Answer on Question #39411, Physics, Electric Circuits

A Zener diode is a diode which allows current to flow in the forward direction in the same manner as an ideal diode, but also permits it to flow in the reverse direction when the voltage is above a certain value known as the breakdown voltage, "zener knee voltage", "zener voltage", "avalanche point", or "peak inverse voltage".

A conventional solid-state diode allows significant current if it is reverse-biased above its reverse breakdown voltage. When the reverse bias breakdown voltage is exceeded, a conventional diode is subject to high current due to avalanche breakdown. Unless this current is limited by circuitry, the diode may be permanently damaged due to overheating. A zener diode exhibits almost the same properties, except the device is specially designed so as to have a reduced breakdown voltage, the so-called zener voltage. By contrast with the conventional device, a reverse-biased zener diode exhibits a controlled breakdown and allows the current to keep the voltage across the zener diode close to the zener breakdown voltage. For example, a diode with a zener breakdown voltage of 3.2 V exhibits a voltage drop of very nearly 3.2 V across a wide range of reverse currents. The zener diode is therefore ideal for applications such as the generation of a reference voltage (e.g. for an amplifier stage), or as a voltage stabilizer for low-current applications.



You can prove this principle with plot below.