2021 NSBE SEEK

ENGINEERING CURRICULUM GUIDE 3rd Grade

NATIONAL SOCIETY OF BLACK ENGINEERS

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About NSBE

With more than 700 chapters and more than 21,000 active members in the U.S. and abroad, the National Society of Black Engineers (NSBE) is one of the largest student-governed organizations based in the United States. NSBE, founded in 1975, supports and promotes the aspirations of collegiate and pre-collegiate students and technical professionals in engineering and technology. NSBE's mission is "to increase the number of culturally responsible Black engineers who excel academically, succeed professionally, and positively impact the community."

Visit www.nsbe.org to learn more.

About SEEK

The National Society of Black Engineers (NSBE) created the Summer Engineering Experience for Kids (SEEK) to inspire Black students with the opportunities and wonders of the STEM fields. SEEK is a free, three-week summer program that offers a fun and engaging educational experience for students in grades 3–5. SEEK aims to provide high-quality learning opportunities to underrepresented students who otherwise may not have access to a robust STEM education.

Visit www.nsbe.org/SEEK to learn more.

THANK YOU
TO OUR
WEEK 1 SPONSORS

Welcome: Week 1

Dear Young Engineers,

Around the world, drone technology is rapidly changing the way we live! Right now, big companies are finding ways to use drones for package delivery and other useful tasks. In fact, a lot of industries are looking at ways to use drones. In the near future, drones could be used in agriculture, environmental conservation, law enforcement, disaster relief, and providing internet access, just to name a few! But there is a problem: all these drones flying around in the future need people to design, build, and **FLY** them! This week, SEEK students will begin learning the necessary skills to become SEEK-approved Drone Pilots. You will complete three different challenges that will sharpen your drone-flying skills while you also learn about drones and aerospace engineering. Check out the challenges below:

Challenge #1: Emergency Supply Delivery

Design and navigate a drone course with at least three "dropoff" locations.

Challenge #2: Obstacle Course Race

Design and race through your very own drone obstacle course.

Challenge #3: Creative Use/Trick Contest

Use the drone to perform a special/creative task or a trick move.
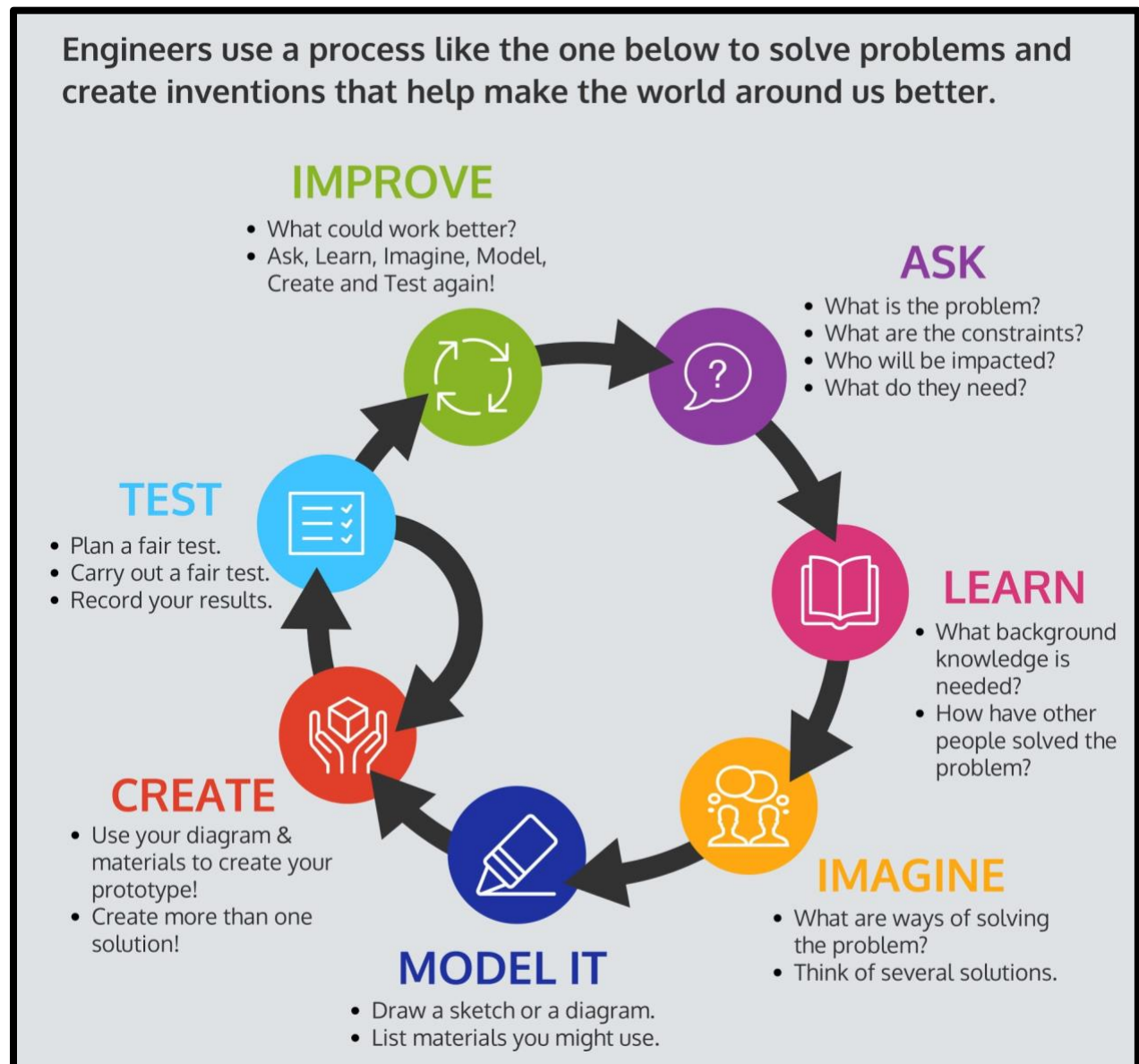
On behalf of the National Society of Black Engineers, we wish you the best of luck!

