

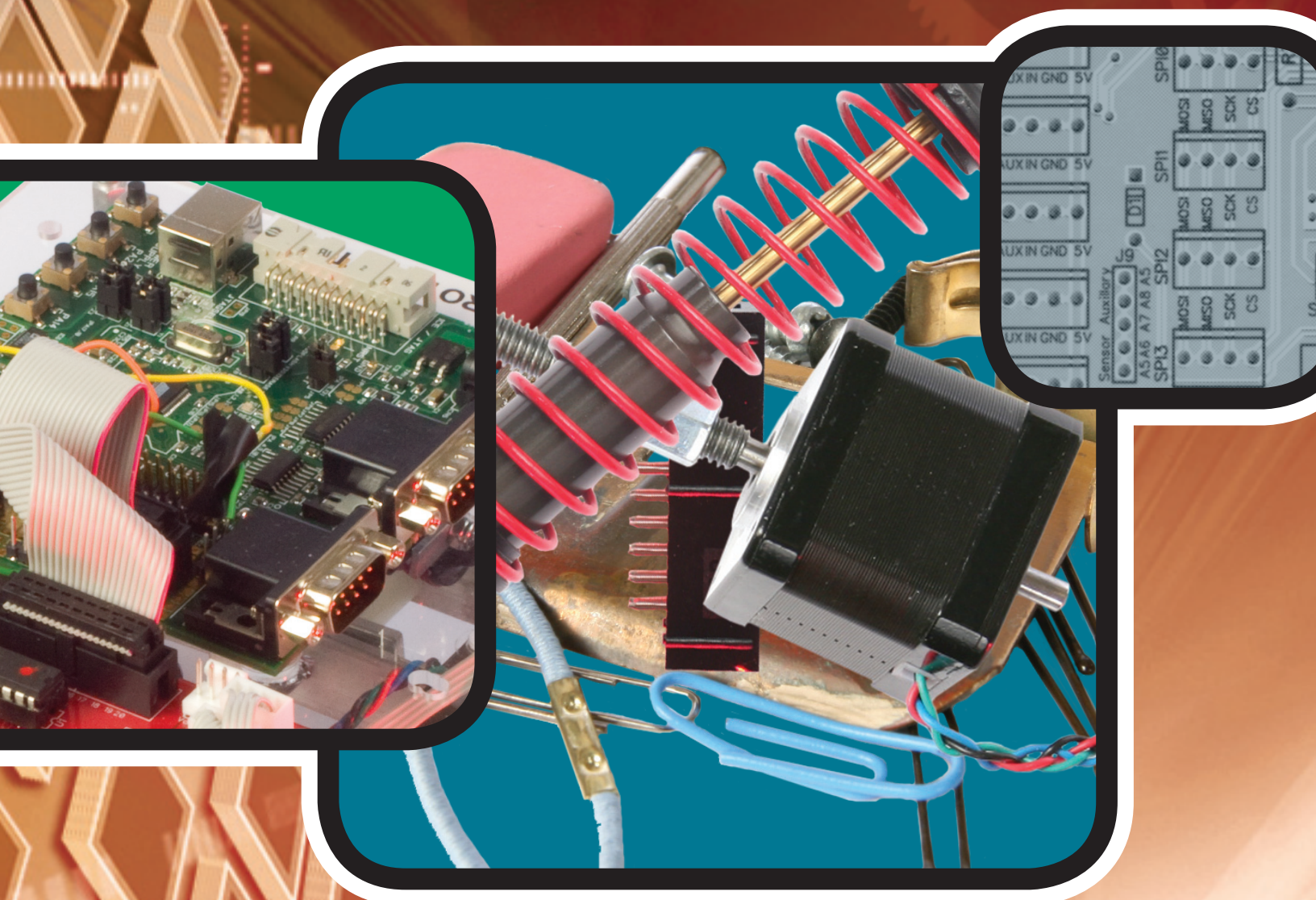


REVIEWED & RECOMMENDED
National 4-H Curriculum

NATIONAL 4-H CURRICULUM
Product Number 08435

JUNK DRAWER ROBOTICS

YOUTH ROBOTICS NOTEBOOK



4-H ROBOTICS: ENGINEERING
FOR TODAY AND TOMORROW

Acknowledgments – Junk Drawer Robotics

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Support for this publication
was provided by jcpenny.



