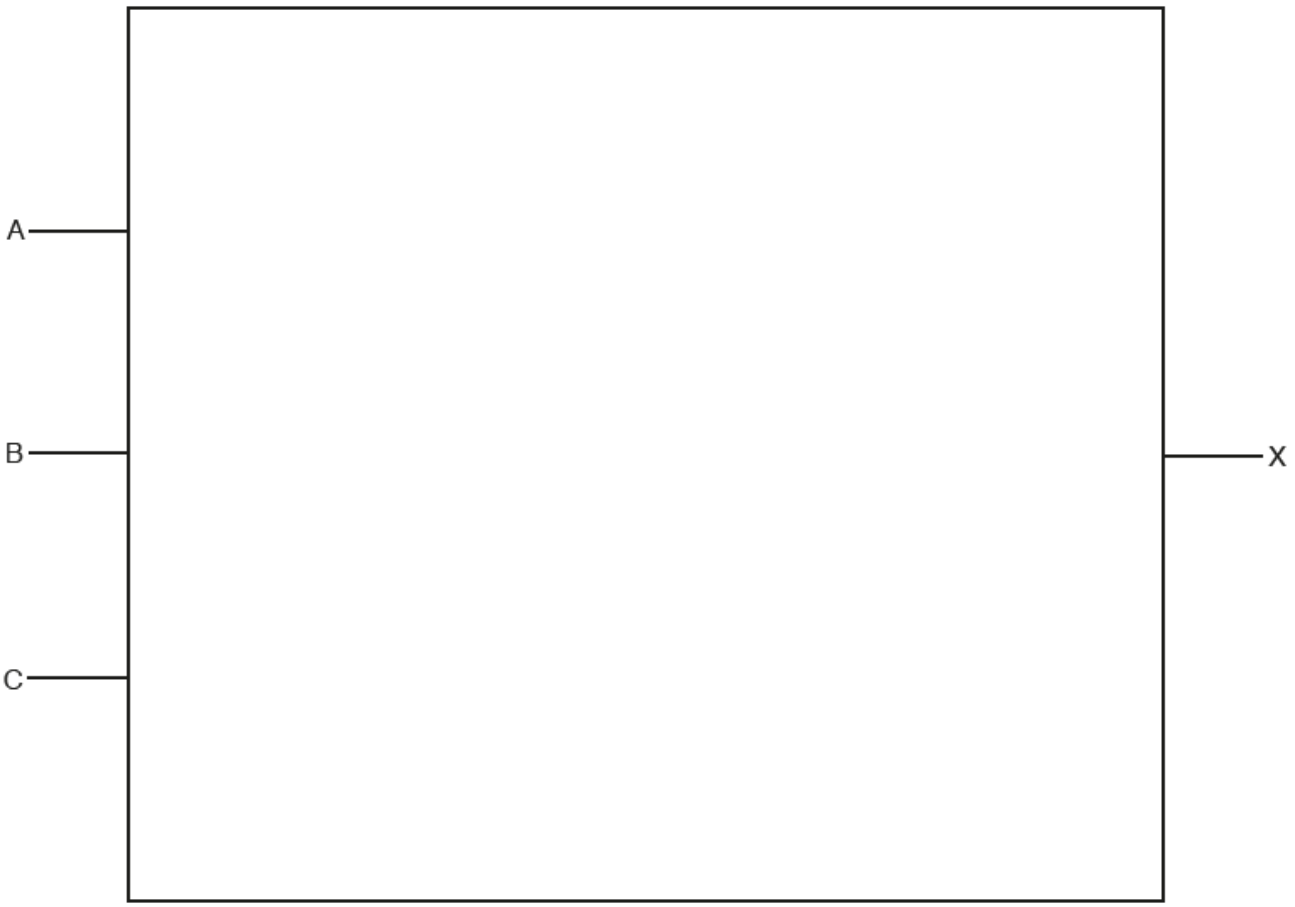
Output X has a value of 1 depending on the following conditions:

Switch A sends value 1 AND Switch B sends value 0

OR

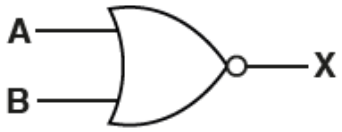
Switch B sends value 1 AND Switch C sends value 0

(a) Draw a logic circuit to represent the conditions above.



YEAR: MAY/JUNE 2017

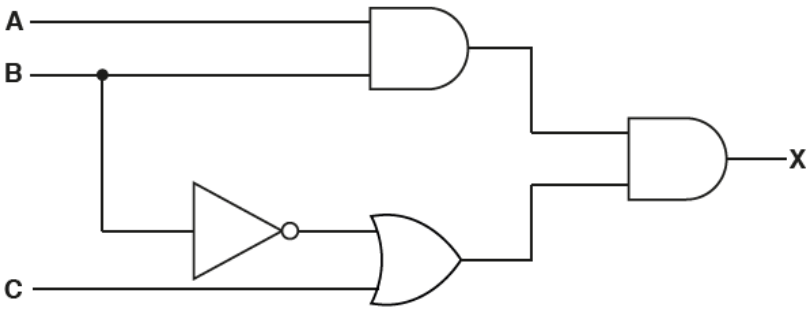
Complete the truth table for the NOR gate.



A	B	Output (X)
0	0	
0	1	
1	0	
1	1	

YEAR: MAY/JUNE 2017

Write a logic statement that corresponds with the following logic circuit.

