

* 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

Eg: 2024

$400 \swarrow \quad \downarrow \quad 100 \searrow$
 $\times \quad \text{yes} \quad \text{no}$

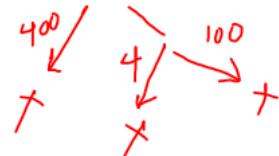
2024 \Rightarrow leap year

Eg. 2100

$400 \swarrow \quad \downarrow \quad 100 \searrow$
 $\times \quad \text{yes} \quad \text{yes}$

2100 \Rightarrow not a leap year

Eg: 2050 \Rightarrow not a leap year



A or B

A or (C and D)

A \rightarrow year % 400 == 0

C \rightarrow year % 4 == 0

D \rightarrow year % 100 != 0

A || (C & D)

* ASCII :

→ every character/symbol is associated with a code/number

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

Source: www.LookupTables.com

"A" → 65

"M" → 77

"A" → "Z" [65 - 90]

"a" → 97

"m" → 109

"a" → "m" [97 - 122]

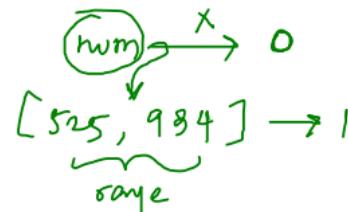
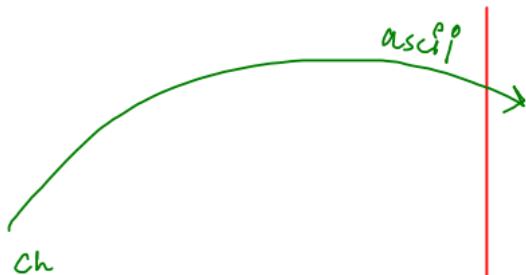
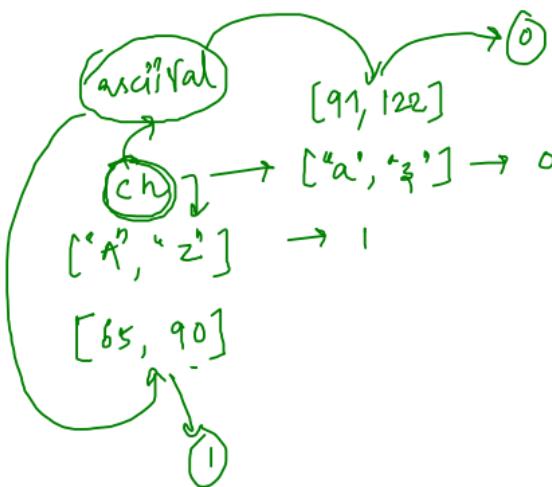


* Which Case :

"A" → 1 (capital)

"a" → 0 (small)

"@" → -1 (not alphabet)



Given a num check whether
it is in the given range,

```
if (525 <= num && num <= 984) {  
    consider log ("YES")  
} else {  
    consider log ("NO")  
}
```

→ given ASCII how to get symbol,
`String::fromCharCode(ascii-value)`

→ given symbol how to get ASCII,
`"A".charCodeAt(0)`

* Big Light :

