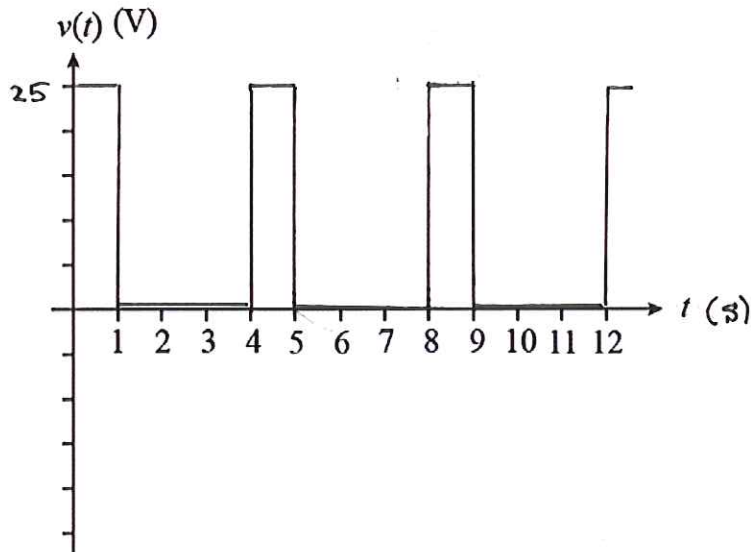


Ex:



Note: Other answers are valid so long as the waveform is repetitive and is zero for three time intervals and high for one time interval.

On the axes provided above, draw a PWM waveform, $v(t)$, with a duty cycle of 25% and average power equal to 625 mW when driving a 250 Ω resistor.

You must label the vertical axis and clearly indicate voltage values for the waveform.

sol'n: The waveform must be high 25% or one-fourth of the time.

The average power equals the power when the signal is on times the duty cycle.

$$625 \text{ mW} = P_{\text{ave}} = 25\% \cdot P_{\text{on}} = \frac{1}{4} P_{\text{on}}$$

or

$$P_{\text{on}} = 4(625 \text{ mW}) = 2500 \text{ mW} = 2.5 \text{ W}$$

The power when $v(t)$ is on is $P_{\text{on}} = V^2 / 250 \Omega$.

$$\text{So } V^2 = 2.5 \text{ W} (250 \Omega) = 625 \text{ V}^2 \quad \text{So } V = 25 \text{ V.}$$