

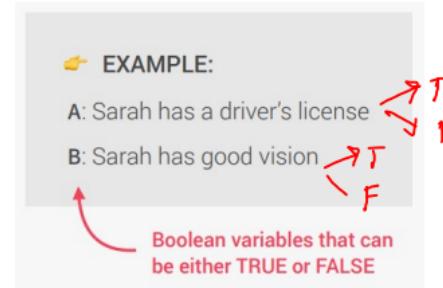
* logical operators : (AND, OR, NOT)

A AND B		
"Sarah has a driver's license AND good vision"		
		Possible values
A	AND	TRUE FALSE
B	TRUE	TRUE FALSE
FALSE	TRUE	FALSE FALSE

Results of operation, depending on 2 variables

true when ALL are true

A	B	A AND B
T	T	T
T	F	F
F	T	F
F	F	F



* true only when all the statements are True.

A OR B

"Sarah has a driver's license
OR good vision"

A

		OR	TRUE	FALSE
		TRUE	TRUE	TRUE
B	TRUE	TRUE	TRUE	
	FALSE	TRUE	FALSE	



true when **ONE** is true

A	B	A OR B
T	T	T
T	F	T
F	T	T
F	F	F

either A must be True

or B must be True

(at least one of the statement = True)

EXAMPLE:

A: Sarah has a driver's license

B: Sarah has good vision

Boolean variables that can be either TRUE or FALSE

- * False only when all the statements are False.



NOT A, NOT B



Inverts true/false value

A	B	NOT A	NOT B
T	T	F	F
T	F	F	T
F	T	T	F
F	F	T	T

EXAMPLE :

BOOLEAN VARIABLES $>= 20$

👉 A: Age is greater or equal 20

👉 B: Age is less than 30

< 30

age = 16

false

true

$(16 >= 20)$

$(16 < 30)$

① $! A \Rightarrow ! \text{false} \Rightarrow \boxed{\text{true}}$

② $A \text{ and } B \Rightarrow \text{false and true} \Rightarrow \boxed{\text{false}}$

③ $A \text{ or } B \Rightarrow \text{false or true} \Rightarrow \boxed{\text{true}}$

④ $! A \text{ and } B \Rightarrow ! \text{false and true}$
 $\Rightarrow \text{true and true} \Rightarrow \boxed{\text{true}}$

⑤ $A \text{ or } ! B \Rightarrow \text{false or } ! \text{true}$
 $\Rightarrow \text{false or false} \Rightarrow \boxed{\text{false}}$

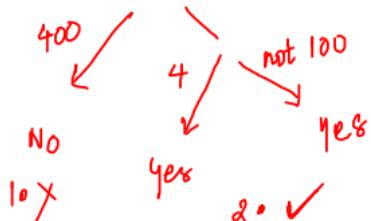
* Leap Year:

what? (366 days) (Feb 29th)

1. divisible by 400 (or) $\rightarrow A$

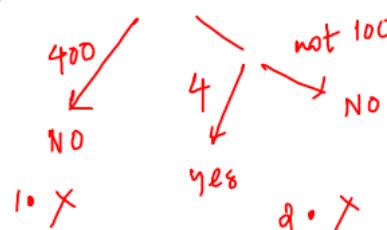
2. divisible by 4 and not divisible by 100 $\rightarrow B$
 ↓
 C D

Eg: 2024



\Rightarrow Leap year

Eg: 2100



\Rightarrow not a leap year

Eg: 2050



1. X

2. X

\Rightarrow not a leap year

A or B

A or (C and D)

A \Rightarrow $\text{year} \% 400 = 0$

C \Rightarrow $\text{year} \% 4 = 0$

D \Rightarrow $\text{year} \% 100 \neq 0$

A || (C & D)

* Which Case :

"A" → Capital → 1

"a" → LowerCase → 0

"#" → not alphabet → -1

How do I know ch is Capital ?

