

\* logical operators : (AND, OR, NOT)

① AND - Both should satisfy

A: Sarah has a Driver's license

$\begin{matrix} \nearrow T \\ \searrow F \end{matrix}$

B: Sarah has good vision

$\begin{matrix} \nearrow T \\ \searrow F \end{matrix}$

A	B	A and B
T	T	T
T	F	F
F	T	F
F	F	F

② OR - atleast one of the statement must satisfy

- \* A and B and C and D = True only when all stnts are True else False
- \* A or B or C or D = False only when all stnts are False else True

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

③ NOT - True  $\rightarrow$  False  
False  $\rightarrow$  True

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

Question :

Const age = 16;

Const A = (age  $\geq$  20) ;  $(16 \geq 20)$   
(False)

Const B = (age  $<$  30);  $(16 < 30)$   
(True)

① ! A = ! false = true

② A and B = false AND True = false

③ A or B = false OR True = true

④ ! A and B = ! false AND True  
= True AND True = true

⑤ A or ! B = False OR ! true  
= False OR False = false

## \* Leap Year ;

What? (366 days) (Feb 29<sup>th</sup>)

1. divisible by 400 → A  
(a)

2. divisible by 4 and not divisible by 100 → E

```

graph TD
    2024[2024] --> 400[400]
    2024 --> 4[4]
    400 --> NO[NO]
    4 --> yes1[yes]
    4 --> not100[not 100]
    not100 --> yes2[yes]
  
```

$\Rightarrow$  leap year

⇒ not a Leap Year

$\Rightarrow$  not a leap year

\* constraints :  $1000 \leq \text{Year} \leq 9999$

⇒ all test cases will have input in range [1000, 9999]

⇒ what kind / what to expect from test cases

A or B  
or (C and D)

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

$$c \Rightarrow \text{year } 1.4 = -0$$

b  $\Rightarrow$  year % top  $\frac{1}{2}$  =

$$A \amalg (C \otimes D)$$

## \* which case :

'A' → capital → 1

'a' → small → 0

'#' → not alphabet

'@', '\*' → -1

How do decide 'ch' is Capital ?

'A' - 'z' → [65, 90]

⇒ ASCII (given ch) should be in  
B/w 65 ad 90.

⇒ ASCII (given ch) should be in  
B/w 97 ad 122.

\* Given a num check whether it is in  
the given range or not

num = 12 → false

= 652 → true

[ 525, 934 ]

[ start, end ]

mathematically,

$$\textcircled{A} \boxed{525 \leq \text{num}} \leq \boxed{934} \textcircled{B}$$

⇒ A AND B

If ( $525 \leq \text{num}$  &  $\text{num} \leq 934$ )

    c1 ("yes In Range");

}

else {

    c1 ("Not In Range");

}

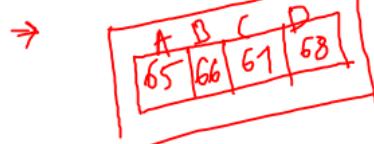
# \* ASCII values:

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

Source: [www.LookupTables.com](http://www.LookupTables.com)

(0 - 127) ASCII values

Count s = "ABCD"



[65, 90] [97, 122]

① String from Char Code (ascii)

⇒ (ASCII → character)

② "A" • char codeAt(0)

→ (ch → ASCII)

\* Big Light :

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

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

time,  $t = 0s$        $\begin{array}{c} 5\text{m}, 7\text{m} \\ +3 \\ 8\text{m}, 9\text{m} \end{array} \rightarrow t=2$

~~$t = 1s$        $\begin{array}{c} 8\text{m}, 9\text{m} \\ +3 \\ 11\text{m}, 11\text{m} \end{array} \rightarrow t=2$~~

~~$t = 2s$        $\begin{array}{c} 11\text{m}, 11\text{m} \\ +3 \\ 14\text{m}, 13\text{m} \end{array} \rightarrow t=2$~~

$t = 3s$        $\begin{array}{c} 14\text{m}, 13\text{m} \\ +3 \\ 17\text{m}, 16\text{m} \end{array} \rightarrow t=2$

Qs: Will they meet

⇒ op: true

$$\star T = \frac{h_2 - h_1}{v_1 - v_2} = \frac{7 - 5}{3 - 2} = 2s$$

$$\star T = \frac{7 - 5}{3 - 2} = \frac{2}{1} = 2$$

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

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

time,  $t = 0$       5m      7m      ( $7\text{m} - 5\text{m} = 2\text{m}$ )

$t = 1$       7m      10m      ( $10\text{m} - 7\text{m} = 3\text{m}$ )

$t = 2$       9m      13m      ( $13\text{m} - 9\text{m} = 4\text{m}$ )

$t = 3$       11m      16m      ( $16\text{m} - 11\text{m} = 5\text{m}$ )

$t = 4$       13m      19m      ( $19\text{m} - 13\text{m} = 6\text{m}$ )

⇒ op: false

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

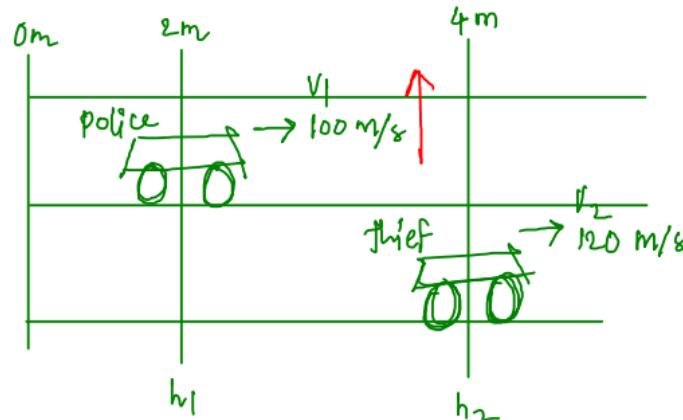
$h_1, h_2$  $v_1, v_2$ 

①  $t=0, h_1 = h_2 \rightarrow$  True

②  $h_1 < h_2, v_1 \leq v_2 \rightarrow$  False

$\left. \begin{matrix} \text{vice} \\ \text{versa} \end{matrix} \right\}$

③  $h_2 < h_1, v_2 \leq v_1 \rightarrow$  False



⇒ Can police  
catch thief?