$$\textcircled{1} \quad g: 5m \quad s: 7m \\ v_1: 3m/s \quad v_2: 2m/s$$

$$t = 0 \quad 5m, \quad 7m \quad \text{op: true}$$

$$t = 1 \quad 8m, \quad 9m \quad (\text{they will meet or not})$$

$$t = 2 \quad 11m, \quad 11m$$

$$\textcircled{2} \quad g: 5m \quad s: 7m \\ v_1: 2m/s \quad v_2: 3m/s$$

$\rightarrow t=0 \quad 5m, \quad 7m \rightarrow 2m \quad \text{op: false}$

$\rightarrow t=1 \quad 7m, \quad 10m \rightarrow 9m$

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

$\rightarrow t=3 \quad 11m, 16m \rightarrow 5m$

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

$$\textcircled{1} \quad t = 0, \quad h_1 == h_2 \rightarrow \text{true}$$

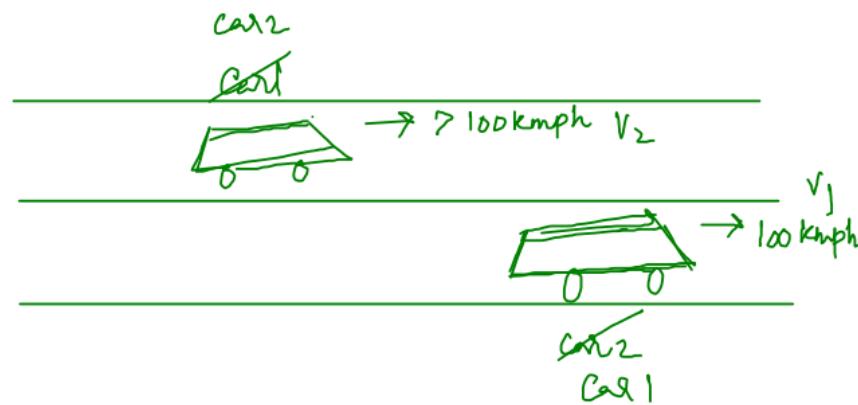
$$\textcircled{2} \quad h_1 < h_2, \quad v_1 <= v_2 \rightarrow \text{false}$$

$$\textcircled{3} \quad h_2 < h_1, \quad v_2 <= v_1 \rightarrow \text{false}$$

$$\textcircled{4} \quad \begin{array}{l} h_1 < h_2, \quad v_1 > v_2 \\ (\text{or}) \\ h_2 < h_1, \quad v_2 > v_1 \end{array}$$

(There is a possibility)

(you need to somehow check whether they become equal)



$$\textcircled{4} \quad h_1 < h_2, v_1 > v_2 \\ (\text{or})$$

$$h_2 < h_1, v_2 > v_1$$

(There is a possibility)

(you need to somehow check whether they become equal)

$$\text{eg: } h_1 = 5\text{m} \quad h_2 = 7\text{m} \\ v_1 \sim 3\text{m/s} \quad v_2 \sim 2\text{m/s}$$

$$t = (5-7)/(2-3)$$

$$= -2/-1 = \textcircled{2}$$

After some 't' seconds,

$$h_1 = h_1 + tv_1$$

$$h_2 = h_2 + tv_2$$

Both should be same,

$$h_1 = h_2$$

$$h_1 + tv_1 = h_2 + tv_2$$

$$h_1 - h_2 = tv_2 - tv_1 = t(v_2 - v_1)$$

$$t = \boxed{(h_1 - h_2) / (v_2 - v_1)}$$

* t should be an integer

$$\boxed{(h_1 - h_2) / (v_2 - v_1) = 0}$$

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

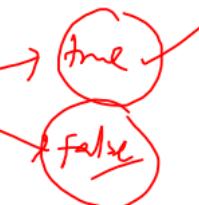
$$v_1 = 7\text{m/s} \quad v_2 = 2\text{m/s}$$

$$t = (2-3)/(2-1)$$

$$= -1/-5 = \textcircled{0.2}$$

(they will not meet at same pos.)

(overlaps but not meet)



$$5m \\ (3m/s)$$

$$7m \\ 2m/s$$

$$tr_1 \quad h_1 = 5 + 3 \\ = h_1 + v_1 = h_1 + 0v_1$$

$$tr_2 \quad h_1 = 5 + 3 + 3 \\ = h_1 + v_1 + v_2 = h_1 + 3v_1$$

$$tr_3 \quad h_1 = 5 + 3 + 3 + 1 \\ = h_1 + v_1 + v_2 + v_3 = h_1 + 3v_1$$

$$\frac{h_1 = (h_1 + tv_1)}{h_2 = (h_2 + tv_2)}$$

$$tr_4 \quad h_1 = h_2$$

$$h_1 = h_2$$

$$h_1 + tv_1 = h_2 + tv_2$$

$$tv_1 - tv_2 = h_2 - h_1$$

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

$$t = (h_2 - h_1)/(v_1 - v_2)$$

$$\left. \begin{array}{l} h_1 - h_2 = tv_2 - tv_1 \\ h_1 - h_2 = t(v_2 - v_1) \\ (h_1 - h_2)(v_2 - v_1) = t \end{array} \right\}$$

