

Introduction to Science and Engineering: 4.A.1

What is an Engineer? What is a Scientist?

Grade Level	4
Sessions	1 – approximately 60 minutes
Seasonality	N/A
Instructional Mode(s)	Whole class
Team Size	N/A
WPS Benchmarks	None
MA Frameworks	None
Key Words	Science, Engineering, Introduction, Engineering Pretest

Summary

The students will receive an overview of scientists and engineers; what types of skill they possess; and what they do. The students will take a simple drawing pre-test to find out how they perceive engineers and scientists for assessment purposes. Definitions of scientists and engineers are given in the lesson. Occupations of both scientists and engineers are introduced and reinforced through the use of the eng-sci-o-meter group challenge.

Learning Objectives

2002 Worcester Public Schools (WPS) Benchmarks for Grade 4

None

Additional Learning Objectives

1. At the conclusion of this lesson, the students will be able to list three examples of a general type of scientist (biologist, physicist, chemist, etc.).
2. At the conclusion of this lesson, the students will be able to list three engineering disciplines (mechanical, electrical, aeronautical, etc.).
3. At the conclusion of this lesson, given a list of types of scientists and definitions, the students will be able to associate the discipline with the correct definition.
4. At the conclusion of this lesson, given a list of engineering disciplines and definition, the students will be able to associate the discipline with the correct definition.

Required Background Knowledge

None

Essential Questions

1. What is a scientist?
2. What does a scientist do?
3. What is an engineer?
4. What do engineers do?
5. What is one type of science discipline?
6. What is one type of engineering discipline?

Introduction / Motivation

Students should be given the Pre-test before the beginning of the lesson.

Procedure

The instructor will:

1. Go over the definitions of scientist and engineer (see attached **Definition of Scientist and Engineer**) (10 minutes).
2. Go over the definitions of scientist and engineer (see attached **Definition of a Scientist / Engineer**) (10 minutes).
3. Begin a list of a few examples of scientists and what they study and then see if the students can come up with some on their own (5-10 minutes).
4. Begin a second list of a few examples of engineering disciplines and what each type of engineer does. Again, see if the students can come up with some more on their own (5-10 minutes).
5. Tell the students they are going to be playing a game that requires they pay attention to some more definitions and go over how the **Eng-Sci-O-Meter Game** works (5-10 minutes).
6. Go over all the science fields of study definitions (see attached **Science Disciplines**) and play the Game with the list of scientists (10-15 minutes).
7. Go over all the engineering disciplines (see attached **Engineering Disciplines**) and play the Game with the list of engineers (10-15 minutes).

8. Hand out the ***Fields of Study in Science and Engineering Matching Worksheet*** for homework (5 minutes).

Materials List

Materials per class	Amount	Location
Poster board or chalkboard	One	Supermarket or Office Supply Store
Markers or Chalk	One	Supermarket or Office Supply Store

Materials per student	Amount	Location
None	N/A	N/A

Vocabulary with Definitions (in alphabetical order)

1. *Aeronautical Engineering* – Aeronautical Engineering is the design of machines that fly such as air planes and rockets.
2. *Anthropology* – Anthropology is the study of human artifacts and civilizations.
3. *Astronomy* – Astronomy is the study of stars, planets, universe, and solar system.
4. *Biology* – Biology is the study of living things.
5. *Biomedical Engineering* – Biomedical Engineering is the design of medical devices and medicine.
6. *Chemical Engineering* – Chemical Engineering is the design of chemical and chemical products through chemical processes.
7. *Chemistry* – Chemistry is the study of reactions among elements.
8. *Civil Engineering* – Civil Engineering is the design of roads, bridges, and dams using soil, rocks, and concrete.
9. *Computer Engineering* – Computer Engineering is the design of computers and how they are connected.
10. *Electrical Engineering* – *Electrical Engineering is the design of electrical circuits found in radios, televisions and computers.*
11. *Engineer* – An engineer is a person who designs something to satisfy a need or want; constructs new things using the engineering design process; assembles known parts to make a whole object.
12. *Epidemiology* – Epidemiology is the study of diseases.

