

## **The $r$ -Reduced Cutting Numbers and Cutting Powers of Cycles, Sequences of Cycles, and Graphs**

Brad Bailey, Dianna Spence\*, North Georgia College & State University

We extend the established definitions of cutting number of a cycle and of a graph. First, we define the  $r$ -reduced cutting number of a cycle within a graph and the  $r$ -reduced cutting number of a graph. We find the minimum and maximum number of edges in a graph on  $n$  vertices and  $r$ -reduced cutting number  $k$ . Second, we extend the definition of  $r$ -reduced cutting number of a cycle within a graph to include edge-wise disjoint collections of cycles, which we call progressions. The cutting power (at level  $r$ ) of a graph is the length of the shortest progression with  $r$ -reduced cutting number at least 2. We determine the cutting powers at level 1 of complete graphs. Finally, we discuss the problem of finding the maximum number of edges in a graph on  $n$  vertices with cutting power  $p$  and with a progression of length  $p$  having  $r$ -reduced cutting number  $k$ .

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