

THE ENGINEERING DESIGN CYCLE

Unit Overview

The objective of this unit is to acquaint you with the engineering design cycle and how it is used in problem solving.

Introduction

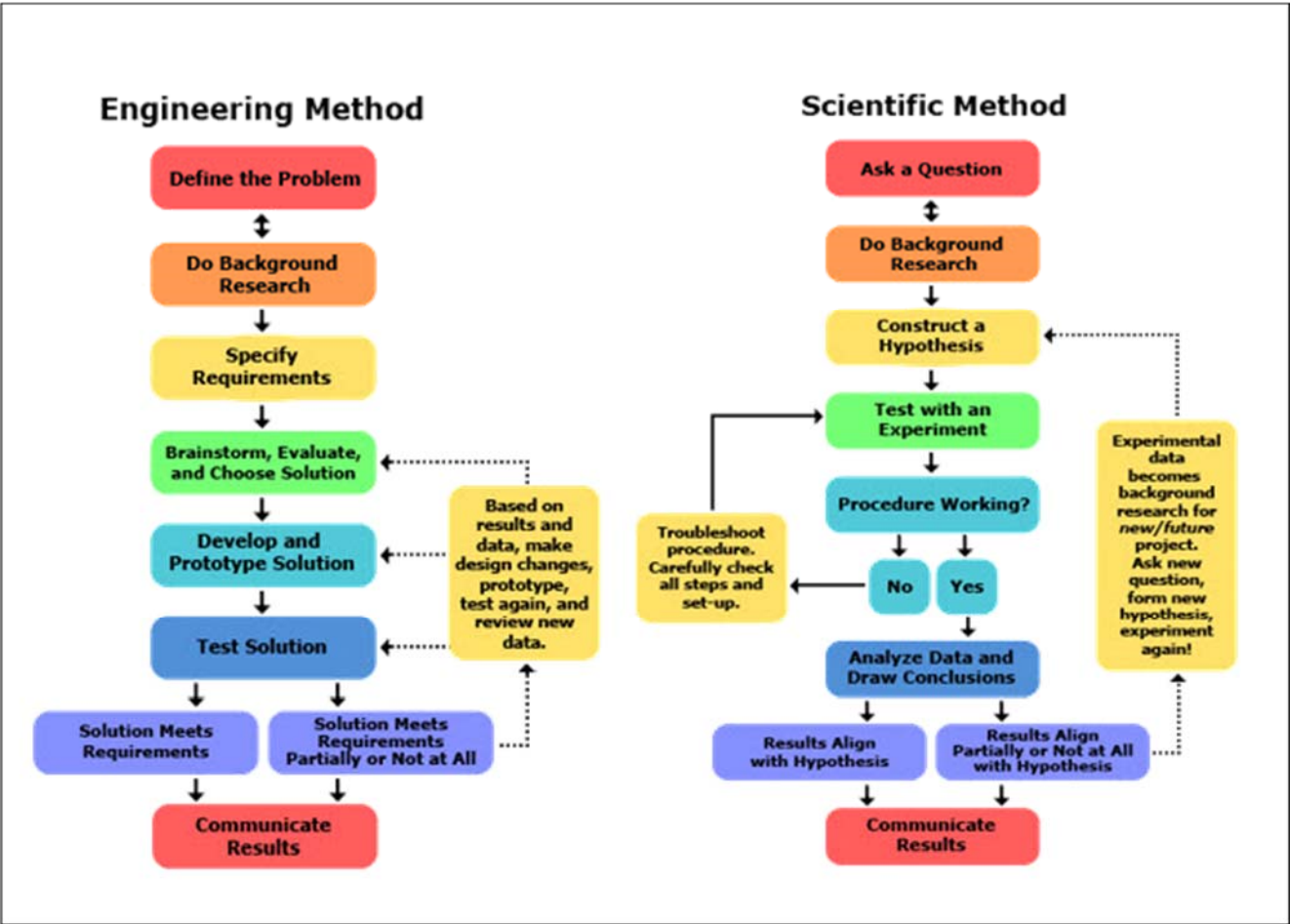
Imagine this: you encounter a problem. You think you may have a few ideas for a possible solution, but it will require some building. Should you use the scientific method to help you solve the problem? How do you tell?

By this point you are familiar with the scientific method, but have you heard of the engineering design cycle? There are similarities and differences between the two. The engineering design cycle is a series of steps that is followed by engineers in order to find solutions to problems. Most often the solution leads to building or designing something to help with the problem.

While the scientific method can also be used to identify and solve problems, these two problem-solving methods are used in different circumstances. If you have a problem that leads to observations and conducting experiments, you need to follow the scientific method. If you have a problem that leads to designing, building, and testing a device, you should follow the engineering design cycle. So if you think back to the problem you've encountered, in which the solution requires you to build something, you should use the engineering design cycle.

Steps of the Engineering Design Cycle

The engineering design cycle, also called the engineering design process, is a series of steps taken to design, build, and test a device in order to solve a problem. But how, exactly, are the steps different from those in the scientific method? Take a look at the diagrams below to compare the engineering design process with the scientific method.



This helpful table from www.sciencebuddies.org lists the steps of each for straightforward comparison:

The Scientific Method	The Engineering Design Process
State your question	Define the problem
Do background research	Do background research
Formulate your hypothesis, identify variables	Specify requirements

The Scientific Method	The Engineering Design Process
Design experiment, establish procedure	Create alternative solutions, choose the best one and develop it
Test your hypothesis by doing an experiment	Build a prototype
Analyze your results and draw conclusions	Test and redesign as necessary
Communicate results	Communicate results

It is important to note that the steps may have different names in different resources, or you may see various charts or diagrams that have minute differences when you compare them. The overall process of the design cycle is what is important, not the exact wording of the steps involved. The main parts are identifying the problem, designing/building/testing a prototype to help solve the problem, redesigning/retesting as needed, and analyzing and communicating results.

Now, you will take a look at a specific problem and apply the engineering design process in order to find possible solutions. Follow along with the example in this article from Khan Academy.

Click on the icon below.



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The article mentions two examples of innovation with football equipment: a football and gloves. When thinking about a football, did you imagine it has

undergone such lengthy testing and design changes to develop the footballs used today? How would the engineering design cycle be applied in this example?

Someone thinks that a football designed differently may gain more forward yardage in passing. That person or group of people brainstorm to come up with a plan to change something about the design of the football. Several plans are evaluated and then a prototype is built from the most favorable design. The prototype is tested to see whether more forward yardage is gained from the new design and results are communicated.

Using the Engineering Design Cycle

You will now use the engineering design cycle to solve a problem. Download the following attachment and complete the activity. Submit as question #4 in the assessment portion of the unit.

[Ramp Design Challenge](#)



Now answer questions 1 through 4.