

Dash

Question 1

Correct

Mark 8.00 out of 8.00

By completing the truth table below, prove the following expression

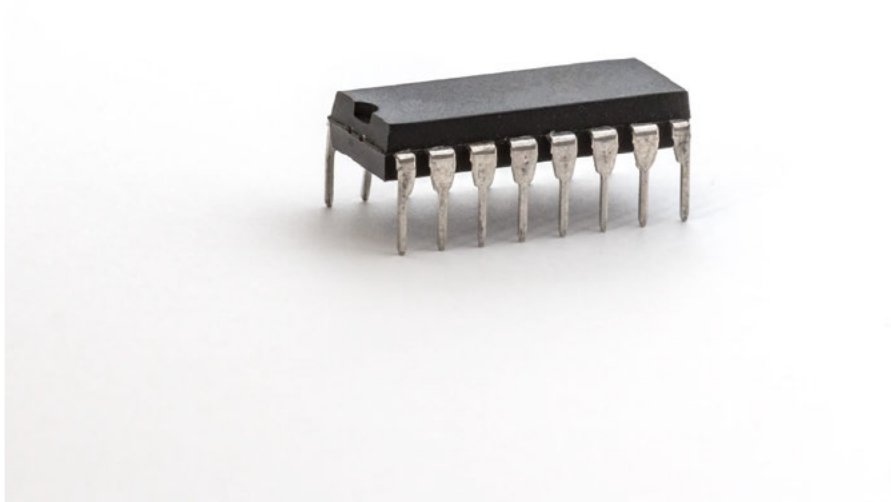
A+A.B = A

A	B	A.B	A.B+A
0	0	<input type="text" value="0"/>	<input type="text" value="0"/>
0	1	<input type="text" value="0"/>	<input type="text" value="0"/>
1	0	<input type="text" value="0"/>	<input type="text" value="1"/>
1	1	<input type="text" value="1"/>	<input type="text" value="1"/>

Response history				
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 09:57	Saved: part 1: 0; part 2: 0; part 3: 0; part 4: 0; part 5: 0; part 6: 1; part 7: 1; part 8: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	8.00

Question **2**
Correct
Mark 2.00 out of 2.00

What is the name of the component in the image?



- ☐ a. Transistor
- ☐ b. HDD
- ☐ c. RAM
- ☒ d. Integrated Circuit ✓

Your answer is correct.
The correct answer is:
Integrated Circuit

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 09:57	Saved: Integrated Circuit	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question 3

Correct

Mark 2.00 out of 2.00

 $(A + B)(B + C)$ can be rewritten as:

- ☐ a. $C + AB$
- ☒ b. $B + AC$ ✓
- ☐ c. ABC
- ☐ d. $A + B + C$

Your answer is correct.

The correct answer is:

 $B + AC$

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 09:58	Saved: [B + AC]	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question 4

Correct

Mark 2.00 out of 2.00

$ABC + AB'C + ABC' + A'BC$ can be rewritten as:

- ☐ a. $C(B \oplus A) + AC$
☒ b. $C(A \oplus B) + AB$ ✓
☐ c. $B(A \oplus B) + AC$
☐ d. $B(A \oplus C) + AB$

Your answer is correct.

The correct answer is:

$C(A \oplus B) + AB$

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:07	Saved: [$B(A \oplus C) + AB$]	Answer saved	
3	9/05/22, 10:59	Saved: [$C(A \oplus B) + AB$]	Answer saved	
4	9/05/22, 11:25	Attempt finished	Correct	2.00

Question **5**

Correct

Mark 2.00 out of 2.00

 $A=0$ $B=1$ $C=1$ $(A+B).(BC)=?$

Answer:



The correct answer is: 1

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:08	Saved: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question **6**

Correct

Mark 2.00 out of 2.00

 $A=1$ $B=1$ $C=1$ $A'(A+B)'C=?$

Answer:



The correct answer is: 0

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:08	Saved: 0	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question **7**