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National 4-H Council Product 08435

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Junk Drawer Robotics

The robotic exercises, activities, and use of this notebook will allow you to examine the communication skills that are used by scientists and engineers in technical writing, sketching, and drawing. You will have a chance to practice your own writing and drawing techniques in this 4-H Robotics Notebook. The notebook is a place for you to record your thoughts, ideas, and experiences as you examine the world of robotics. Your notebook should become like a formal diary that you will want to review yourself and share with others. This 4-H Robotics Notebook covers all three levels of the *Junk Drawer Robotics* curriculum. You'll want to continue keeping notes of what you do in all levels and refer back to them often.

Robotics Notebook

Level 1

Give Robots a Hand

In the beginning Junk Drawer Robotics level, “Give Robots a Hand,” you will explore the function and design of robotic arms. You will investigate robotic hands, grippers, and other end effectors by studying their movements and power sources.

Module 1 – Parts Is Parts

You will start with activities to practice using your notebook and how to design and communicate like an engineer. As you begin to design and build, you will apply ideas about form and function. You will explore the design, manufacturing, and assembly of items. These objects will then be used to build your own robots.

Module 2 – In Arm’s Reach

Module 2 will allow you to examine different robotic arms and their uses. This knowledge will help you design and build a robot arm. You also will study air pressure and its ability to provide power and movement.

Module 3 – Get a Grip

In these activities, you will discover how various end effectors pick up and hold items. This module will conclude when you assemble your robotic arm and hand, and use it to move and grip items using air power!



To Learn

Activity A – Think Like a Scientist

Sort all of your items. To fill out the table, count the amount of items you have that fit within that category. Add up your items for totals of each color.

Sorting 1 – Color and Shapes

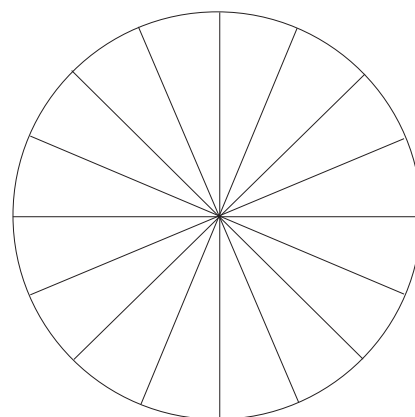
Shape Color	Square	Triangle	Circle	Rectangle	_____	_____	Total
Red							
Blue							
Green							
Yellow							

You can take your total data (numbers) above and make a visual chart or graph. Try to make a bar graph or a pie graph using the forms below. How does the data look different in each type?

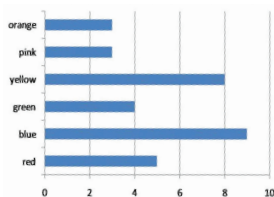
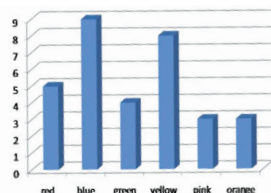
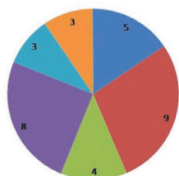
Graph 1 – Number by Color

Red										
Blue										
Green										
Yellow										

Color Number	1	2	3	4	5	6	7	8	9	10



Pie Graph 1A - By Color





To Learn

Activity A – Think Like a Scientist

Resort the parts with a different criteria. Then create a new table below that matches your criteria. You can use as many cells as needed; if you need more, draw a new table on a separate sheet.

