

StepUp Program Session 1: Intro to Engineering

Step-Up is a multi-session program for a class of Middle-School students. These sessions are meant to introduce students to the concept of engineering and allow them to explore many engineering-related concepts. It will help them determine the career possibilities within STEM and determine the path they want to take if the events of the program interest them.

1. Intro Activity: Build sailboats and race with classmates

- Have students form teams of 3 or 4 and create team names
- Each team's goal is to build the fastest sailboat in the class
- We will allow 15 minutes of build time
- After 15 minutes, we will have a sailboat racing tournament
- Sailboats will be pushed by a fan, and the fastest sailboat wins
- Building Materials:
 - Long trays
 - Bucket
 - Water
 - Fan
 - Paper plates
 - Construction paper
 - Scissors
 - Pipe cleaners
 - Tape
 - Glue
 - Markers

2. Talk: What is Engineering?

- Engineering is a career that allows people to create and build the world around us by designing technology that makes our lives better.
- The activity you just completed, building these sailboats, is a good representation of this.
- Engineers do many things to meet our needs and solve world problems. Some examples of this are to
 - upgrade our infrastructure(roads and buildings, other structures etc.)
 - prevent further climate change
 - better feed our population
 - find new ways to treat devastating medical conditions
 - much more
- Question for class: "Can anyone give me an example of something they know engineers do or create?"
- Engineering Disciplines:
 - Mechanical and Civil

- Design and construct machines/moving parts(mechanical) and structures like roads and bridges(civil)
 - Chemical and Biomedical
 - Produce chemical substances such as medicine / polymeric materials (chemical) and medical/medicine technology (biomedical)
 - Aerospace
 - Builds and designs planes, rockets, and other aircraft
 - Electrical
 - Environmental
 - Materials
 - Computer
 - Industrial
- Engineering could be right for you if you:
 - Are good at solving problems
 - Are curious about how products work
 - Work well in a team
 - Enjoy learning, in the classroom or on your own
 - Like to create new things
- Questions?

3. Ending Activity: “What kind of Engineer are you?” from

<https://spacefem.com/quizzes/engineer/>

- Quiz worksheet (seen below)
- 5-10 mins allowed for the activity

Conclusion:

- Have students raise hands to see who got what results on their engineering type quiz
- This activity can help you decide what type of engineering to study if you want to be an engineer.
- It is important for students like you to start thinking about what career you want, because picking the right career for the future can make a big difference.
- The world needs engineers, and if you think it might be right for you, you should consider pursuing it!
- Additional questions?

What kind of engineer should you be?

Engineering is one of the coolest jobs in the world, but there are so many disciplines it can be a little daunting to choose one for yourself! Take this quiz to find out what type of engineering you might enjoy most if you become an engineer. At the end you will find a scoring guide.

1) Favorite color?

- a. Red
- b. Pink
- c. Orange
- d. Yellow
- e. Green
- f. Blue
- g. Purple
- h. Gray
- i. White
- j. Black

2) Are you good at minding your own business?

- a. Yes
- b. No

3) Another possible job for me might be...

- a. Teacher
- b. Politician
- c. Retail
- d. Pilot
- e. Veterinarian
- f. Cosmetologist

4) My mad scientist laboratory would have...

- a. A greenhouse full of plants (maybe evil plants?)
- b. Blinky lights
- c. Colorful liquids in test tubes
- d. Everything, it'd be a total mess

5) Word that best describes you

- a. Ambitious
- b. Organized
- c. Nerd
- d. Adventurous

e. Practical

6) Favorite household item?

- a. Fridge
- b. Lawnmower
- c. Microwave
- d. Blender
- e. Air conditioner

7) What are you most likely to draw on the side of a paper when you're bored?

- a. Lines
- b. Cars, buildings, trees... other things you see around you
- c. Arrows
- d. Squares
- e. Clouds, airplanes, rockets, other things in the sky
- f. Circles

8) I'd rather have friends who are...

- a. Unique
- b. Generous
- c. Confident
- d. Imaginative
- e. Loyal

9) What's more important?

- a. That everything is done right
- b. That people get along

10) Favorite way to spend your free time?

- a. Expressing myself through art or something I create
- b. Expressing myself directly, like writing my thoughts down or speaking to groups
- c. Hanging out with friends and family
- d. Doing puzzles or creating things that involve putting pieces together

11) If I'm late on a project, it's more likely because it...

- a. Takes me a while to get done, I'm a perfectionist.
- b. Takes me a while to get motivated, I'm a procrastinator

12) Do you like being in charge?

- a. Yes
- b. No
- c. Doesn't matter

13) What would you rather do?

- a. Build big impressive things
- b. Invent cool gadgets
- c. Make the world a better place
- d. Be a mad scientist
- e. Break stuff

14) What size company do you think you'd want to work at?

- a. Huge, like the government
- b. A small company, with a few dedicated people I'm close to
- c. A big company, with lots of people to meet and room to move around
- d. Someplace in the middle

15) What's something you'd HATE at work?

- a. Getting messy
- b. Sitting at a desk all day
- c. Constantly being distracted and having to switch tasks
- d. Working in isolation

16) I'm good at helping people...

