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Nissa Yestness* (Nissa.Yestness@unco.edu). *Diagrams in Abstract Algebra: How are Diagrams used in the Proving Process?* Preliminary report.

Research on visual representations and diagrams in K-12 mathematics includes investigations from arithmetic (Agathangelou, Papakosta, & Gagatsis, 2008) to high school calculus (Zubieta & Meza, 2008) including fractions (Deliyianni, Elia, Panaoura, & Gagatsis, 2008), word problems (Uesaka & Manalo, 2006), algebra (Hitt, Gonzalez-Martin, & Morasse, 2008), and geometry (Chen & Herbst, 2007). Research on diagram use by students in collegiate mathematics is less abundant, specifically in abstract algebra. A literature review of abstract algebra and diagrams yielded only two articles (Almeida, 1999; Zazkis, Dubinsky, & Dautermann, 1996). In Gibson's (1998) study of 12 undergraduates in a beginning proof course, one of his research questions was, "In what ways do students use diagrams while proving?" (p. 286). Building on Gibson's work, I ask, what is the nature of undergraduate students' use of diagrams in understanding and constructing proofs related to groups, subgroups, and isomorphisms? I will address this question by investigating ways Gibson's descriptions about students' use of diagrams in proof writing in analysis are similar for students in abstract algebra. Can these student uses of diagrams be further detailed? Are there additional student uses of diagrams? (Received September 23, 2009)