A horizontal string transmits a power \( P \) if a wave with an amplitude \( A \) and an angular frequency \( \omega \), is traveling along it. If both the amplitude \( A \) and the tension \( F \) along the string are doubled, the new power of transmission is \( P' \), then the ratio of \( \frac{P}{P'} \) is

A) \( \frac{P}{P'} = 2 \).

B) \( \frac{P}{P'} = 2 \sqrt{2} \).

C) \( \frac{P}{P'} = 4 \).

D) \( \frac{P}{P'} = 4 \sqrt{2} \).
\[ P = \frac{1}{2} \mu (\omega A)^2 v, \text{ where } v = \sqrt{\frac{F}{\mu}}. \]

So

\[ P = \frac{1}{2} \mu (\omega A)^2 \sqrt{\frac{F}{\mu}} = \frac{1}{2} \sqrt{\mu} \omega^2 \sqrt{F A^2}, \]

\[ \frac{P'}{p} = \frac{\sqrt{F'} A'^2}{\sqrt{F A^2}} = \frac{\sqrt{2F} (2A)^2}{\sqrt{F A^2}} = 4 \sqrt{2}. \]

Answer D.

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