- a. Understand themselves and what they're really looking for
- b. Get their head out of the clouds and have a reality check
- c. Understand others and resolve disagreements
- d. Understand complex ideas

17) Where would you like to go to work?

- a. My own office
- b. A different city every week
- c. A busy factory
- d. Outer space
- e. The great outdoors
- f. A hospital

18) What do people like about you?

- a. I'm convincing, opinionated, and fresh
- b. I'm relaxed and easy to get along with
- c. I'm very supportive and loyal

19) Word that describes you best?

- a. Successful
- b. Happy
- c. Helpful
- d. Understanding

20) I'd rather work

- a. Alone. I don't care how helpful the group is.
- b. With a group of helpful people.

Answer Key

To score your quiz, circle the letters next to each question number that equal the letters of your responses for that question. You might circle more than one per row, that's okay. You might not find your answer in a row at all, that's also okay. Then add up each column to find out which engineering field scored the highest for you!

Question #	Your Responses								
	Industrial	Mechanical	Computer	Aerospace	Materials	Electrical	Civil	Chemical	Environmental
1	b	a	d	f	h	i		g	
2	a	b	b	a	b	b	a	a	a
3	c			d		a	b	f	e
4	b	d	b	a	c	b	a	c	a
5		b	c		e		a		d
6	a	b	c		e				
7	c	d		e		a	b	f	
8	b		c	d			a	e	
9	b	a	a	b		a			b
10		b			d		a		c
11	b		a		a	a		b	
12	b	a	b	c	a	c	c	b	a
13			b		e		a	d	c
14			b	c	d	d	a	c	b

15	b	c		b		a			d
16		b			d		a	c	
17	c			d		a	b	f	e
18	c	a	a	c	b	a	b	b	c
19			a	b	d				c
20		b				a			
Total #:									
	Industrial score	Mechanical score	Computer score	Aerospace score	Materials score	Electrical score	Civil score	Chemical score	Environmental score

About the Engineering Disciplines

Industrial

Industrial engineers design logistical and resource systems. They make manufacturing processes faster and help us use facilities more efficiently. They may plan out components and tools needed to make a product, or analyze reliability records to help companies understand maintenance costs.

What this test might say about you: You are trustworthy, loyal, and socially conscious. Your friends have lots of different personalities. You're patient enough to slowly work through problems with people. You really like to think different and can be funny sometimes without even meaning to be.

Mechanical

Mechanical engineers are responsible for the physical design of products. They think about how components transmit temperature, stress, or vibration between other connected components, and are heavily involved in the transportation industry.

What this test might say about you: You're assertive and confident. You can stand up for yourself. You enjoy life if you're taking challenges head on and supporting the causes that are important to you.

Computer

Computer engineers apply and construct computers needed for system design. They write software, design hardware, and work on improving capabilities like multimedia, mobile computing, simulations, and artificial intelligence.

What this test might say about you: You are very energetic when you've got your eyes set on a task. You like hearing what people honestly think of you. You're proud of your accomplishments. You're not always great at working around the feelings of sensitive people at first, so people have to get to know you to appreciate what you're good at.

Aerospace

Aerospace engineers design aircraft, spacecraft, and other air vehicles. They work with the systems and equipment needed to propel and control anything that moves through the air. There is a great deal of overlap between aerospace and mechanical engineering, which is responsible for the physical design of all kinds of products.

What this test might say about you: You are optimistic and want to contribute to the world. You have your own unique style. You love having grand visions. You're a free spirit who is fun to be around. You like pursuing whatever your new crazy interest of the week is, rather than being told what to do.

Materials

Materials engineers apply the properties of matter to engineering. They may work with special building materials like ceramics or composites, or assist electrical engineers in creating small components with crystals.

What this test might say about you: You can work out big ideas but in a very independent way. You love analyzing a problem from all different sides and viewpoints. You know a lot more than you let on.

Electrical

Electrical engineers develop a wide range of technologies, from global positioning systems to power plants. They learn about how individual components interact in a circuit in addition to creating large systems out of devices and networks.

What this test might say about you: You have strong principles. You can sometimes be hard on yourself, but you achieve a lot and any team with you on it will be successful... even if you have to do the work yourself.

Civil

Civil engineers design and manage construction of large projects like roads, airports, bridges, dams, and buildings.

What this test might say about you: You are highly perceptive, and know what people think of you. Your work has a lot of meaning to yourself and others. You have a good eye for aesthetics.

Chemical

Chemical engineers help figure out how to convert raw materials or chemicals into useful forms. They improve how we refine petroleum, design new plastics, or optimize paper production.

What this test might say about you: You're always thinking of a lot of things at once. You tell stories with great points that meander creatively. You enjoy life. There are only a few chosen people who really understand you and know how to get you to open up.

Environmental

Environmental engineers apply engineering principles to the improvement and protection of the environment. They help protect ecosystems, water resources, people and animals, from the effects of industry. They make sure we consider things like temperature changes, chemicals, fires or landscape changes in our technology projects.

What this test might say about you: You relate easily to people and can be very convincing. You know what people need to make their lives better. You can be generous, and when things are going well for you you tell everyone and can't help but share the laughter.