Sincerely,

The SEEK Team

The SEEK Engineering Design Process

DIRECTIONS: We'll be using the SEEK Engineering Design Process to explore our projects this week. The Engineering Design Process, or EDP, is a set of steps that engineers use to solve problems and create solutions to challenges. The steps follow the order: **ASK, LEARN, IMAGINE, MODEL, CREATE, TEST, AND IMPROVE.** Notice how the steps go around in a circle (below)? The EDP can be done *over and over again* until you feel your design is *perfect*! Try it out this week. Once you finish your initial design, ask, learn, imagine, model, create, and test it all over again to see how much better your design becomes.

Engineers use a process like the one below to solve problems and create inventions that help make the world around us better.

IMPROVE
- What could work better?
- Ask, Learn, Imagine, Model, Create and Test again!

ASK
- What is the problem?
- What are the constraints?
- Who will be impacted?
- What do they need?

TEST
- Plan a fair test.
- Carry out a fair test.
- Record your results.

LEARN
- What background knowledge is needed?
- How have other people solved the problem?

CREATE
- Use your diagram & materials to create your prototype!
- Create more than one solution!

IMAGINE
- What are ways of solving the problem?
- Think of several solutions.

MODEL IT
- Draw a sketch or a diagram.
- List materials you might use.

ASK

What Is Aerospace Engineering?

Aerospace engineering is the field of engineering concerned with the development of aircraft and spacecraft. It has two major and overlapping branches: aeronautical engineering and astronautical engineering.

What Is an Aerospace Engineer?

- Aeronautical or aerospace engineers are responsible for the research, design, and production of aircraft, spacecraft, aerospace equipment, satellites, and missiles.
- Aerospace engineers work with aircraft. They are involved primarily in designing aircraft and propulsion systems and in studying the aerodynamic performance of aircraft and construction materials.
- Aspiring engineers develop their skills during the four years it takes to earn a bachelor's degree.
- Preparation can begin in high school, with courses in physics, chemistry, and advanced mathematics, such as trigonometry and calculus.

Aisha Bowe creates software solutions for government and corporations. Also, she works hard to close the achievement gap within communities of color.

Focus: Aerospace Engineering

KWL Chart

DIRECTIONS: KWL charts are meant to help organize your thoughts. Use the following chart to write down what you ALREADY KNOW about drones, aeronautical engineering, etc., as well as what you WANT TO KNOW. Then come back and fill in the last column with what you've LEARNED at the end of each day.

What you KNOW about drones, aerospace engineering, etc.	**What you WANT TO KNOW** about drones, aerospace engineering, etc.	**What you've LEARNED** about drones, aerospace engineering, etc.

LEARN

3rd Grade Vocabulary List

Accelerometer
A sensor used for measuring changes in acceleration. Useful to see if a device is in motion.