Correct

Mark 1.00 out of 1.00

A=0

B=1

C=0

$B'.(A+B).C=?$

Answer:

✓

The correct answer is: 0

Response history

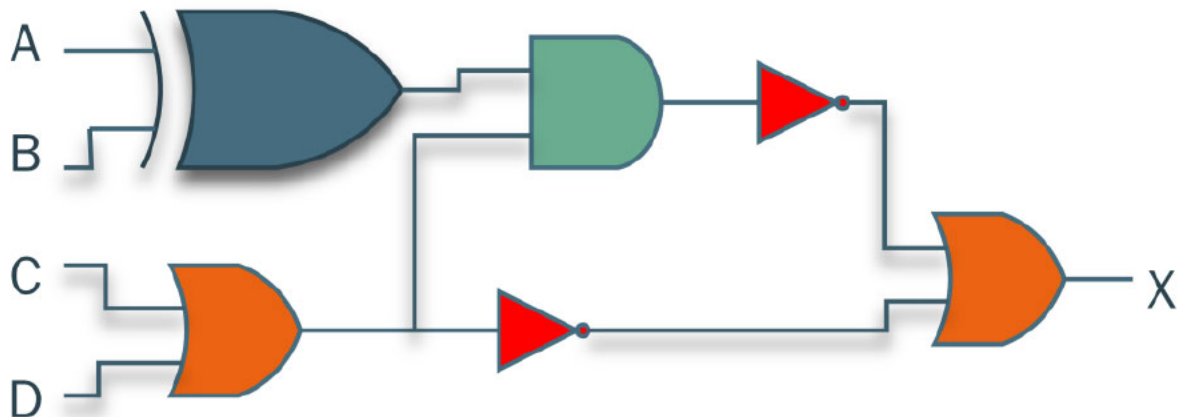
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:08	Saved: 0	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	1.00

Question 8

Correct

Mark 2.00 out of 2.00

Which one of the following Boolean expressions best describes the above circuit?



- ☐ a. $((A + C).(C \oplus B))' + (C + D)'$
☒ b. $((A \oplus B).(C + D))' + (C + D)'$ ✓
☐ c. $((A + C).(C \oplus B))' + (C + D)'$
☐ d. $((A.B) + (C.D)) + (C.D)'$
☐ e. $((A \oplus B).(C + D)) + (C + D)'$

Your answer is correct.

The correct answer is:

$((A \oplus B).(C + D))' + (C + D)'$

Response history

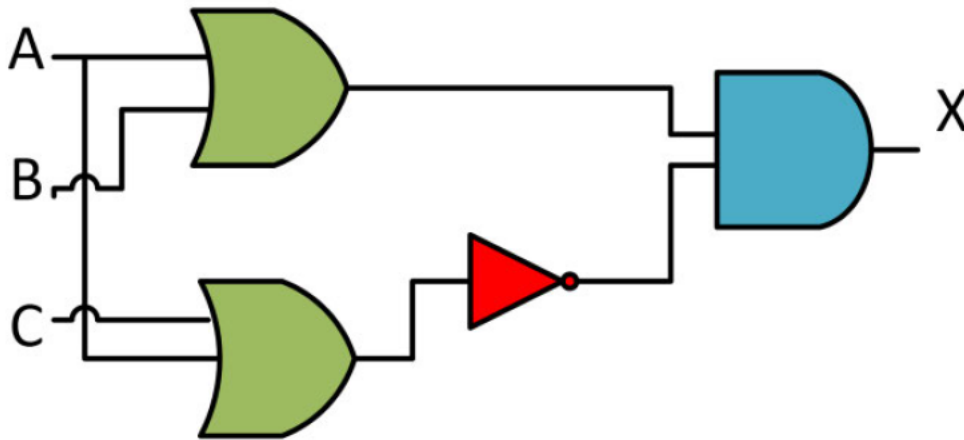
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:11	Saved: $((A \oplus B).(C + D))' + (C + D)'$	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question 9

Correct

Mark 2.00 out of 2.00

Use the following circuit to answer this question.



