1116-05-603 **J. Laison**, **Y. Li**, **J. Schreiner-McGraw** and **C. Starr*** (cstarr@willamette.edu), Willamette University, 900 State St, Salem, OR 97301. *Prime Power Graphs and Prime Product Graphs.* Preliminary report.

Let $L : V(G) \to \mathbb{Z}$ be a one-to-one integer labeling of the vertices of a simple graph G.

(1) We call L a **prime distance labeling** of G if for any two adjacent vertices u and v, the integer $|L(u) - L(v)|$ is prime; in this case, we say G is a **prime distance graph**.

(2) We call L a k**-prime product distance labeling** of G if for any two adjacent vertices u, v, the integer $|L(u)-L(v)|$ is a product of at most k (not necessarily distinct) primes; in this case, we say G is a k**-prime power distance graph**. If G has a k-prime product distance labeling and not a $(k-1)$-prime product distance labeling, then we set $\pi(G) = k$.

(3) We call L a **prime power distance labeling** of G if for any two adjacent vertices u and v, the integer $|L(u)-L(v)|$ is a positive power of a prime; in this case, we say G is a **prime power distance graph**.

In this paper, we characterize some families of prime distance graphs, prime power distance graphs, and k-prime product distance graphs; provide bounds for $\pi(G)$; and make connections between graphs of these kinds and several important theorems and conjectures from Number Theory (including the Green-Tao Theorem and Fermat's Last Theorem). (Received September 09, 2015)