13. *Geology* – Geology is the study of rocks and minerals.
14. *Herpetology* – Herpetology is the study of reptiles, snakes, and lizards.
15. *Hydrology* – Hydrology is the study of water, lakes, and streams.
16. *Ichthyology* – Ichthyology is the study of fishes.
17. *Manufacturing Engineering* – Manufacturing Engineering is the design factory floor layouts and assembly lines containing various machining tools.
18. *Marine Biology* – Marine Biology is the study of living things in salt-water environments.
19. *Mechanical Engineering* – *Mechanical Engineering is the design of machines and devices with moving parts.*
20. *Meteorology* – Meteorology is the study of weather.
21. *Oceanography* – Oceanography is the study maps of the ocean including information on water depth, currents and temperature.
22. *Paleontology* – Paleontology is the study of fossils and dinosaurs.
23. *Physics* – Physics is the study forces on, energy of and movement of objects.
24. *Scientist* – A scientist is a person who looks closely at the world around him/her to draw conclusions; performs experiments with the scientific method; studies a whole object to identify the parts.
25. *Seismology* – Seismology is the study of plate tectonics and earthquakes.
26. *Structural Engineering* – Structural Engineering is the design of buildings such as bridges and skyscrapers with beams and supports.
27. *Zoology* – Zoology is the study of animals.

Assessment / Evaluation of Students

The instructor may assess the students in any/all of the following manners:

1. Check the Draw an Engineer and Draw a Scientist activities to use as a baseline of students' conceptions of what scientists and engineers are for a comparison further through the school year.
2. Check for participation in the ***Eng-Sci-O-Meter Game***
3. Check the homework assignment (***Fields of Study in Science and Engineering Matching Worksheet***)

Lesson Extensions

The instructor might use this lesson as an introduction to the other lessons in this unit.

Attachments

1. Draw an Engineer/Scientist
2. Eng-Sci-O-Meter Game Description
3. Definition of a Scientist / Engineer
4. Science Disciplines
5. Engineering Disciplines
6. Fields of Study in Science and Engineering Matching Worksheet

Troubleshooting Tips

None

Safety Issues

None

Additional Resources

None

Key Words

Introduction, Science, Engineering, Engineering Pretest

Draw an Engineer / Scientist

Summary – An activity to get a sense of the progression of children’s level of interest in science and engineering. The children are asked to draw what comes to mind when they think of a scientist and an engineer. This activity should be performed three times during the year – beginning, middle, and end of the year. The activity should take no more than 10 minutes.

Procedure –

1. Tell the students they are not being graded on this assignment.
2. Pass out a single blank 8.5 x 11 in. piece of paper to every child.
3. Have the students fold the paper in two the short way (resulting in two 5 x 8.5 halves) and draw a line separating the two.
4. Have them turn the paper sideways, so there is a left and right side.
5. On the top of the left side, have them write, “scientist”.
6. On the top of the right side, have them write, “engineer”.
7. Tell them to draw a picture below each what comes to mind when they think of each word.
8. If they don’t know what to write at all, have them write, “I don’t know” and draw whatever they want.
9. If a student says he/she is not good at drawing and don’t know where to start, you may draw a simple, non-gender, stick figure on both sides and have him/her add his/her own features.
10. Be sure to have each student put his/her name and today’s date on the paper before handing them in.

Eng-Sci-O-Meter Game Description

Summary – The Eng-Sci-O-Meter Game is a fun way to reinforce definitions. As a class, the students are given an opportunity to correctly identify either the word given the definition or the definition given the word. For each correct answer, the "mercury" in the Eng-Sci-O-Meter, just like a real thermometer with increasing temperature, rises one level higher.

Object of the Game for the Students – To increase the level of the Eng-Sci- Meter to the highest level as possible in the given time allowed.

Procedure –

1. Prepare a large version of the Eng-Sci-O-Meter ahead of time using Figure 1 as a guide, either on a piece of poster or on the blackboard.
2. Explain how the game works with the students.
3. Pick one child to be scorekeeper in charge of filling in the Eng-Sci-O-Meter when the class gets a correct answer.
4. Play the game by asking questions, alternating between giving definitions and asking the students to come up with the correct word, and giving a word and seeing if they can come up with correct definition.
5. For every correct answer, the scorekeeper fills in the Eng-Sci-O-Meter up to the next line.
6. The game is finished when time is up or when the highest level is reached, whichever comes first.

Rules –

- No shouting out answers.
- Raise hands and wait to be called upon by the teacher.

