

## Waves on a rope

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**Solution:** a. We have,

$$v = \lambda_n f_n = \frac{2L}{n} f_n .$$

Hence,  $v_1 = 2L f_1 = 2 \text{ km/s}$ .

b. We have,

$$v' = \sqrt{\frac{m'g}{\mu}} = 2v .$$

Hence,  $v'_1 = 4 \text{ km/s}$ .

c. To calculate the new frequency,

$$v' = \lambda_3 f_3 = \frac{2L}{3} f_3 .$$

Hence,  $f_3 = \frac{3v'_1}{2L} = 6 \text{ kHz}$ .