

*a*



0

1

2

3

4

5

6

7

8

$a$



0 1 2 3 4 5 6 7 8

$n = 7$

$\text{length}(a) = 9$

$a$



$n = 7$

$a$



0 1 2 3 4 5 6 7 8

$n = 7$

get(3)

*a*



0 1 2 3 4 5 6 7 8

$n = 7$


get(3)

*a*



0 1 2 3 4 5 6 7 8

$n = 7$

get(3)  $\Rightarrow$  



$n = 7$


$a$



0 1 2 3 4 5 6 7 8


$n = 7$



set(4, )




$n = 7$

set(4, )



$n = 7$

set(4, )




$n = 7$

$a$




0 1 2 3 4 5 6 7 8

$n = 7$

add(3, )




$n = 7$

add(3, )



$n = 7$

add(3, )


$$n - i$$

*a*



0 1 2 3 4 5 6 7 8

$n = 7$

add(3, )




$n = 7$



add(3, )




$n = 7$

add(3, )




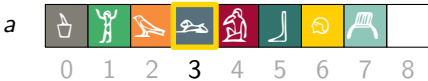
$n = 7$

add(3, )




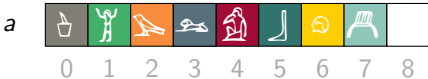
$n = 7$

add(3, )



$n = 7$

add(3, )




$n = 8$

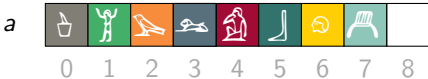
$a$




0 1 2 3 4 5 6 7 8

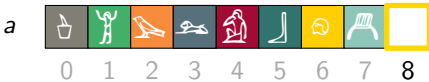
$n = 8$

add(8, )




$n = 8$

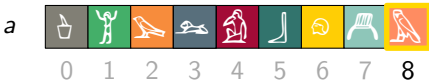
add(8, )



$n = 8$



add(8, )



$n = 8$

$a$



0 1 2 3 4 5 6 7 8

$n = 8$

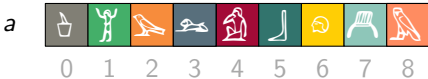
$a$



0 1 2 3 4 5 6 7 8

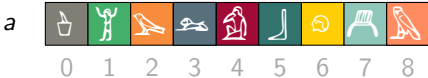
$n = 9$

`add(6, )`



$n = 9$

`add(6, )`



$n = 9 = \text{length}(a) \Rightarrow \text{resize}()$

add(6, )

$2n$

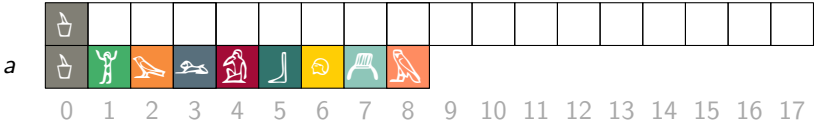
$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )



$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$



add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*

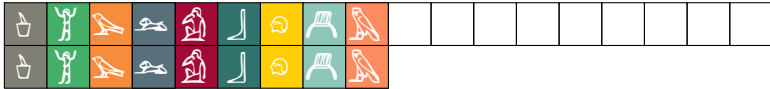


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*

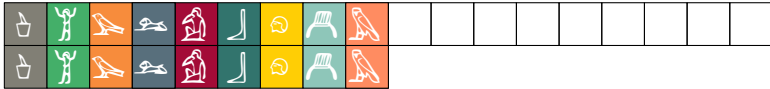


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

add(6, )

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$



add(6, )



$n = 9$

add(6, )



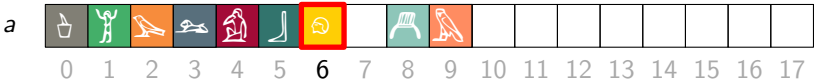
$n = 9$

add(6, )



$n = 9$

add(6, )



$n = 9$

add(6, )



$n = 9$

add(6, )



$n = 9$

$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$



remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

$$n - i - 1$$



*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 10$

remove(5)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$



$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

remove(8)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

remove(8)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

remove(8)

*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 9$

remove(8)

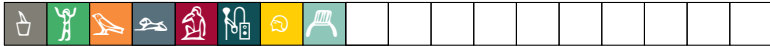
*a*



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 8$

$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 8$

remove(7) ... remove(6) ... remove(5)

*a*

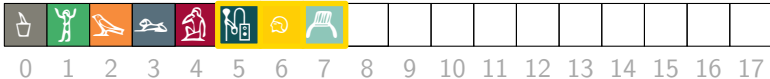


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 8$

remove(7) ... remove(6) ... remove(5)

*a*



$n = 8$



$a$

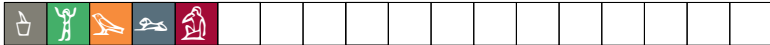


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

$\text{length}(a)/3$

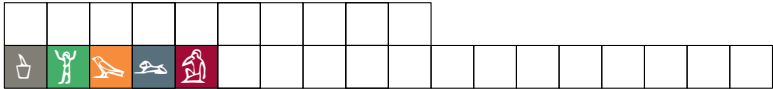
$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5 < \text{length}(a)/3 \Rightarrow \text{resize}()$

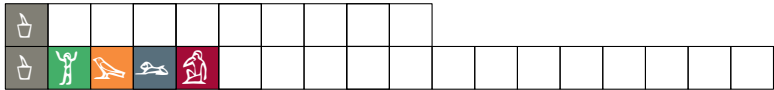
$$2n$$

 $a$ 

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$$n = 5$$

$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

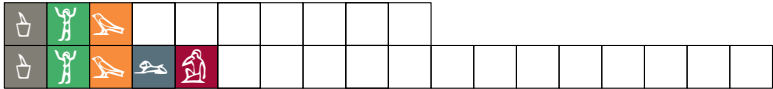
$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

$a$

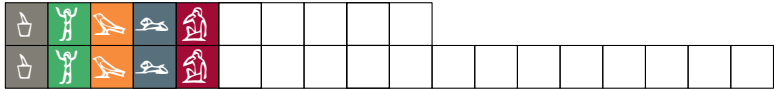


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$



$a$



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

$n = 5$

$a$



0 1 2 3 4 5 6 7 8 9

$n = 5$