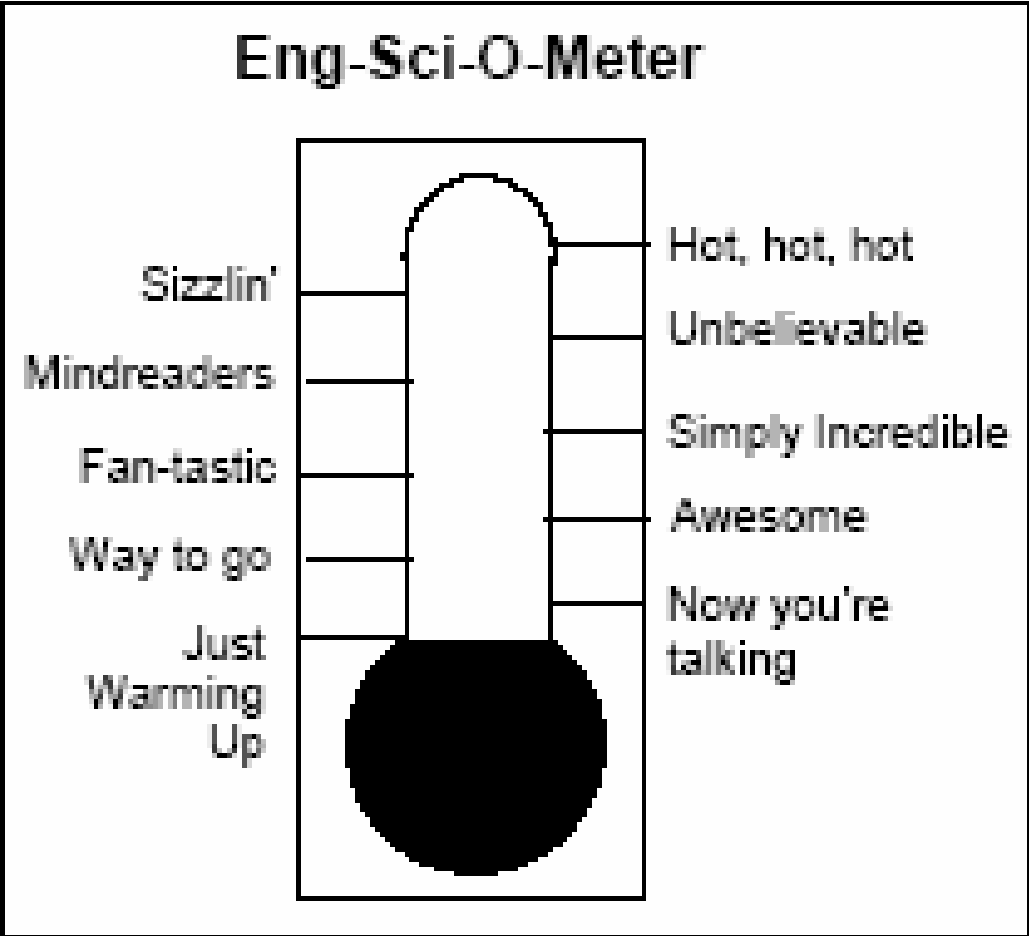


Figure 1. Sample Eng-Sci-O-Meter for Poster

Definition of a Scientist

A person who...

- Looks closely at the world around him/her to draw conclusions
- Performs experiments with the Scientific Method
- Studies a whole object to identify the parts

Definition of an Engineer

A person who...

- Designs something to satisfy a need or want
- Constructs new things with a Design Process
- Assembles known parts to make a whole object

Science Disciplines

Anthropology – study of human artifacts and civilizations.

Astronomy – study of stars, planets, universe, solar system.

Biology – study of living things.

Chemistry – study of reactions among elements.

Epidemiology – study of diseases.

Geology – study of rocks & minerals.

Herpetology – study of reptiles, snakes & lizards.

Hydrology – study of ground water, lakes & streams.

Ichthyology – study of fishes.

Marine Biology – study of living things in salt water environments.

Meteorology – study of weather.

Oceanography- study of maps of the ocean

Paleontology – study of fossils & dinosaurs.

Physics – study of forces on, energy of and movement of objects.

Seismology – study of plate tectonics & earthquakes.

Oceanography – study of maps of the ocean including information on water depth, currents & temperature.

Zoology – study of animals.

Engineering Disciplines

Mechanical Engineering – design of machines & devices with moving parts.

Electrical Engineering – design of electrical circuits found in radios, televisions & computers.

Civil Engineering – design of roads, bridges, & dams using soil, rocks & concrete.

Structural Engineering – design of buildings such as bridges & skyscrapers with beams & supports.

Aeronautical Engineering – design of machines that fly such as air planes & rockets.

Manufacturing Engineering – design of factory floor layouts & assembly lines containing various machining tools.

Biomedical Engineering – design of medical devices and medicines.

Computer Engineering – design of computers and how they are connected.

Chemical Engineering - design of chemicals and chemical products through chemical processes.

Name: _____

Date: _____

Fields of Study in Science and Engineering Matching Worksheet

Directions: For both blocks below, draw lines connecting each field of study on the left to the correct definition on the right.

Science Fields	The study of...
Biology	Weather
Physics	Forces and movement of objects
Meteorology	Stars and planets
Astronomy	Rocks and minerals
Geology	Living things

Engineering Field	Designs
Mechanical	Assembly lines in factories
Electrical	Medical devices
Civil	Rockets and airplanes
Biomedical	Machines with moving parts
Aeronautical	Roads, bridges, dams
Manufacturing	Circuits and electrical devices