Sorting 2 – _____

_____	_____	_____	_____	_____	_____	_____	Total

After resorting all of your objects and filling out the table, use the data to create a graph to visually show the results. Label the graph so others can read the data.

Graph 2 – _____

number	1	2	3	4	5	6	7	8	9	10



Date _____

Signature _____

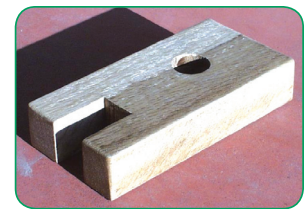
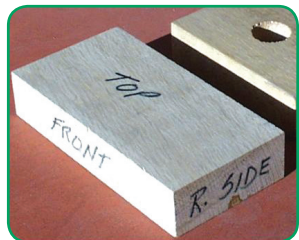
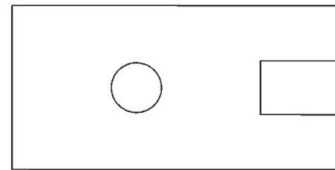
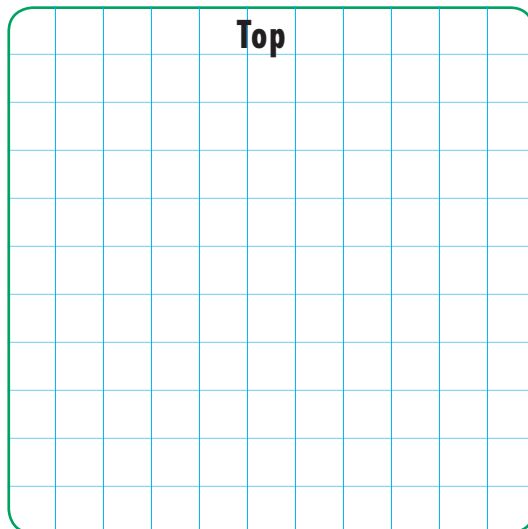


To Learn

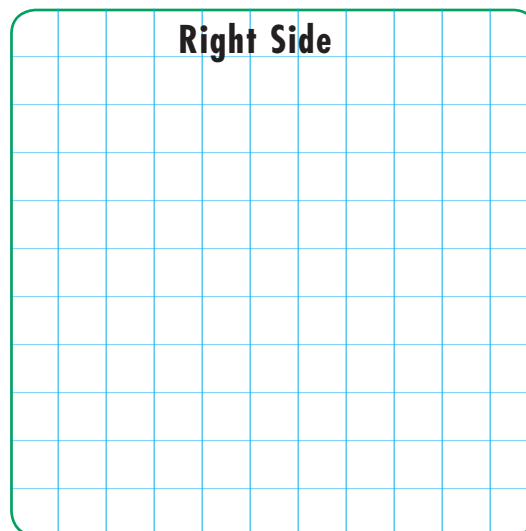
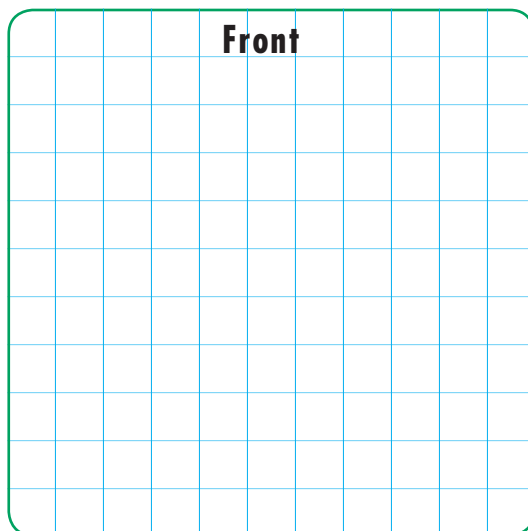
Activity B – Communicate Like an Engineer – 2-D Drawing

Look around and select an object in the room, but don't let anyone know what it is. Study the item and think about how it looks; pretend you are looking at it from above, at the side of it, and in front of it. Then use the grids below to sketch the object in full detail.

