ENGINEERING LEVEL I

ENGINEERS USE ROBOTICS TO SOLVE PROBLEMS

The U.S. has approximately 1.6 million engineering jobs. The engineering field makes up two-thirds of the American engineering workforce. These jobs will continue to grow as technology changes.

OVERVIEW

Throughout this unit students will be exposed to robots and the Engineering Design Process. The goal of the kit is to encourage students to explore robotics and coding through play. Students will work to solve a problem by identifying the problem, asking questions, and imagining how they can help solve the problem

MATERIALS

- Rosie Revere, Engineer by Andrea Beaty (1)
- Pete the Cat Construction Destruction (1)
- Engineering Design Process Magnets (1)
- Sphero Spark+ (6)
- Sphero Chariots (6)
- K'nex (1)
- journals (30)
- crayons (30 packs)
- colored pencils (30 packs)
- pencils (30)

*** Device Required – Tablet – minimum 6 per kit

ENGINEERING LEVELII

3D PRINTING: DESIGN, PRINT, UNLOCK IMAGINATION

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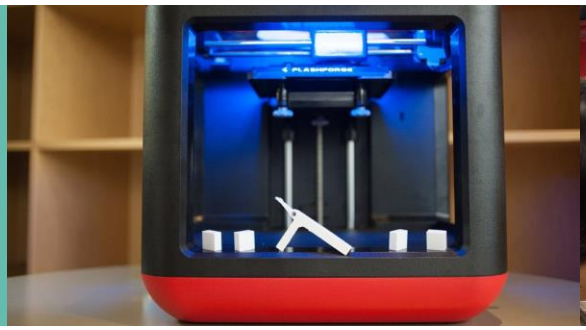

OVERVIEW

In this kit, students will embark on the study of 3D printing by examining an object print and exploring the printer's movement. Using small toys, they will investigate the various shapes that comprise an object and break those shapes down into a 3D model. Given two separate engineering challenges, students will first create an object and promote it to the class in a class challenge, and then work in groups to create a class biome with both 3D prints and other materials. This jam-packed unit culminates by asking students to pitch their own project for printing

MATERIALS

Flashforge Finder 3D printers (3)

- spools of filament (9)
- student journals (30)
- straws
- modeling clay
- construction paper
- scissors (12)
- graph paper
- scotch tape.
- printer cards (1)
- geometric manipulatives (30)
- rulers (15)
- calipers (15)
- Despicable Me 3 Micro Minion Figurines 8-pieces Gift Set
- matchbox cars (9)
- decibel meter
- printer paper
- Crayola washable markers triangular class pack
- glue sticks (12)

COPIES OF

- Big News Template (30)
- Module 2 exit ticket (30)
- Design Thinking Graphic (10)
- Engineering Challenge Testing Checklist (10)
- Engineering Challenge Rubric (30)
- Promotional Media Rubric - Module 4 (30)
- Biome Research sites or QR codes
- copies Module 5 Exit ticket (30)
- Pitch your project rubric Module 6 (30)
- Pitch your project checklist module 6 (30)
- Pitch your Project Ideas - Module 6
- Clips app for iPads or WeVideo Videos Editor for computers (30)
- 6 Biome Signs for Modified 4 Corner Activity

*** Device Required – Computer, tablet, or Laptop (no Chromebook)– minimum 15 per kit

ENGINEERING LEVELIII

3D PRINTING

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OVERVIEW

The lessons in this unit will support instructors as they introduce students to the process, potential, and products of 3D printing. Beginning with a conceptual understanding and moving towards 3D printing with purpose, these lessons will support both instructor and student as they make their way into this exciting realm.

The lessons have a rich mix of manipulative activities, building 3D items in modeling software, and engineering challenges. Students will track their learning through an engineering journal.

MATERIALS

- FlashForge Finder 3D Printer (3)
- Legos (1)
- rulers (15)
- assorted filament (12)
- journals (30)
- $10 iTunes card (to purchase Print the Legend)
- blue painter's tape (3)
- Design Thinking Rubric
- Modules 6-7 (30)
- Design Thinking Rubric Modules 8-9 (30)

COPIES OF

- Design Thinking Rubric (30)
- Modules 6-7 (30)
- Design Thinking Rubric Modules 8-9 (30)

*** Device Required – Computer, tablet, or Laptop (no Chromebook)– minimum 15 per kit

ENGINEERING LEVELIV

3D PRINTING

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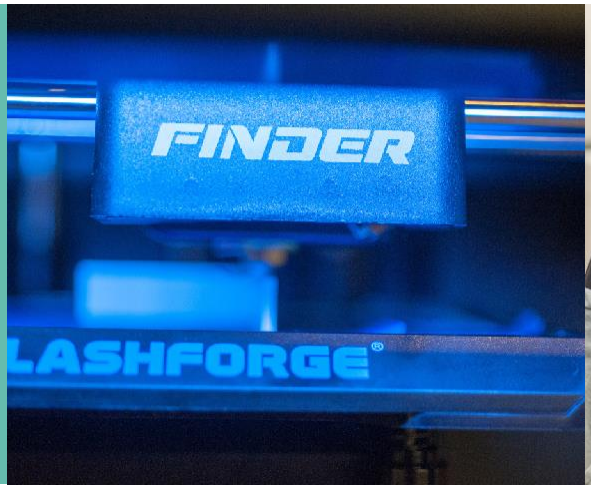

OVERVIEW

This unit aims to teach students how to help others by solving real-world problems using design thinking and 3D printing. Students will be challenged to empathize with others, understand a problem, then design a solution. Through the challenge, students will interview people, prototype and design solutions, then test them for success or failure. In the end, students will use 3D printing and presentations to finalize production and pitch their best ideas to the class.

MATERIALS

- Flashforge Finder 3D printers (3)
- spools of filament (9)
- pencils (30)
- pens (30)
- markers (15)
- copy paper
- glue sticks (15)
- tape (10)
- cardboard
- Access to tinkercad or Morphi app
- student journals 30)

COPIES OF

- Understanding Design Thinking handout (30)
- Mind-Map handout (30)
- Getting Started with Tinkercad (30)
- Presentation Self-Evaluation (30)

*** Device Required – Computer, tablet, or Laptop (no Chromebook)– minimum 15 per kit