How many transistors would the above circuit require if it were to be built exactly as shown?

- ☐ a. 7
- ☐ b. 8
- ☐ c. 11
- ☐ d. 9
- ☒ e. 10 ✓

Your answer is correct.

The correct answer is:
10

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:11	Saved: 10	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question 10

Correct

Mark 2.00 out of 2.00

Which one of the following properties do not hold in Boolean algebra?

- ☐ a. $x + y = y + x$
- ☐ b. $x + (yz) = (x + y)(x + z)$
- ☒ c. $x.(x + y) = x + y$ ✓
- ☐ d. $x + x = x$
- ☐ e. $x.(x + y) = x$

Your answer is correct.

The correct answer is:

$x.(x + y) = x + y$

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:13	Saved: $x.(x + y) = x + y$	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

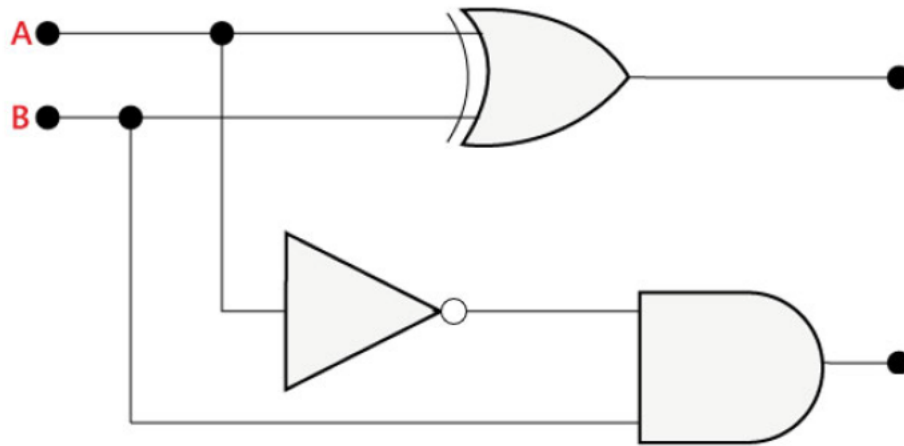
Question 11

Correct

Mark 1.00 out of 1.00

Given the following Circuit:

What gates are used to create it?



- ☒ a. AND Gate ✓
- ☐ b. NAND
- ☐ c. NOR
- ☐ d. OR Gate
- ☒ e. XOR ✓
- ☒ f. NOT ✓
- ☐ g. None of the above

Your answer is correct.

The correct answers are:

AND Gate,

XOR,

NOT

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:17	Saved: XOR	Answer saved	
3	9/05/22, 11:04	Saved: AND Gate ; XOR ; NOT	Answer saved	

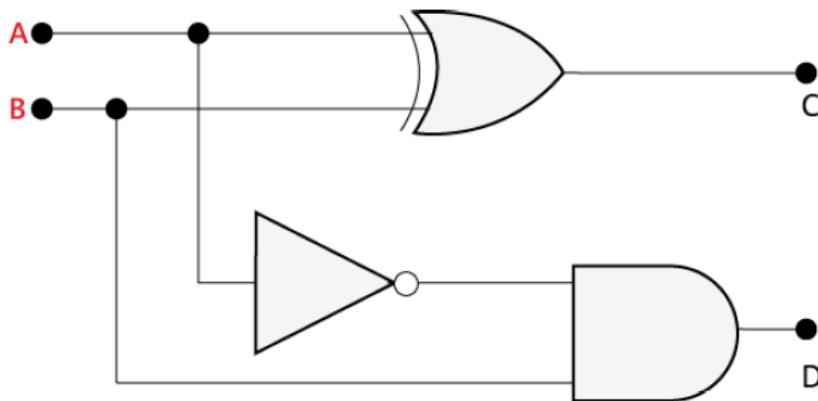
Step	Time	Action	State	Marks
4	9/05/22, 11:25	Attempt finished	Correct	1.00

Question 12

Correct

Mark 1.00 out of 1.00

Given the circuit below:



What is this circuit called?

