

A horizontal string transmits a power P if a wave with an amplitude A and an angular frequency ω , 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**.