In[•]:=
```
Clear[γ];
κ = 4 K / γ + γ / (4 - γ);
```

In[•]:=
```
r = ((κ - 1) / (κ + 1)) // FullSimplify
```

Out[•]=

$$\frac{8\,K - 2\,(1 + K)\,\gamma + \gamma^2}{-2\,K\,(-4 + \gamma) + 2\,\gamma}$$

In[•]:=
```
FullSimplify[∀_{K,K≥1} r^2 ≥ (K / (γ + K))^2, Assumptions → 0 ≤ γ ≤ 4]
```

Out[•]=

True