This dissertation introduces a novel validation method for knowledge-based systems (KBS). Validation is an essential phase in the development lifecycle of knowledge-based systems. Validation ensures that the system is valid, reliable and that it reflects the knowledge of the expert and meets the specifications. Although many validation methods have been introduced for knowledge-based systems, there is still a need for an incremental validation method based on a lifecycle model. Lifecycle models provide a general framework for the developer and a mapping technique from the system into the validation process. They support reusability, modularity and offer guidelines for knowledge engineers to achieve high quality systems. CommonKADS is a set of models that helps to represent and analyze knowledge-based systems. It offers a de facto standard for building knowledge-based systems. Additionally, CommonKADS is a knowledge representation-independent model. It has powerful models that can represent many domains. Defining an incremental validation method based on a conceptual lifecycle model (such as CommonKADS) has a number of advantages such as reducing time and effort, ease of implementation when having a template to follow, well-structured design, and better tracking of errors when they occur. Moreover, the validation method introduced in this dissertation is based on case testing and selecting an appropriate set of test cases to validate the system. The validation method defined makes use of results of prior test cases in an incremental validation procedure. This facilitates defining a minimal set of test cases that provides complete and effective system coverage. CommonKADS doesn’t define validation, verification or testing in any of its models. This research seeks to establish a direct relation between validation and lifecycle models, and introduces a validation method for KBS embedded into CommonKADS.