Flight Path
The path of a drone through the air, viewed from the side

Fuselage
The central body of an aircraft where propellers, motors and stabilizers are attached

Gravity
The force that pulls objects toward each other; the force that opposes
the lift force

Lift
The upward force created by the propeller of an aircraft due to a greater air pressure below than above

Motor
A machine that supplies power for a vehicle or for some other device with moving parts

Receiver
A device that receives electrical signals or messages

Thrust
The force of pushing or propelling

Transmitter
A device used to generate and transmit electromagnetic waves carrying messages or signals
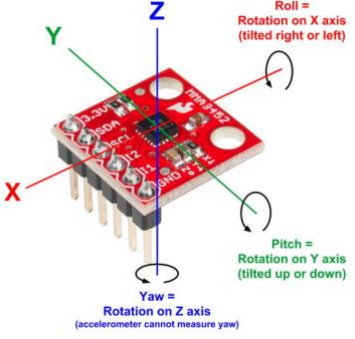
Propeller
A device that provides lift for the aircraft by spinning and creating an airflow.
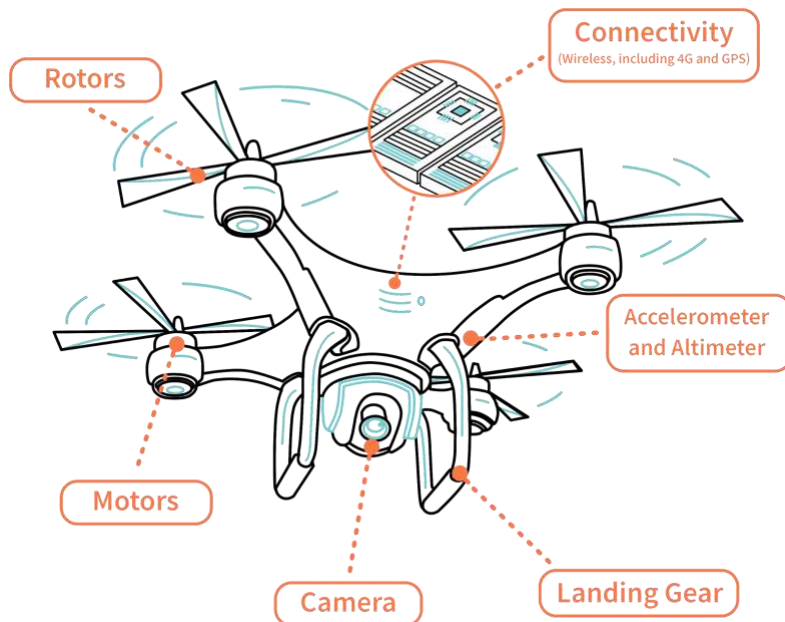
3rd Grade Fill-in-the-Blank Worksheet

DIRECTIONS: Using your vocabulary knowledge, fill in any blank squares in the following table. In the first column, place the vocabulary word, and the second column is for the definitions. In the last column, draw a picture that best represents what the vocabulary word means to you.

Vocabulary Term	Definition	Image
	A device used to generate and transmit electromagnetic waves carrying messages or signals	
	A sensor used for measuring changes in acceleration; useful to see if a device is in motion.	
Fuselage		

Lift	The upward force created by the wing of an aircraft due to a greater air pressure below the wing than above it	
Thrust		
	The path of a drone through the air	
	A machine that supplies power for a vehicle or for some other device with moving parts	
Receiver		
	A device that provides lift for the aircraft by spinning and creating an airflow.	

3rd Grade Vocabulary Match Worksheet

DIRECTIONS: Using your vocabulary knowledge, match the vocabulary word with the correct description.

Definition	Term
1 ____ A device that provides lift for the aircraft by spinning and creating an airflow	A. Thrust
2 ____ A sensor used for measuring changes in acceleration; useful to see if a device is in motion	B. Lift
3 ____ The central body of an aircraft where wings and stabilizers are attached	C. Motor
4 ____ The force of pushing or propelling	D. Gravity
5 ____ The force that pulls objects toward each other; the force that opposes the lift force	E. Propeller
6 ____ The upward force created by the wing of an aircraft due to a greater air pressure below the wing than above it	F. Accelerometer
7____ A machine that supplies power for a vehicle or for some other device with moving parts	G. Flight Path
8____ A device that receives electrical signals or messages	H. Fuselage
9____ The path of a drone through the air, viewed from the side	I. Transmitter
10____ A device used to generate and transmit electromagnetic waves carrying messages or signals	J. Receiver

Cultural Connection

Directions: The amazing contributions of Black and Brown people throughout history have helped shape the modern, high-tech world as we know it. Read below to learn more about these amazing leaders.