(Hint, look at similar circuits taught in class/slides)

- ☐ a. Full Subtractor
- ☐ b. Half Adder
- ☐ c. Full Adder
- ☒ d. Half Subtractor ✓

Your answer is correct.

The correct answer is:

Half Subtractor

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:19	Saved: Half Adder	Answer saved	
3	9/05/22, 11:05	Saved: Half Subtractor	Answer saved	
4	9/05/22, 11:25	Attempt finished	Correct	1.00

Question **13**

Correct

Mark 1.00 out of 1.00

How are integrated circuits classified?

- ☐ a. What they are implemented to do.
- ☐ b. The way they are structured.
- ☒ c. The number of gates contained in them. ✓
- ☐ d. Their physical size.

Your answer is correct.

The correct answer is:

The number of gates contained in them.

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:19	Saved: The number of gates contained in them.	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	1.00

Question **14**

Correct

Mark 8.00 out of 8.00

Complete the truth table below to prove the Boolean expression: $A + A.B = A$

A	B	$A.B$	$A + A.B$
0	0	<input type="text" value="0"/>	<input type="text" value="0"/>
0	1	<input type="text" value="0"/>	<input type="text" value="0"/>
1	0	<input type="text" value="0"/>	<input type="text" value="1"/>
1	1	<input type="text" value="1"/>	<input type="text" value="1"/>

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:20	Saved: part 1: 0; part 2: 0; part 3: 0; part 4: 0; part 5: 0; part 6: 1; part 7: 1; part 8: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	8.00

Question **15**

Correct

Mark 3.00 out of 3.00

A	B	C	Out
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

What is the Boolean expression for out in the following truth table?

- ☐ a. $AB + AB'C$
- ☐ b. $A'BC + AB'C$
- ☒ c. $AB + A'B'$ ✓
- ☐ d. $A'C + AC$

Your answer is correct.

The correct answer is:

$AB + A'B'$

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:23	Saved: $AB + A'B'$	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	3.00

Question **16**

Correct

Mark 1.00 out of 1.00

What is the minimum number of transistors you would need to implement the XOR gate?

Answer:



The correct answer is: 8

Response history

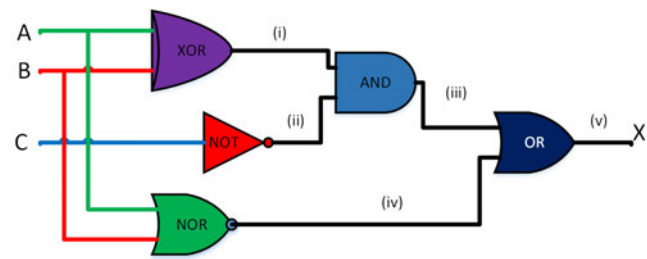
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:23	Saved: 8	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	1.00

Question 17

Partially correct

Mark 25.00 out of 25.00

Show the behaviour of the circuit given below by completing the below truth table.



ABC	(i)	(ii)	(iii)	(iv)	(v)
0 0 0	0	1	0	1	1
	✓	✓	✓	✓	✓
0 0 1	0	0	0	1	1
	✓	✓	✓	✓	✓
0 1 0	1	1	1	0	1
	✓	✓	✓	✓	✓
0 1 1	1	0	0	0	0
	✓	✓	✓	✓	✓
1 0 0	1	1	1	0	1
	✓	✓	✓	✓	✓
1 0 1	1	0	0	0	0
	✓	✓	✓	✓	✓
1 1 0	0	1	0	0	0
	✓	✓	✓	✓	✓
1 1 1	0	0	0	0	0
	✓	✓	✓	✓	✓

Write a Boolean expression for the above circuit in its simplest form?