$$h_1 = 2 \text{ m}$$

$$h_2 = 3 \text{ m}$$

$$r_1 = 7 \text{ m/s}$$

$$r_2 = 2 \text{ m/s}$$

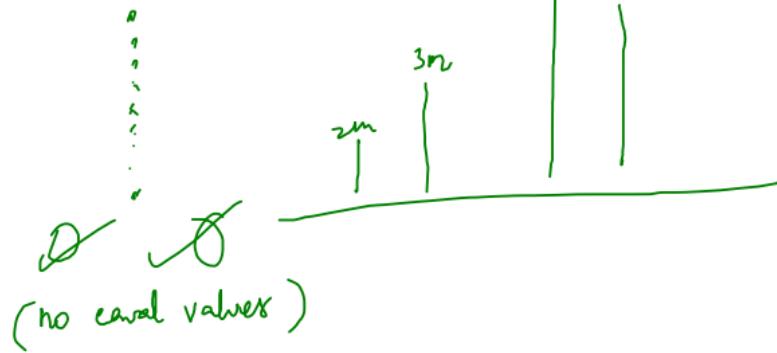
$$t=0 \quad 2 \text{ m}, \quad 3 \text{ m}$$

$$t=0.2 \text{ s}$$

$$t=1 \quad 9 \text{ m}, \quad 5 \text{ m} \rightarrow \text{overtake}$$

$$t=2 \quad 16 \text{ m}, \quad 7 \text{ m}$$

$$t=3 \quad 23 \text{ m}, \quad 9 \text{ m}$$



$h_1 < h_2, r_1 > r_2$
(we can overtake)

$$t = 0.2 \text{ s}$$

$$\checkmark h_1 = 2 + 0.2 \cdot 2 + 1 = 3.04$$
$$h_2 = 3 + 0.2 \cdot 2 = 3.04$$



**

1. understand as

→ IP, OP, constraints

2. put your thoughts on paper

(take some examples)

(analyse)

3. write some steps and verify

with examples

4. code → errors (logic)

(testcases)

* short circuiting:

A and B and C and D

① $\textcircled{1} F \text{ and } \textcircled{2} T \text{ and } \textcircled{3} T \text{ and } \textcircled{4} T \rightarrow F$

② $\textcircled{1} T \text{ and } \textcircled{2} F \text{ and } \textcircled{3} T \text{ and } \textcircled{4} T \rightarrow F$

③ $\textcircled{1} T \text{ and } \textcircled{2} T \text{ and } \textcircled{3} F \text{ and } \textcircled{4} T \rightarrow F$

→ break when you see false

A or B or C or D

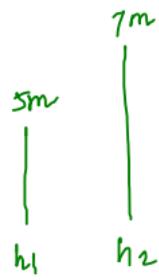
① $\textcircled{1} T \text{ or } \cancel{\textcircled{2} F \text{ or } \textcircled{3} F \text{ or } \textcircled{4} F} \rightarrow T$

② $\textcircled{1} F \text{ or } \textcircled{2} T \text{ or } \cancel{\textcircled{3} T \text{ or } \textcircled{4} F} \rightarrow T$

③ $\textcircled{1} F \text{ or } \textcircled{2} F \text{ or } \textcircled{3} T \text{ or } \cancel{\textcircled{4} F} \rightarrow T$

→ break when you see true

$t = 0^{\text{th}}$



$\rightarrow h_1$ grows by $v_1 \text{ m}$ every second

$\rightarrow h_2$ grows by $v_2 \text{ m}$ every second

$$h_1 = 5\text{m} \quad v_1 = 3\text{m}/\text{s}$$

$$h_2 = 7\text{m} \quad v_2 = 2\text{m}/\text{s}$$

① $h_1 = h_2 \rightarrow \text{true}$

② $h_1 < h_2, v_1 \leq v_2 \rightarrow \text{false}$

③ $h_2 < h_1, v_2 \leq v_1 \rightarrow \text{false}$

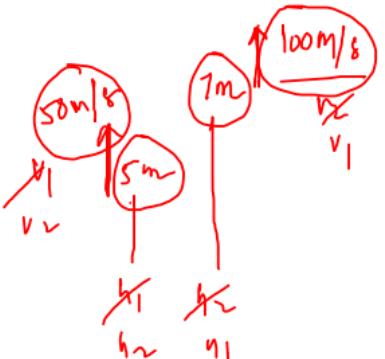
④ $h_1 < h_2, v_1 > v_2$ (a)
 $h_2 < h_1, v_2 > v_1$ (there is a possibility to meet)

