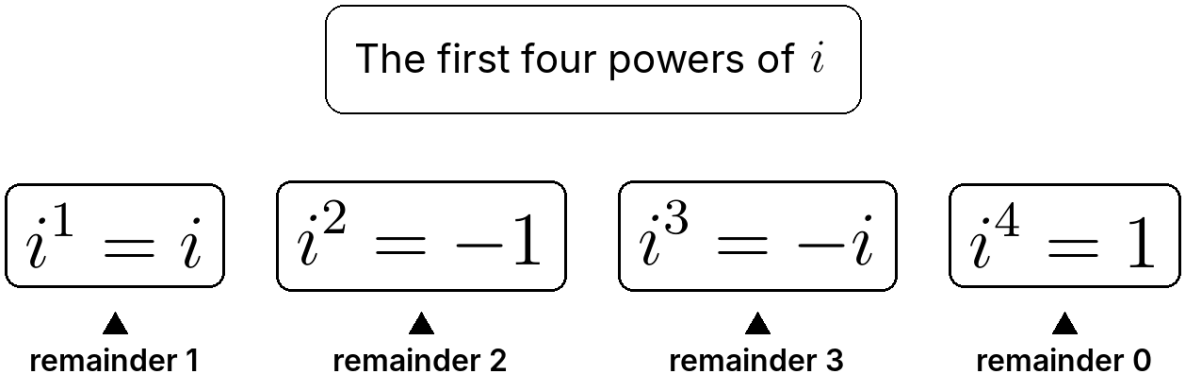
Powers of i

CN03-V1 · storyboard · CN03 Powers of i. Read each picture with its sentences.

Picture 1



1. Here are the first four powers.
2. i to the 1 is i.
3. i squared is negative 1.
4. i cubed is i squared times i, which is negative i.
5. And i to the 4 is negative 1 times negative 1, which is 1.
6. Then i to the 5 is i again.

Picture 2

Simplify i^{1007}.

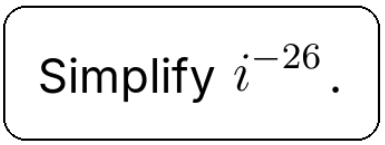
$$1007 = 4 \cdot 251 + 3 \quad \text{divide by 4}$$

$$i^{1007} = (i^4)^{251} \cdot i^3 \qquad i^4 = 1$$

$$= \boxed{-i}$$

7. Simplify i to the 1007.
8. Divide 1007 by 4: 4 times 251 is 1004, remainder 3.
9. So i to the 1007 is i to the 4, to the 251, times i cubed.
10. And i to the 4 is 1.
11. So it is just i cubed: negative i.

Picture 3

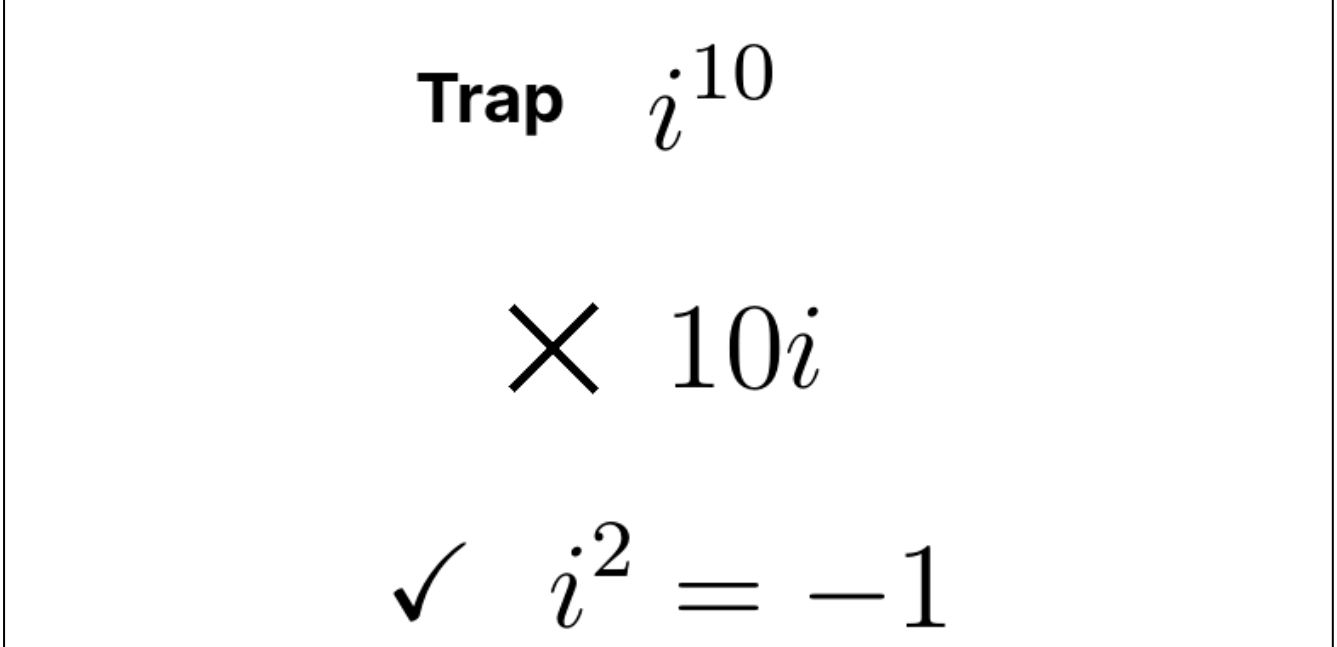


$$i^{-26} = \frac{1}{i^{26}} = \frac{1}{i^2} \qquad 26 = 4 \cdot 6 + 2$$

$$= \boxed{\frac{1}{-1} = -1}$$

12. Simplify i to the negative 26.
13. One over i to the 26.
14. 26 is 4 times 6, plus 2, so i to the 26 is i squared.
15. One over negative 1 is negative 1.

Picture 4



16. Watch for the trap: i to the 10 is not 10 i.
17. 10 is 4 times 2, remainder 2, so i to the 10 is i squared, negative 1.