A'B' or C'.(A'B+AB')

✗ (e.g. (A.B'.C)' or C.(A+B))

NB: If you answer includes an XOR gate, then write it using NOT, AND, and OR gates.

Response history

Step	Time	Action	State	Marks
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Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:34	Saved: part 1: 0; part 2: 1; part 3: 0; part 4: 1; part 5: 1; part 6: 0; part 7: 0; part 8: 0; part 9: 1; part 10: 1; part 11: 1; part 12: 1; part 13: 1; part 14: 0; part 15: 1; part 16: 1; part 17: 0; part 18: 0; part 19: 0; part 20: 0; part 21: 1; part 22: 1; part 23: 1; part 24: 0; part 25: 1; part 26: 1; part 27: 0; part 28: 0; part 29: 0; part 30: 0; part 31: 0; part 32: 1; part 33: 0; part 34: 0; part 35: 0; part 36: 0; part 37: 0; part 38: 0; part 39: 0; part 40: 0; part 41:	Incomplete answer	
3	9/05/22, 11:17	Saved: part 1: 0; part 2: 1; part 3: 0; part 4: 1; part 5: 1; part 6: 0; part 7: 0; part 8: 0; part 9: 1; part 10: 1; part 11: 1; part 12: 1; part 13: 1; part 14: 0; part 15: 1; part 16: 1; part 17: 0; part 18: 0; part 19: 0; part 20: 0; part 21: 1; part 22: 1; part 23: 1; part 24: 0; part 25: 1; part 26: 1; part 27: 0; part 28: 0; part 29: 0; part 30: 0; part 31: 0; part 32: 1; part 33: 0; part 34: 0; part 35: 0; part 36: 0; part 37: 0; part 38: 0; part 39: 0; part 40: 0; part 41: A'B' or C'.(A'B+AB')	Answer saved	
4	9/05/22, 11:25	Attempt finished	Partially correct	25.00

Question **18**

Correct

Mark 8.00 out of 8.00

Design a circuit for a "half-subtractor" i.e. a circuit which takes two bits X and Y and outputs X-Y and B, the borrow required.

Complete the truth table below for the half-subtractor.

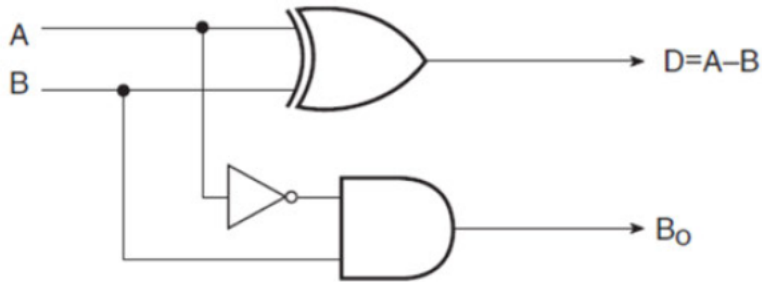
XY	Diff(X-Y)	Borrow
00	<input type="text" value="0"/>	<input type="text" value="0"/>
01	<input type="text" value="1"/>	<input type="text" value="1"/>
10	<input type="text" value="1"/>	<input type="text" value="0"/>
11	<input type="text" value="0"/>	<input type="text" value="0"/>

Response history				
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:35	Saved: part 1: 0; part 2: 0; part 3: 1; part 4: 1; part 5: 0; part 6: 0; part 7: 0; part 8: 0	Answer saved	
3	9/05/22, 11:17	Saved: part 1: 0; part 2: 0; part 3: 1; part 4: 1; part 5: 1; part 6: 0; part 7: 0; part 8: 0	Answer saved	
4	9/05/22, 11:25	Attempt finished	Correct	8.00

Question 19

Correct

Mark 3.00 out of 3.00



A half subtractor functions similarly to a half adder, but instead of a carry value, we have a borrowed value. What would our difference value (D) be if $A=0$ and $B=1$?