Bessie Coleman
Bessie Coleman was the first Black woman to earn a pilot's license. Because flying schools in the United States denied her entry, she taught herself French and moved to France, earning her license from France's well-known Caudron Brother's School of Aviation in just seven months. Coleman specialized in stunt flying and parachuting, earning a living barnstorming and performing aerial tricks. To this day, she remains a pioneer of women in the field of aviation.

"I decided Blacks should not have to experience the difficulties I had faced, so I decided to open a flying school and teach other Black women to fly." — Bessie Coleman

C. Alfred ("Chief") Anderson
A Philadelphia native, C. Alfred Anderson was one of the most talented Black aviators of the 1930s. He taught himself how to fly and earned his pilot's license in 1929 at the age of 22. In 1933, he teamed up with Albert E. Forsythe, a physician from Atlantic City, New Jersey, and the two became the first African Americans to fly across the United States. With Anderson's skills as a pilot and Forsythe's financial backing, they made a name for themselves flying long-distance flights. Their "Goodwill Flight" of 1934 was even more ambitious: an aerial trek from the United States to the Caribbean and South America.

Known as the "Father of Black Aviation," because of his training and mentoring of hundreds of African-American pilots

Bernard A. Harris Jr.
In 1995, Bernard Harris became the first African American to walk in space, during the STS-63 Discovery mission. During this 10-day mission, he served as the payload commander. He was elected by NASA to be an astronaut in 1990.

The first African American to walk in space

Guion ("Guy") Bluford, Ph.D.

Guion ("Guy") Bluford was born in Philadelphia, Pennsylvania, on Nov. 22, 1942. He began his career as a pilot in the U.S. Air Force, flying 140 missions during the Vietnam war before becoming a NASA astronaut in 1979. In 1983, Dr. Bluford became the first African American to travel in space, as a mission specialist aboard the space shuttle Challenger. He later participated in three other space missions.

"I felt an awesome responsibility, and I took the responsibility very seriously, of being a role model and opening another door to Black Americans, but the important thing is not that I am Black but that I did a good job as a scientist and an astronaut. There will be Black astronauts flying in later missions…and they, too, will be people who excel, not simply who are Black...who can ably represent their people, their communities, their country." — Dr. Guy Bluford

Mae C. Jemison, M.D.

Mae Jemison was the first African-American woman in space. She served as mission specialist on STS-47 Endeavor in 1992. Astronauts on this cooperative mission between the United States and Japan conducted experiments in life science and materials processing. Dr. Jemison was selected as an astronaut candidate by NASA in June 1987.

"Never limit yourself because of others' limited imagination; never limit others because of your own limited imagination." — Mae C. Jemison

Frederick D. Gregory

Col. Frederick D. Gregory became the first Black person to pilot a space shuttle when he led the Challenger on a seven-day mission in 1985. As an astronaut, he has spent more than 455 hours in outer space and commanded three major space missions from 1985 to 1991. Col. Gregory was a decorated helicopter pilot during the Vietnam War and was a jet test pilot before working with NASA. From 2002 to 2005, Gregory held the second-highest administration position, deputy administrator, with NASA.

The first Black space shuttle pilot

Review Questions:

Where did Bessie Coleman learn to fly?

_____

_____

_____

Who was the first African American to walk in space?

_____

_____

_____

Who was the first Black space shuttle pilot?

_____

_____

_____

Name the first African-American woman in space.

_____

_____

_____

Name a Black pilot who taught himself to fly at the age of 22.

_____

_____

_____

3rd Grade Math Worksheet #1 – Identifying Irregular Shapes

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Identify the type of shape shown.

1)

2)

3)

4)

5)