$t = 1^{\text{s}}$



$$h_1 = 5 + 3 = 8\text{m}$$

$$h_2 = 7 + 2 = 9\text{m}$$



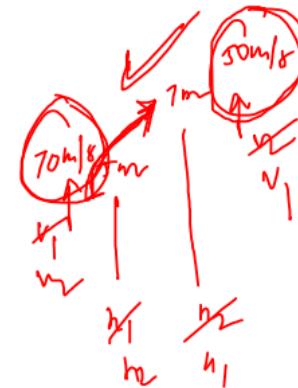
$t = 2^{\text{s}}$



$$h_1 = 8 + 3 = 11$$

$$h_2 = 9 + 3 = 11$$

Op: true

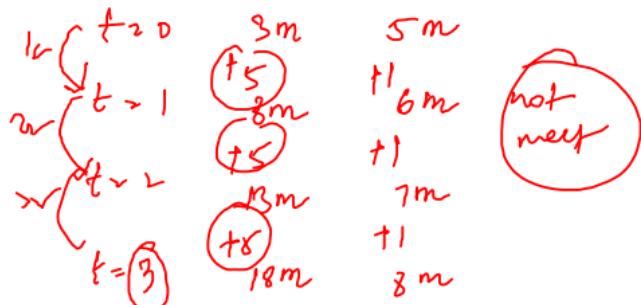


$$h_1 = 3 \text{ m}$$

$$h_2 = 5 \text{ m}$$

$$v_1 = 5 \text{ m/s}$$

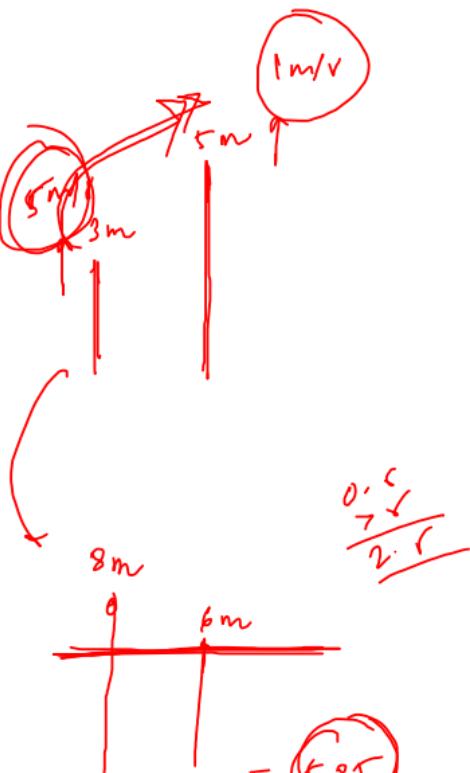
$$v_2 = 1 \text{ m/s}$$



$$t = \frac{5 - 3}{5 - 1}$$

$$= \frac{2}{4} \cancel{\frac{1}{2}} = 0.5 \cancel{8}$$

~~fraction~~



$$h_1 = h_1 + 0.5 v_1 = 3 + 0.5(5)$$

$$h_2 = h_2 + 0.5 v_2 = 5 + 0.5(1)$$

$$= 5.5$$

lets say after ' t ' seconds both will meet,

$$h_1 = h_2$$

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

$$t v_1 - t v_2 = h_2 - h_1$$

$$t = (h_2 - h_1) / (v_1 - v_2)$$

$$h_1 = 3 \text{ m} \quad h_2 = 5 \text{ m}$$

$$v_1 = 5 \text{ m/s} \quad v_2 = 1 \text{ m/s}$$

$$t = \frac{15}{3-2}$$

$$= 2 \cancel{1} \cancel{2}$$