"f" - "z" [65, 90]

check ASCII(ch) is in this range

ascii = ch.charCodeAt(0);

if ($65 \leq \text{ascii} \text{ and } \text{ascii} \leq 90$) {

 console.log("1");

}

* Given a number check whether it is in the given range.

$\text{num} = 0 \rightarrow \text{false}$
 $\text{num} = 612 \rightarrow \text{true}$

[525, 934]

mathematically,

525	\leq	num	\leq	934
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① ②

525 \leq num \leq 934

if ($525 \leq \text{num}$ and $\text{num} \leq 934$) {

 console.log("YES");

}

else {

 console.log("NO");

}

* ASCII Values :

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0 000	000	NUL (null)	32	20	040	 	Space	64	40	100	@	Ø	96	60	140	`	'
1	1 001	041	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2 002	042	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3 003	043	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4 004	044	EOT (end of transmission)	36	24	044	$	\$	68	44	104	D	D	100	64	144	d	d
5	5 005	045	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6 006	046	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7 007	047	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8 010	050	BS (backspace)	40	28	050	({	72	48	110	H	H	104	68	150	h	h
9	9 011	051	TAB (horizontal tab)	41	29	051)	:	73	49	111	I	I	105	69	151	i	i
10	A 012	052	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B 013	053	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C 014	054	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D 015	055	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E 016	056	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F 017	057	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10 020	060	DLE (data link escape)	48	30	060	0	Ø	80	50	120	P	P	112	70	160	p	p
17	11 021	061	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12 022	062	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13 023	063	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14 024	064	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15 025	065	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16 026	066	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17 027	067	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18 030	070	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19 031	071	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A 032	072	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B 033	073	ESC (escape)	59	3B	073	;	:	91	5B	133	[[123	7B	173	{	{
28	1C 034	074	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174	|	
29	1D 035	075	GS (group separator)	61	3D	075	=	=	93	5D	135]]	125	7D	175	}	}
30	1E 036	076	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F 037	077	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177		DEL

const ch = "A"

* for every letter on
your keyboard there
is code called ASCII
value.

"A" - "z" "a" - "z"
[65, 90] [97, 122]

→ given an ASCII value
how to get its character
`String.fromCharCode(ascii)`

→ given a character how to
get its ASCII value
`charCodeAt(0)`

`charCodeAt(0)`

* Big Light:

$$\textcircled{1} \quad h_1 : 5\text{m} \quad s : 7\text{m}$$

$$v_1 : 3\text{m/s} \quad v_2 : 2\text{m/s}$$

$$\text{time, } t = 0s \quad 5\text{m}, \quad 7\text{m}$$

$$t = 1s \quad 8\text{m}, \quad 9\text{m}$$

$$\boxed{t = 2s \quad 11\text{m}, \quad 11\text{m}}$$

op: true (they will be equal)
at $t = 2s$

$$t = \frac{h_2 - h_1}{v_1 - v_2} = \frac{7 - 5}{3 - 2}$$

$$= \frac{2}{1} = 2s$$

$$\textcircled{2} \quad h_1 : 5\text{m} \quad s : 7\text{m}$$

$$v_1 : 2\text{m/s} \quad v_2 : 3\text{m/s}$$

$$t = 0s \quad 5\text{m}, \quad 7\text{m} \rightarrow 2\text{m}$$

$$t = 1s \quad 7\text{m}, \quad 10\text{m} \rightarrow 3\text{m}$$

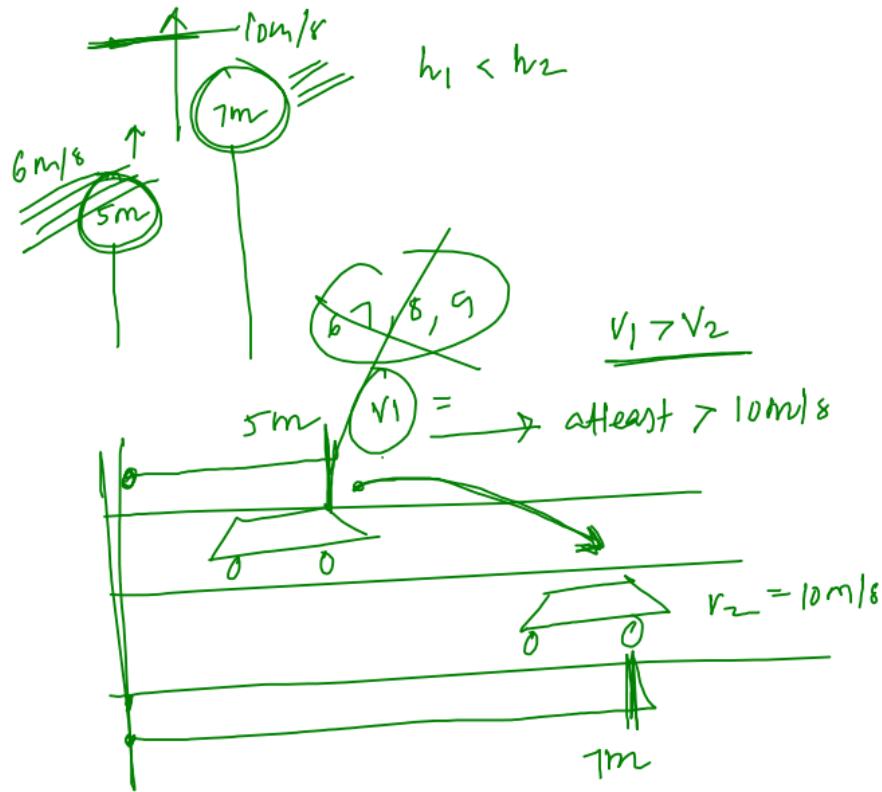
$$t = 2s \quad 9\text{m}, \quad 13\text{m} \rightarrow 4\text{m}$$

$$t = 3s \quad 11\text{m}, \quad 16\text{m} \rightarrow 5\text{m}$$

op: false (they will not be equal)
at any time

$$h_1, h_2$$
$$v_1, v_2$$

- ① $t=0, h_1 = h_2 \rightarrow \text{true}$
- ② $h_1 < h_2, v_1 \leq v_2 \rightarrow \text{false}$
- ③ $h_2 < h_1, v_2 \leq v_1 \rightarrow \text{false}$
- ④ $(h_2 - h_1) \% (v_1 - v_2) == 0$



$$\textcircled{4} \quad h_1 < h_2, v_1 > v_2$$

(a)

$$h_2 < h_1, v_2 > v_1$$

$$h_1 = 2\text{m} \quad h_2 = 3\text{m}$$

$$v_1 = 1\text{m/s} \quad v_2 = 2\text{m/s}$$

$$t = 0, 2\text{m}, 3\text{m}$$

$$t = 1, 9\text{m}, 5\text{m} (2+1)1, 3+(1)2)$$

$$t = 2, 16\text{m}, 7\text{m} \quad h_1 + t v_1, h_2 + t v_2$$

$$t = 3, 23\text{m}, 9\text{m} (2+3)1, 3+(3)2)$$

op: false (Even though $h_1 < h_2$ and $v_1 > v_2$ they are not meeting)

~~→ true (you cannot directly say)~~

$$t = \frac{h_2 - h_1}{v_1 - v_2}$$

$$= \frac{1}{5} = 0.2\text{s}$$

↓

is not
a valid time
because time
is an integer
in our discussion

After some 't' seconds

$$h_1 = h_1 + t v_1$$

$$h_2 = h_2 + t v_2$$

Let's assume they meet at t seconds,

$$h_1 = h_2$$

$$h_1 + t v_1 = h_2 + t v_2$$

$$t v_1 - t v_2 = h_2 - h_1 \Rightarrow t(v_1 - v_2) = h_2 - h_1$$

$$t = \frac{h_2 - h_1}{v_1 - v_2} \Rightarrow \textcircled{3} \approx \textcircled{1}$$

$$\textcircled{4} \approx \textcircled{1}$$

$$\underline{\underline{7 \cdot 1 \cdot 4 = 0}}$$

⇒ t will be valid only when $\underline{\underline{7 \cdot 1 \cdot 4 = 0}}$

$$\textcircled{4} \boxed{(h_2 - h_1) \cdot (v_1 - v_2) = 0}$$

* Quadrants :

The mystery room is divided into four chambers and each chamber will have two boxes storing balls.