You should draw your object from three different perspectives; the front, side, and top.



Note how dotted lines were used to show surface changes hidden in some views.



Then exchange your Drawing with the next player so that person can try to locate the same item using your drawing to find the item.



To Learn

Activity B – Communicate Like an Engineer – Description

After trading notebooks, you will look at the drawing and try to locate the item in the room but not let anyone else know which item it is. Then use the space below to use words to describe that object. Do not use the name of the object in describing the item. Describe the form, not the function of the object. If you do not know what the object is, just describe the object from the pictures drawn by your partner.

Author of Description: _____

Descriptors

Size

Colors

Textures

Shape

Measurements

Patterns

Materials

Surface

Other

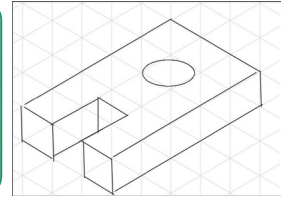
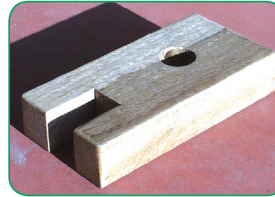
Then exchange your Description with the next player. Have that person find the same item using your words to locate the item.



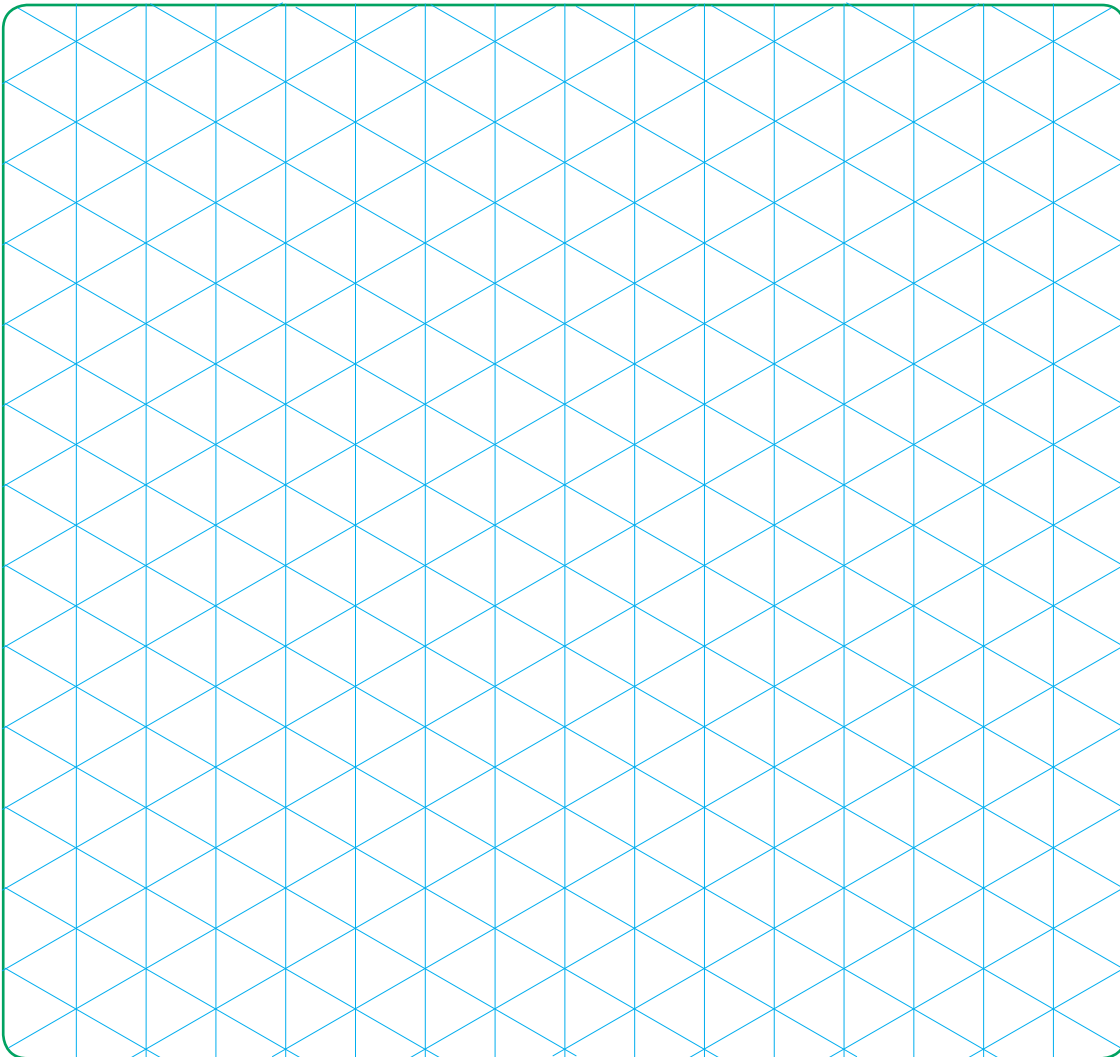
To Learn

Activity B – Communicate Like an Engineer - 3-D Drawing

After trading notebooks with a third member of the group, you will read the Description of the object and then draw a 3-D image of the item. To help, you can use the isometric grid below to line up your 3-D drawing.



Artist _____



Then exchange your 3-D Drawing with the next player so that person can locate the same item, using your picture drawing to find the item.



To Learn

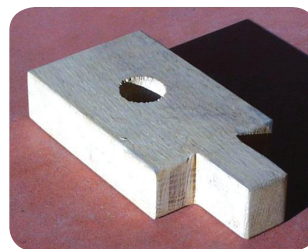
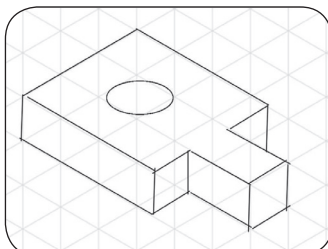
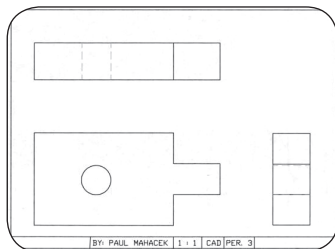
