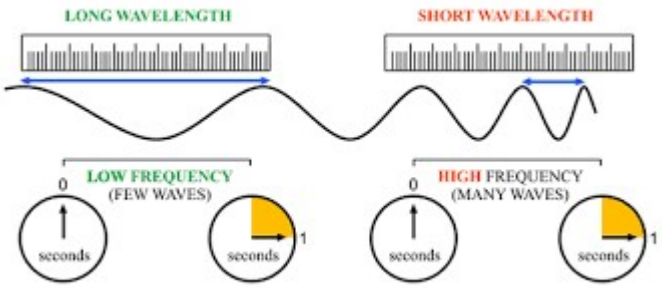
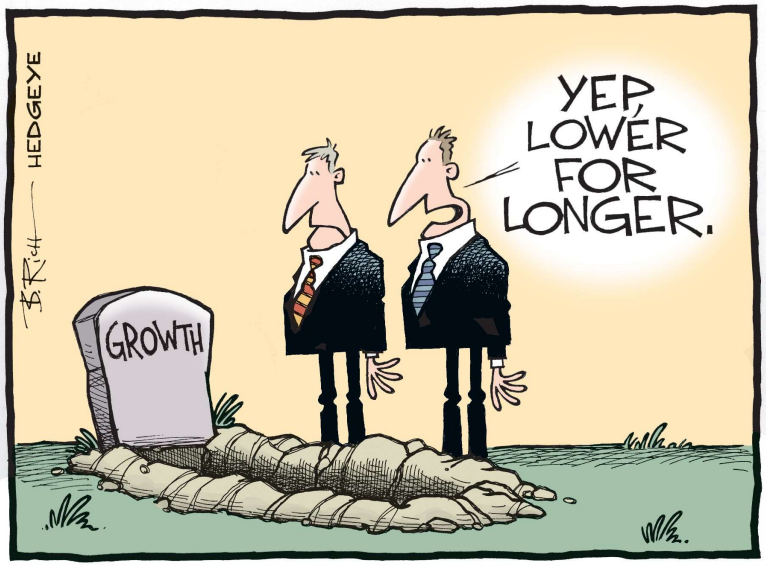
Longer is Lower

The distance a radio wave travels before the amplitude returns to the same value is called the wavelength. The rate at which it returns to this same value per second is called the frequency.



Since the wavelength is inversely related to the frequency by the speed of light, $\lambda = \frac{c}{f}$. For the problems on this Element 2 exam we may use the relationship: $\lambda = \frac{300}{f}$, where λ is in meters and f is in Megahertz.

While the $\lambda = \frac{300}{f}$ relationship is exact, the band designations are approximate. As example the 2-meter band goes from 144 MHz to 148 MHz. So λ = 300/144.0 = $2.0\overline{833}$ meters and λ = 300/148.0 = $2.\overline{027}$.



This cartoon may help you remember longer is lower or lower is longer.

Questions

T1B03 (B)

Which frequency is within the 6 meter band?

A. 49.00 MHz

B. 52.525 MHz

C. 28.50 MHz

D. 222.15 MHz

Convert wavelength to frequency for 6 meter and $f = \frac{300}{6} = 50$ MHz while A is closer, B is the correct answer.

T1B04 (A)

Which amateur band are you using when your station is transmitting on 146.52 MHz?

A. 2 meter band

B. 20 meter band

C. 14 meter band

D. 6 meter band

Convert frequency to wavelength for 146.52 MHz and $\lambda = \frac{300}{146.52} = 2.04$ or 2 meters and A is the correct answer.

T2A02 (A)

What is the national calling frequency for FM simplex operations in the 2 meter band?

A. 146.520 MHz

B. 145.000 MHz

C. 432.100 MHz

D. 446.000 MHz

Convert 2 meter to frequency and $f = \frac{300}{2} = 150$ MHz and A is the correct answer.

T3B06 (D)

What is the formula for converting frequency to approximate wavelength in meters?

A. Wavelength in meters equals frequency in hertz multiplied by 300

B. Wavelength in meters equals frequency in hertz divided by 300

C. Wavelength in meters equals frequency in megahertz divided by 300

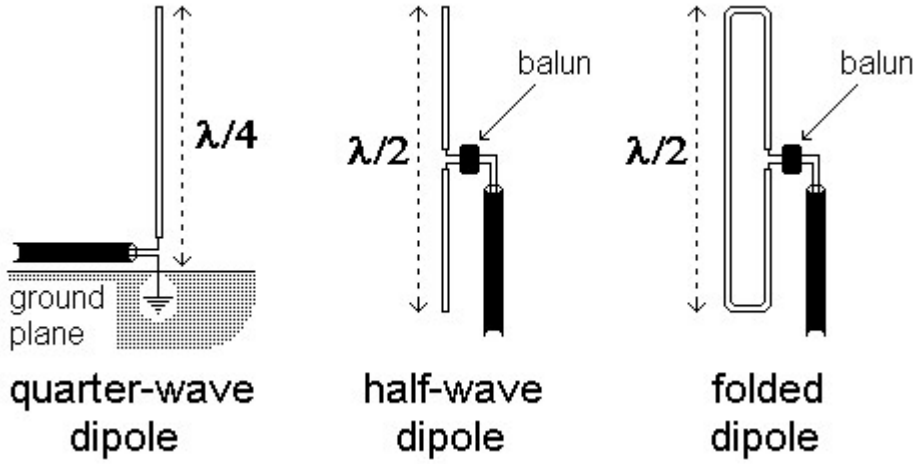
D. Wavelength in meters equals 300 divided by frequency in megahertz

The formula for converting frequency to wavelength is $\lambda = \frac{300}{f}$. A involves multiplication and must be incorrect. Both B and C have 300 divided into something and are incorrect. D is the correct reading of the formula and is correct.

Half-Wave and Quarter-Wave Dipoles

In the following questions we show our stand along position against the metric system. The answers are given in inch. For a standard 1/2 wavelength dipole $\lambda = \frac{468}{f}$ feet when the frequency is in MHz. For the 1/4 wave dipole divide the answer by 2. Remember that the answer is in feet, so multiply by 12 since there are 12 inches in a foot.

On this exam there is one question about the half-wave dipole and one about the quarter-wave dipole. These antenna are shown below. Note the total length of a half-wave dipole is ½ the wavelength of the resonate frequency and for the quarter-wave dipole it is ¼ the wavelength of the resonate frequency. The resonant frequency is the frequency at which the antenna radiates the most power.



Questions

T9A08 (C)

What is the approximate length, in inches, of a quarter-wavelength vertical antenna for 146 MHz?

A. 112

B. 50

C. 19

D. 12

First find the length of a full wavelength diople in feet for 146 MHz and $\lambda = \frac{468}{146} = 3.20$ feet. For

a quarter-wave dipole divide by 2 and $\frac{3.20}{2}=1.6$ feet or $1.6\times12=19.2$ inches. Therefore C is the correct answer.

T9A09 (C)

What is the approximate length, in inches, of a 6 meter 1/2-wavelength wire dipole antenna?

A. 6

B. 50

C. 112

D. 236

This is a two step problem. Lets first convert 6 meters to its corresponding frequency of $f=\frac{300}{\lambda}=\frac{300}{6}=50$ meters. The 1/2 dipole length is $\lambda=\frac{468}{50}MHz=9.36$ feet. Now multiply by 12 and the answer in inches is $9.36\times12=112.32$ inches. Therefore C is the correct answer.