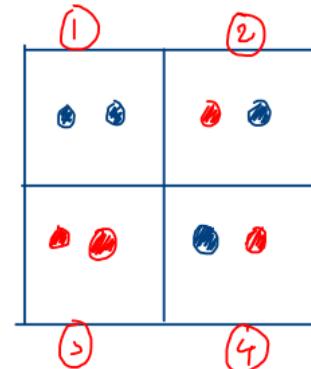
Now if both the boxes have blue balls, it must belong to chamber 1.

Similarly if the first box has red balls and second box has blue balls, they must belong to chamber 2.

If both the boxes have red balls, they must belong to chamber 3.

Finally if the first box has blue balls and second box has red balls, it must belong to chamber 4.

You are given number of balls in each box and if the number has a negative sign it means the balls are red else the balls are blue if the sign is positive.



$$\text{eg: } b_1 = 10 \quad b_2 = +$$

10 6

\Rightarrow Chamber - (1)

$$\text{eg: } b_1 = 9 \quad b_2 = -13$$

9 13 \Rightarrow Chamber - (4)

* Short Circuiting :

A and B and C and D

$$\textcircled{1} \quad \begin{array}{c} \checkmark \\ F \end{array} \text{ and } \begin{array}{c} \textcircled{2} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{3} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{4} \\ T \end{array} \rightarrow \text{false}$$

$$\textcircled{2} \quad \begin{array}{c} \textcircled{1} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{2} \\ F \end{array} \text{ and } \begin{array}{c} \textcircled{3} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{4} \\ T \end{array} \rightarrow \text{false}$$

$$\textcircled{3} \quad \begin{array}{c} \textcircled{1} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{2} \\ F \end{array} \text{ and } \begin{array}{c} \textcircled{3} \\ T \end{array} \text{ and } \begin{array}{c} \textcircled{4} \\ T \end{array} \rightarrow \text{false}$$

→ short circuit / cut / break when you see false

when ever you see one false you can ignore all other statement and output false because if there atleast one false, AND cannot be true.

A or B or C or D

$$\textcircled{1} \quad \begin{array}{c} \textcircled{1} \\ T \end{array} \text{ or } \begin{array}{c} \textcircled{2} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{3} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{4} \\ F \end{array} \rightarrow \text{true}$$

$$\textcircled{2} \quad \begin{array}{c} \textcircled{1} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{2} \\ T \end{array} \text{ or } \begin{array}{c} \textcircled{3} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{4} \\ F \end{array} \rightarrow \text{true}$$

$$\textcircled{3} \quad \begin{array}{c} \textcircled{1} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{2} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{3} \\ T \end{array} \text{ or } \begin{array}{c} \textcircled{4} \\ F \end{array} \rightarrow \text{true}$$

$$\textcircled{4} \quad \begin{array}{c} \textcircled{1} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{2} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{3} \\ F \end{array} \text{ or } \begin{array}{c} \textcircled{4} \\ F \end{array} \rightarrow \text{false}$$

→ short circuit / cut / break
when you see true

* How to approach ?
= = =

Sunday (8pm - 11pm)

1. understand & clearly

→ Examples ($^9P_1, OP$), constraints (test cases are limited to these)

2. put your thoughts on paper

(take same examples)

(analyse / draw some insights)

3. write some steps / have some logic in your mind

and verify with examples (try to take edge cases)

4. code → errors / some test cases might fail

Edge Case

↳ A special case where the logic may go wrong.