String Length and Pitch

When you pluck the string without touching it, you get the lowest possible pitch (smallest possible frequency of vibration) for this string. This is called the fundamental.

If you shorten the string to half its original length by pressing down in the middle, you get a pitch one octave higher. The string is 1/2 of its original length and the frequency is 2x the original frequency.

If you shorten the string to 1/3 of its original length, the note which you hear has a frequency which is 3x the original.
Harmonics

The vibrating string is actually producing many pitches at once: the fundamental and many higher pitches, called the harmonics. When you touch the string lightly in the middle, you stop the fundamental and all you hear are the harmonics.

If you touch the string at a certain point between the middle and the end, you stop both the fundamental and the "second harmonic", which is an octave higher than the fundamental. You still hear many of the higher harmonics.

You can investigate how the harmonics are related to the fundamental frequency by following the instructions "Find Harmonics."
Find Harmonics

1. First just pluck the string and listen to the note. Notice that the string is 36 cm long.

2. Next, touch the string with your left finger VERY LIGHTLY in the middle. Pluck the string with your right hand while you are touching it with your left. You should hear a higher note, but it will ring. If your finger is not EXACTLY in the right place, you will just hear a dull thud. Slide your finger around very close to the middle (while plucking) and stop when you hear it ring. Read the number on the scale underneath.

36 ÷ scale reading = ?
3. Next, slide your left finger to the left of the middle towards the smaller numbers on the scale (touching the string very lightly) until you hear an even higher note ringing. Look at the scale.

36 ÷ scale reading = ?

4. Look for one more harmonic. Continue to slide your left finger to the left while plucking until you hear a higher note ringing.

36 ÷ scale reading =?