Activity B – Communicate Like an Engineer - Verbal

The fourth and last person in the group will use the 3-D Picture Drawing to locate the item and then will describe the item out loud for people in other groups to guess the item. You can use the area below to make notes for your sharing.

After sharing, return the notebook to its owner and then discuss and make a list of the benefits and problems when using each type of the communication.

Type of Communication	Benefits	Problems
2-D Drawing/Sketch		
Written Description		
3-D Picture Drawing		
Verbal Description		
Other		

Why is it important to have detailed and accurate drawings and descriptions?



- Rectangular
- Wooden
- Has a hole through it in the large surface
- Is about 1 inch thick, 3 inches wide, and 5 inches long
- Light tan color
- Smooth surfaces
- One end has a tang



CAREER CONNECTIONS

Career Connection 1: Robotics Notebook

Scientists conduct experiments and try to find new knowledge. Engineers apply their knowledge of science, math, and other elements to solve problems. As they work, they need to record their ideas and progress. These notes are usually kept in a notebook. This notebook is an important tool for communication. It records what has been done, what has worked, what has not worked, and ideas about what to work on next. The notebook is also used to assign credit for discoveries, inventions, and patents.

- What type of experiments do you think scientists might work on and record in their notebooks?
- What might an engineer invent or design that would be recorded in a notebook? Engineers use both drawings and words to describe their ideas. Do you think it would be easier for you to use words or drawings to describe a new invention?