6)
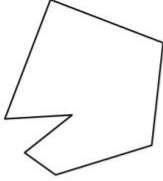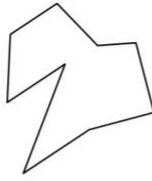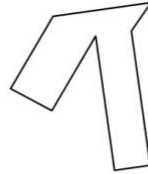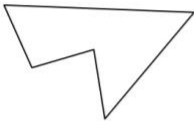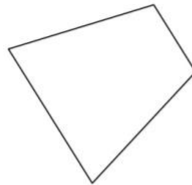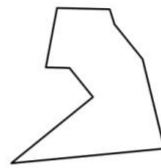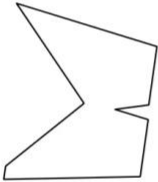
7)
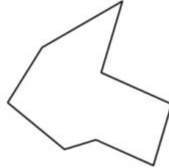
8)
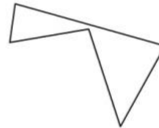
9)
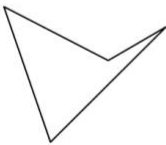
10)
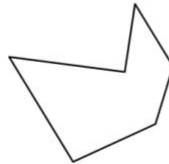
11)
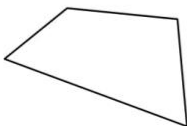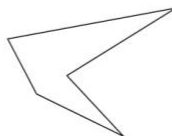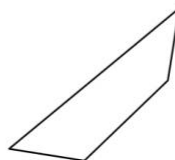
12)

13)

14)

15)

3rd Grade Math Worksheet #2 – Estimating Products

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Determine which choice best answers each question.

1) A teacher had 39 students in her classes. If each student completed 73 problems which expression shows about how many problems she'd have to grade?

A. 40×80 B. 30×70 C. 30×80 D. 40×70

2) George had 32 music albums on his computer. If each album was 35 minutes long, which expression shows about how many minutes of music he had?

A. 40×30 B. 40×40 C. 30×30 D. 30×40

3) A zoo used 12 pounds of food each day. Which expression shows the amount of food they'd have used after 36 days?

A. 20×30 B. 10×30 C. 20×40 D. 10×40

4) Larry's Lawn Care charges 79 bucks to mow a customer's lawn for a year. If they have 37 customers which expression shows about how much money they'll make?

A. 70×30 B. 80×30 C. 80×40 D. 70×40

5) Nancy was reading through her favorite book series. Each week she read 51 pages. Which expression shows about how many pages she would have read through after 12 weeks?

A. 60×10 B. 50×10 C. 50×20 D. 60×20

6) A delivery company gave each of their 26 trucks 49 boxes each. Which expression shows about how many total boxes they had?

A. 30×40 B. 30×50 C. 20×40 D. 20×50

7) An orchard owner was counting the number of apples he had. Each of their 27 trees had 54 apples in it. Which expression shows how many apples they had total?

A. 20×50 B. 30×60 C. 30×50 D. 20×60

8) An industrial machine can make 24 shirts every minute. Which expression shows about how many shirts would it have made in 45 minutes?

A. 30×40 B. 20×50 C. 20×40 D. 30×50

9) Will's school was collecting cans for recycling. They had 47 bags with 56 cans inside each bag. Which expression show about how many cans they collected?

A. 40×50 B. 50×50 C. 50×60 D. 40×60

10) Billy was drawing on scrap paper. He could fit 97 drawings on each page. If he has 62 pieces of paper, which expression shows about how many drawings he could make?

A. 90×60 B. 100×70 C. 90×70 D. 100×60
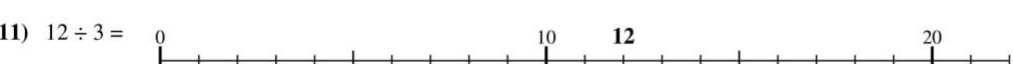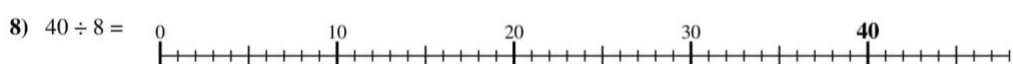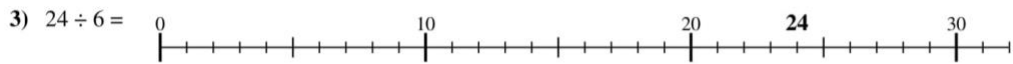
Answers

1. _____
2. _____
3. _____
4. _____
5. _____
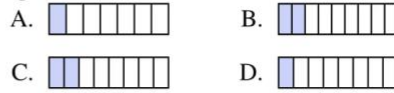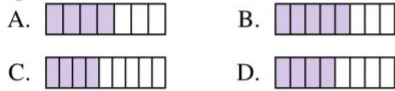6. _____
7. _____
8. _____
9. _____
10. _____

3rd Grade Math Worksheet #3 – Dividing With a Number Line

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Use the numberline to solve each problem.

