# 1.4 I can appreciate (describe) the need for testing and project based development

When developing software it is important to subject it to rigorous testing. Doing so will catch bugs early. If bugs are not caught until the production stage then you risk damaging your reputation, having to pay compensation or needing to pay costs related to having to recall the product.

**Manual Testing**

Manual testing requires the developer to test the software from the perspective of the end user. Whilst the software is being developed, the developer will write a test plan based on a number of user scenarios related to the requirements of the product to test for bugs.

There are several stages to manual testing;

* Unit testing
  + The functionality of individual units is tested
* Integration testing
  + Multi units are tested to check that they can work together
* System testing
  + Multiple tests are carried out to test the system as a whole
* UI testing
  + Tests the elements that the end user will interact with such as icons, menu bars etc as well as cross browser and device testing
* Acceptance testing
  + Testing the finished system as a whole, this is done internally and externally. End users helping to test the system are given access to a BETA (test) version of the software

Black and White Box testing are two different types of manual testing;

**Black Box Testing**

Black box testing requires the QA (Quality Assurer) to have no knowledge of the code or structure that makes up the software. The QA uses the software as the end user would to test for any issues.

**White Box Testing**

White box testing requires the QA to have knowledge of the code and structure of the application. This type of testing is usually used for unit testing.

**Automated Testing**

Software developers can also subject their software to automated testing to test for bugs. Automated testing tools are used to test the software without the need for humans to carry out steps manually. There are numerous open source automation testing tools including Selenium, Cypress and Robotium. Like manual testing there are numerous types of automated testing including;

**Unit testin**g – Tests are run on individual components to test for functionality

**Integration testing –** Various units are tested at the same time to verify that they work together asintended

**Smoke testing** – the main elements of the software application are tested for functionality

**Key word driven testing –** files containing keywords relevant to the software application are used to carry out a set of instructions to perform a specific action

**Project based development**

Agile, project based development methods such as SCRUM are development methods most likely to be used when developing software. Teams are required to work together to produce useable software, continuously improving on the end product as they work together through the cycles of the development stage, introducing improvements and fixes as the product is developed. The use of a SCRUM master, defining the product backlog, sprints, sprint reviews and retrospectives are utilised to quickly deliver useable, tested software to the product owner.