- ☐ a. 0
- ☐ b. 2
- ☒ c. 1 ✓
- ☐ d. 10

Your answer is correct.

The correct answer is:

1

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:36	Saved: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	3.00

Question 20

Correct

Mark 16.00 out of 16.00

Design a circuit for a "full-subtractor" i.e. a circuit which takes three bits X, Y, a borrow_in and outputs X-Y-borrow_in and the borrow_out required.

(a) Complete the truth table below for the full-subtractor.

X Y borrow_in	Diff	borrow_out
0 0 0	0	0
0 0 1	1	1
0 1 0	1	1
0 1 1	0	1
1 0 0	1	0
1 0 1	0	0
1 1 0	0	0
1 1 1	1	1

- (b) Use the paper provided to write down (and simplify) the Boolean expressions for Diff and Borrow_out;
- (c) Finally, use the paper provided to draw the circuit diagram for the full-subtractor.

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:39	Saved: part 1: 0; part 2: 0; part 3: 1; part 4: 1; part 5: 1; part 6: 1; part 7: 0; part 8: 1; part 9: 1; part 10: 0; part 11: 0; part 12: 0; part 13: 0; part 14: 0; part 15: 1; part 16: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	16.00

Question **21**

Correct

Mark 2.00 out of 2.00

How many inputs and outputs does a full adder have?

- ☐ a. 2 inputs, 2 outputs.
- ☐ b. 2 inputs, 3 outputs.
- ☒ c. 3 inputs, 2 outputs. ✓
- ☐ d. 3 inputs, 1 output.

Your answer is correct.

The correct answer is:
3 inputs, 2 outputs.

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:40	Saved: 3 inputs, 2 outputs.	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question **22**

Correct

Mark 2.00 out of 2.00

We have constructed a half adder, what is the carry value if we have an input $A=1$, $B=1$?

- ☐ a. 10
- ☐ b. 0
- ☒ c. 1 ✓
- ☐ d. Can't calculate without a carry-in.

Your answer is correct.

The correct answer is:

1

Response history

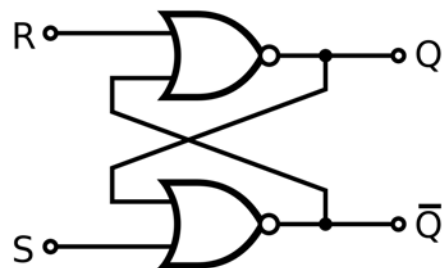
Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:41	Saved: 1	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	2.00

Question 23

Partially correct

Mark 6.00 out of 6.00

Consider the circuit below which is called an RS Flip-Flop.



What happens to Y if

(a) R is set to 1 and S is set to 0? Q =

✓, Q' =

✓.

(b) R is set to 0 and S is set to 1? Q =

✓, Q' =

✓.

(c) R and S are both 1? Q =

✓, Q' =

✓.

(d) R,S,X and Y are all 0 at some point?

✗

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:44	Saved: part 1: 0; part 2: 1; part 3: 1; part 4: 0; part 5: 0; part 6: 0; part 7:	Incomplete answer	
3	9/05/22, 11:25	Saved: part 1: 0; part 2: 1; part 3: 1; part 4: 0; part 5: 0; part 6: 0; part 7: No	Answer saved	
4	9/05/22, 11:25	Attempt finished	Partially correct	6.00

Question **24**

Correct

Mark 1.00 out of 1.00

Communication between a chip and what it's connected to happens through its pins?

Select one:

☒ True ✓

☐ False

The correct answer is 'True'.

Response history

Step	Time	Action	State	Marks
1	9/05/22, 09:54	Started	Not yet answered	
2	9/05/22, 10:45	Saved: True	Answer saved	
3	9/05/22, 11:25	Attempt finished	Correct	1.00

[◀ Lesson 2: Gates and Circuits](#)

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