Answers

1) $10 \div 5 =$

2) $4 \div 2 =$

3) $24 \div 6 =$

4) $16 \div 8 =$

5) $45 \div 9 =$

6) $15 \div 3 =$

7) $12 \div 4 =$

8) $40 \div 8 =$

9) $9 \div 3 =$

10) $20 \div 5 =$

11) $12 \div 3 =$

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

3rd Grade Math Worksheet #4 – Visually Determining Fractions

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Determine which choice best answers each question.

Answers

1) Which of the shapes below is shaded to represent 6/10?

A. B.

C. D.

2) Which of the shapes below is shaded to represent 2/8?

A. B.

C. D.

3) Which of the shapes below is shaded to represent 4/8?

A. B.

C. D.

4) Which of the shapes below is shaded to represent 3/7?

A. B.

C. D.

5) Which of the shapes below is shaded to represent 7/10?

A. B.

C. D.

6) Which of the shapes below is shaded to represent 5/10?

A. B.

C. D.

7) Which of the shapes below is shaded to represent 2/7?

A. B.

C. D.

8) Which of the shapes below is shaded to represent 5/8?

A. B.

C. D.

9) Which of the shapes below is shaded to represent 2/10?

A. B. C. D.

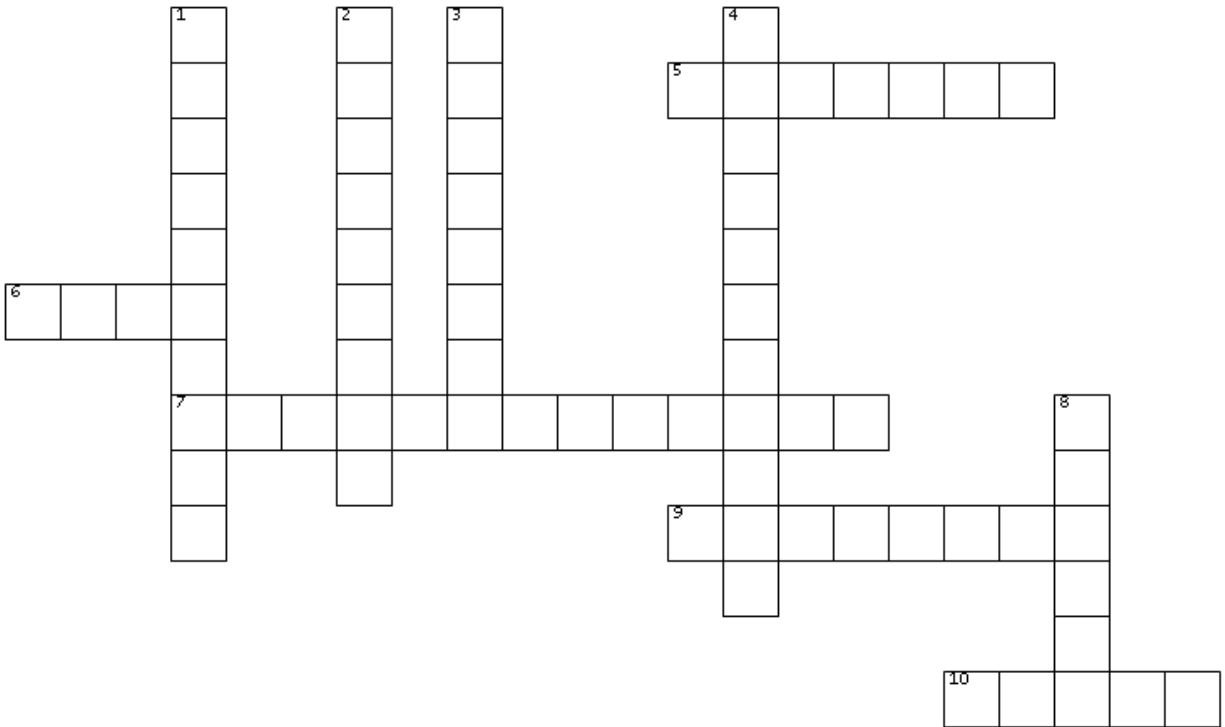10) Which of the shapes below is shaded to represent 5/7?

A. B. C. D.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

3rd Grade Crossword

Directions: Use the definitions at the bottom of the page to fill in the crossword puzzle.