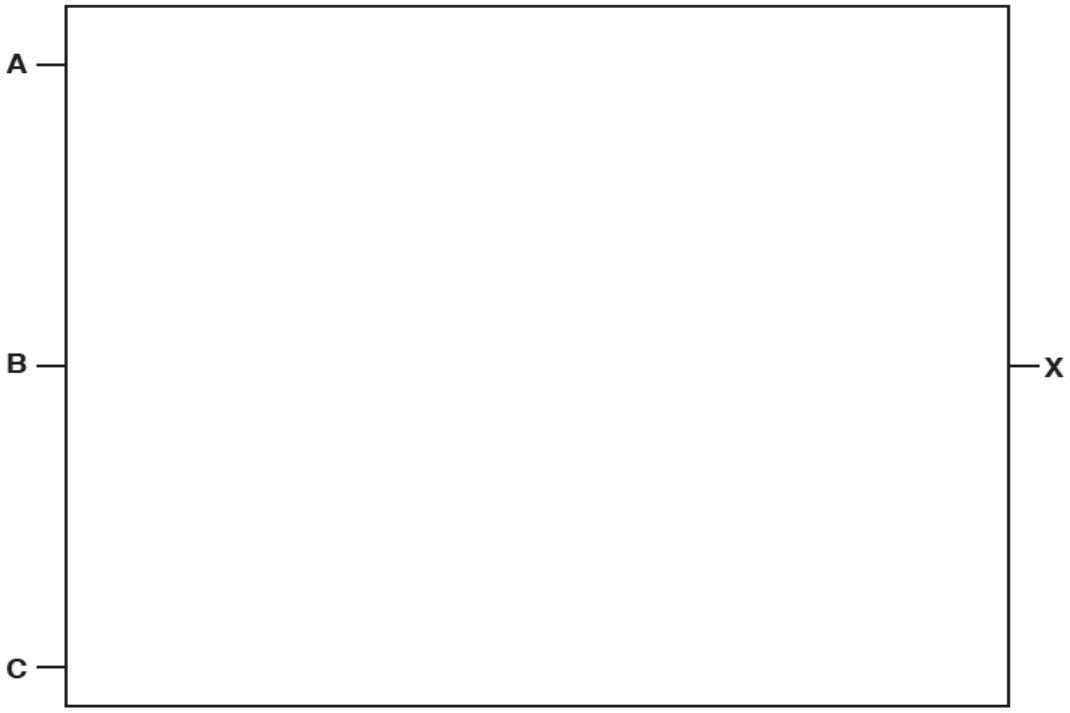


X = ... [3]

For this logic statement:

X = 1 if ((A is 1 AND B is 1) OR (B is 1 AND C is NOT 1))

(a) Draw the logic circuit.



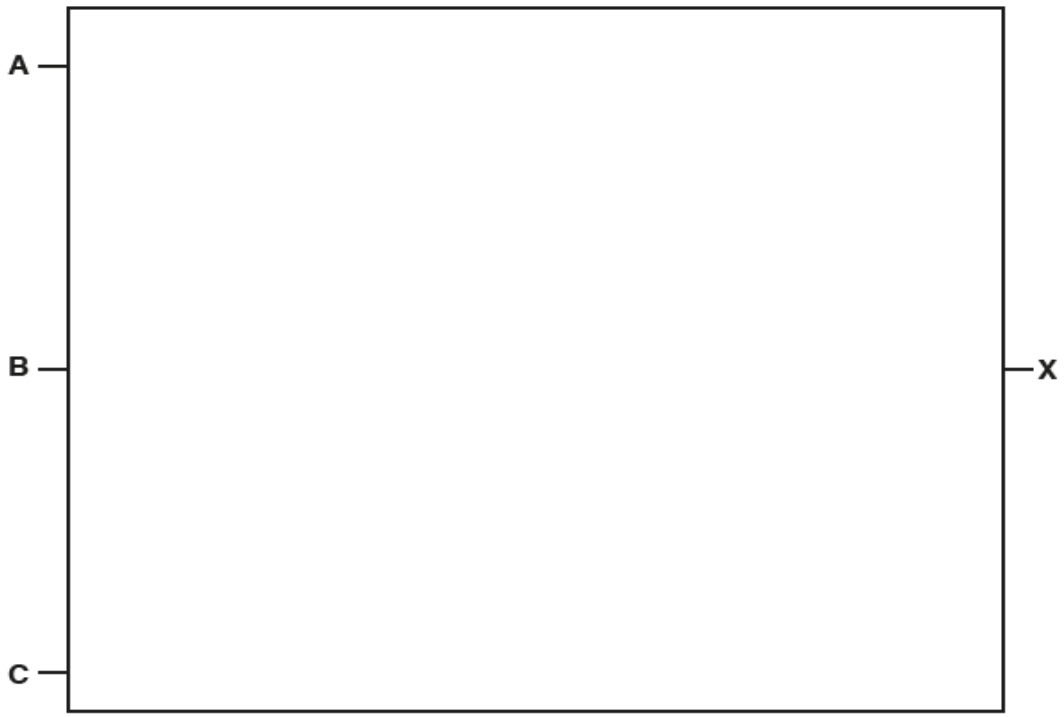
Complete the truth table for the given logic statement.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

For this logic statement:

X = 1 if ((A is 1 AND B is 1) OR (B is 1 AND C is NOT 1))

(a) Draw the logic circuit.



[4]

Complete the truth table for the given logic statement.

A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]