→ NO

→ thief is already  
ahead of police  
and he is moving  
faster than police  
 $\text{police} > \text{thief}$   
 $= 120 \text{ m/s}$  (Can catch)

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

(a)

$$h_2 < h_1, v_2 > v_1$$

$\Rightarrow$  from this I can only say that police will overtake/catch thief, but I don't know about equal positions.

Initially at  $t=0$ ,  $h_1, h_2$

after  $T$ 's,  $h_1' = h_1 + TV_1$

$$h_2' = h_2 + TV_2$$

We assumed that they meet after  $T$ 's

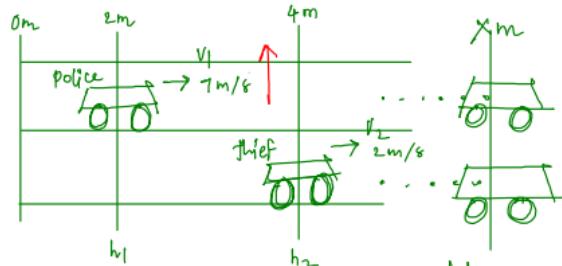
$$\therefore h_1' = h_2'$$

$$\Rightarrow h_1 + TV_1 = h_2 + TV_2$$

$$\Rightarrow TV_1 - TV_2 = h_2 - h_1$$

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

$$\Rightarrow T = \frac{h_2 - h_1}{v_1 - v_2}$$



Let's assume both are at equal pos after some time  $\tau$ .

\* Can police catch thief?

$\Rightarrow$  yes

\* But the Q is not about catching, we need to see at some time they are at same positions

$$\begin{aligned} h_1 &= 2m & h_2 &= 4m \\ v_1 &= 7m/s & v_2 &= 2m/s \end{aligned}$$

$$\tau = \frac{4-2}{7-2}$$

$$= \frac{2}{5} = 0.4s$$

\* fractions are not possible  
 $T = 1s, 2s, 3s, 4s, \dots$

\* they will meet only when  $T$  is a natural number  
 $(1s, 2s, 3s, 4s, \dots)$

$$\textcircled{4} \quad (h_2 - h_1) \% (v_1 - v_2) == 0 \xrightarrow{\text{F}} T$$

$$g: 5m$$

$$v_1: 3m/s$$

$$s: 7m$$

$$v_2: 2m/s$$

$$t = 0$$

$$h_1 = \textcircled{5m}$$

$$h_2 = 7m$$

$$t = 1$$

$$+3 \downarrow$$

$$8m,$$

$$+3 \downarrow$$

$$11m,$$

$$+3 \downarrow$$

$$14m,$$

$$+3 \downarrow$$

$$17m,$$

$$t = 3$$

$$t = \textcircled{4}$$

$$t = \textcircled{10}$$

$$25m, -$$

If we need  $t = 4$ ,  
initial  $h = 5m$

we need to do  $+v_1$  4 times  
 $\Rightarrow +3$  4 times.

$5m (+3)$  4 times

$$\Rightarrow 5 + 4*3$$

$$\Rightarrow 5 + 12$$

$$= 17m$$

generalise,

$$h'_1 = h_1 + t v_1$$

$$h'_2 = h_2 + t v_2$$

## \* How to Approach ?

1. understand Qs clearly

→ Examples ( $C_p, D_p$ )

→ Constraints (Test cases are limited to this)

2. → put your thoughts on paper

→ take multiple examples

→ analyse and make observations

→ Just think how a normal person solves

3. write some steps / have some logic in mind

→ test that with examples

(try to take examples where you feel your approach / logic fails)

4. Code → pass / failed tests

## \* Quadrants :

$$\begin{array}{l} -ve \Rightarrow \text{red} \\ +ve \Rightarrow \text{blue} \end{array}$$

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

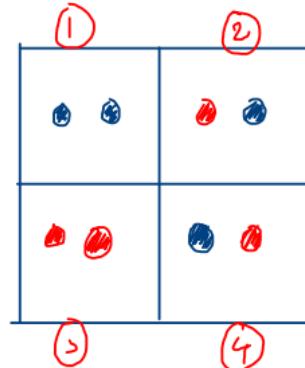
Now if both the boxes have blue balls, it must belong to chamber 1.

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.



$$\text{eg: } b_1 = 10 \quad b_2 = +6$$
$$\downarrow \qquad \downarrow$$
$$\text{blue} \qquad \text{blue} \Rightarrow \text{chamber 1}$$

$$\text{eg: } b_1 = 9 \quad b_2 = -13$$
$$\downarrow \qquad \downarrow$$
$$\text{blue} \qquad \text{red} \Rightarrow \text{chamber 4}$$