ACROSS

5. The force that pulls objects toward each other; the force that opposes the lift force
6. The upward force created by the propeller of an aircraft due to a greater air pressure below than above
7. A sensor used for measuring changes in acceleration; useful to see if a device is in motion
9. A device that receives electrical signals or messages
10. A machine that supplies power for a vehicle or for some other device with moving parts

DOWN

1. The path of a drone through the air, viewed from the side
2. A device that provides lift for the aircraft by spinning and creating an airflow
3. The central body of an aircraft where propellers, motors, and stabilizers are attached
4. A device used to generate and transmit electromagnetic waves carrying messages or signals
8. The force of pushing or propelling

3rd Grade Word Search

DIRECTIONS: Search through the scramble below to locate all the words in the word bank at the bottom of the page.

```
J  P  K  X  C  S  X  F  X  F  K  W  I  V  I  B  G  M  A  F
B  P  Y  I  V  Q  U  D  C  A  C  P  D  W  C  V  H  Y  S  Y
X  M  H  J  A  Q  S  J  W  I  Y  L  F  J  J  T  G  T  Z  R
H  B  V  I  E  P  P  W  Z  M  N  J  G  T  A  L  J  I  I  D
V  S  K  J  F  B  H  W  A  W  B  A  I  P  Y  C  M  V  O  M
L  O  G  I  J  Q  L  G  E  T  E  W  T  H  I  Q  Q  A  F  F
D  V  K  L  C  E  S  U  L  G  N  H  T  M  N  U  Q  R  U  Y
B  S  D  D  X  V  G  O  I  W  G  S  M  O  J  V  M  G  Q  O
E  B  J  J  J  R  Y  A  W  I  A  Q  Q  T  Q  L  A  P  P  C
R  E  T  E  M  O  R  E  L  E  C  C  A  O  A  G  T  D  B  N
S  J  O  U  A  A  G  F  Q  E  H  L  F  R  U  R  D  W  S  F
R  R  U  K  R  E  T  T  I  M  S  N  A  R  T  N  V  H  H  Q
F  E  J  C  B  M  K  B  L  R  E  U  T  G  D  Q  V  S  K  M
V  B  L  Z  I  A  A  E  R  M  J  H  F  A  P  H  B  C  V  V
L  S  Y  L  D  A  I  E  Z  C  R  R  R  L  Q  L  K  M  V
D  R  E  C  E  I  V  E  R  U  Y  F  Z  V  K  S  D  M  E  I
N  Q  U  P  O  P  J  M  S  Q  J  F  L  P  Z  Y  O  N  D  M
U  Y  K  W  G  J  O  T  R  C  M  N  A  I  F  L  R  N  B  V
H  Z  I  L  T  Z  U  R  J  F  Y  X  H  N  F  K  Y  R  A  Z
Z  Y  P  E  D  X  G  E  P  Q  F  O  N  K  R  T  F  A  A  M
```

Accelerometer	**FlightPath**	**Fuselage**
Gravity	**Lift**	**Motor**
Propeller	**Receiver**	**Thrust**
Transmitter		

Drone Pilot Training Course

DIRECTIONS: Now that we've learned about drones and aerospace engineering, we'll learn how to properly fly our drones. First we'll need to get acquainted with the parts of the drone and learn how to put the device together.

PLEASE WATCH THIS FLIGHT INSTRUCTION VIDEO BEFORE FLYING YOUR DRONE.

Click here to access a DIGITAL VERSION of the UFO3000 Drone User Manual.

Next, we need to get comfortable with the remote controls. First, look over the instruction booklet, and read **pages 1–9.** This exercise is meant to familiarize you with how the basic components of your drone operate. The lessons you learn now will help as you develop more advanced drone-flying skills for competition.

2-SPEED LED STUNT DRONE

Lesson 1: Pre-Flight Check and Calibration

Before any flight, it's important to go through a pre-flight checklist to ensure that you haven't missed anything. Part of the pre-flight checklist is ensuring that you have properly calibrated your drone. Follow the steps listed on **pages 10–12** of your User Manual to learn the proper way to check your drone pre-flight and calibrate it (trim adjustments) for a smooth and safe flight!

Lesson 2: Basic Drone Controls

If you want to fly your drone like a pro, you have to learn the controls. Review **pages 12–14** to learn how to fly your drone, perform tricks, and more…

BOX CONTENTS

DRONE

TRANSMITTER

PROPELLERS (4)

3.7v LITHIUM BATTERY (2)

USB CHARGER

Lesson 3: How to Safely Take Off and Land Your Drone
To fly, you have to get yourself off the ground. On **page 14**, you'll learn how to take off and land using the one-button press along with a few other flight modes.

Lesson 4: Flying the Box
Flight practice time! Flying the Box is the drill that drone pilots practice daily! Check out this video for detailed instructions. Repetition of this flight pattern will help you master your drone and fly safely no matter what situation you find yourself in. If your drone isn't flying stably upon lift-off, try adjusting the trim as shown to the right. More troubleshooting is available on **page 16** of your User Manual.

