① Coin Change problem

- Different types of coins of different denomination.
- certain amount (w).

⇒ To find total no. of ways to make the change of the given amount using the coins given.

there is infinite supply of coins.

Coins = {2, 3, 5, 10}

W = 15.

coins (i) \ w (j)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
3	1	0	1	0+1 =1	1+0 =1	0+1 =1	1+1 =2	0+1 =1	1+1 =2	0+2 =2	1+1 =1	0+2 =2	1+2 =3	0+1 =1	1+2 =3	0+3 =3
5	1	0	1	1	1	1+1 =2	2+0 =2	1+1 =2	2+1 =3	2+1 =3	1+2 =3	2+2 =4	3+2 =5	1+3 =4	3+3 =6	3+3 =6
10	1	0	1	1	1	2	2	2	3	3	3+1 =4	4+0 =4	5+1 =6	4+1 =5	6+1 =7	6+2 =8

Total 8 ways

when coin's value > w ... copy the above row.

else ... ① exclude the coin
② include the coin
③ Add ① & ②.

Implementation

```
a[i][0] = 1;
for(i=0; i<=coins.length; i++) {
    for(j=0; j<=w; j++) {
        if(coins[i] > j)
            a[i][j] = a[i-1][j];
        else a[i][j] = a[i-1][j] + a[i][j-coin[i]]
```