

4-12 2 Grounded half-planes intersect at $\theta = \frac{2\pi}{n}$.
A charge q is at r_0 on the bisector.

$\theta = 0$: real charge q
Half planes P_1 & P_2 are at $\theta = \pm \pi/n$

At P_1 , image of q is $-q = q_1$ at
 $\theta_1 = \pi/n + \pi/n = 2\pi/n$

Image of q_1 in P_2 is $q_2 = -q_1$ at
 $\theta_2 = -\pi/n - (\pi/n + \theta_1) = -4\pi/n$

Image of q_2 in P_1 is $q_3 = -q_2$ at θ_3
 $\theta_3 = \pi/n + (\pi/n - \theta_2) = 6\pi/n$

e.g.

$$q_k = (-1)^k q, \quad \theta_k = (-1)^{k-1} \frac{2\pi k}{n}$$

n even: Sequence terminates at $k = n$

n odd: Would put an image charge at $\theta_n = 2\pi$, sequence breaks down.