Lesson 5: Post-Flight Check and Flight Logbook
After each flight, it's a good idea to give your drone a look over to ensure that it's still in the same condition it was when it took off. Crashes may cause your drone propellers to become loose or misaligned. Also, be sure to take notes in a drone flight logbook during your flights!

TRIM ADJUSTMENTS

If your drone drifts in an unwanted direction, try adjusting the trim as shown below.

FORWARD/BACKWARD TRIM

Adjust the FORWARD/BACKWARD TRIMMER backwards if the drone drifts forward when taking off, and adjust the FORWARD/BACKWARD TRIMMER forwards if drone drifts backwards. In Mode 1, the FORWARD/BACKWARD TRIMMER is on the left side.

LEFT/RIGHT TRIM

Adjust the LEFT/RIGHT FLYING TRIMMER to the right if the drone drifts to the left when taking off, and adjust the LEFT/RIGHT FLYING TRIMMER to the left if drone drifts to the right.
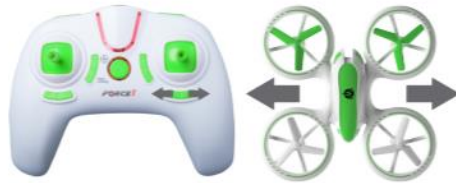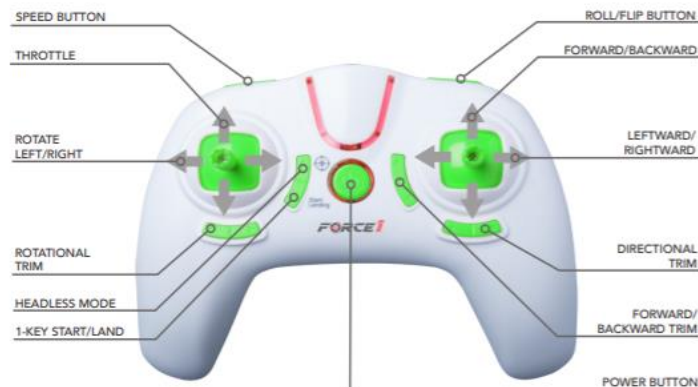
LEFT OR RIGHT ROTATION TRIM

Adjust the LEFT/RIGHT RUDDER TRIMMER to the right if the drone rotates to the left when taking off, and adjust the LEFT/RIGHT RUDDER TRIMMER to the left if drone rotates to the right.

TRANSMITTER OVERVIEW

SPEED BUTTON

THROTTLE

ROTATE LEFT/RIGHT

ROTATIONAL TRIM

HEADLESS MODE

1-KEY START/LAND

ROLL/FLIP BUTTON

FORWARD/BACKWARD

LEFTWARD/ RIGHTWARD

DIRECTIONAL TRIM

FORWARD/ BACKWARD TRIM

POWER BUTTON

FORCE1

IMAGINE

Begin to Plan for the Week's Challenges

DIRECTIONS: Use your time now to imagine the ideas you have for this week's challenges: **Emergency Supply, Obstacle Course, and the Creative Use Contest**. Remember to use whatever extra materials you have available, and check with your parent or guardian before working on your projects!

Challenge #1: Emergency Supply Delivery
Description: In emergency situations, drones can quickly deliver life-saving supplies to people in need. Your challenge is to design and navigate a drone course that has *at least* three landing pads or "drop-off locations." Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

Challenge #2: Obstacle Course Race
Description: Drones are well-known for their speed and agility. In this challenge, you'll design and race through your very own obstacle course. Heads up: drone courses typically include a starting line, landing pads, gates, and finish line. Learn more about these items below! Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

Challenge #3: Creative Use/Trick Contest
Description: Use the drone to perform a special/creative task or a trick move. The possibilities here are limitless. Feel free to do research online or elsewhere to see what others are doing. Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

To build a fun drone course, you need to take many different things into consideration, including the space and obstacles you will be using. For a drone race, a few things are necessary: landing pads, gates, and a finish line!

Landing Pads: Small, flat platforms that the drone can land and take off from

Gates: Either a hoop or two vertical poles that a drone must fly through to stay on course

Starting/Finish Line: Marks the beginning and end of the course

Questions

Are there any items you already have that you can use as a landing pad, gate, or finish line, (e.g., cardboard or other recycled materials?

_____

_____

_____

_____
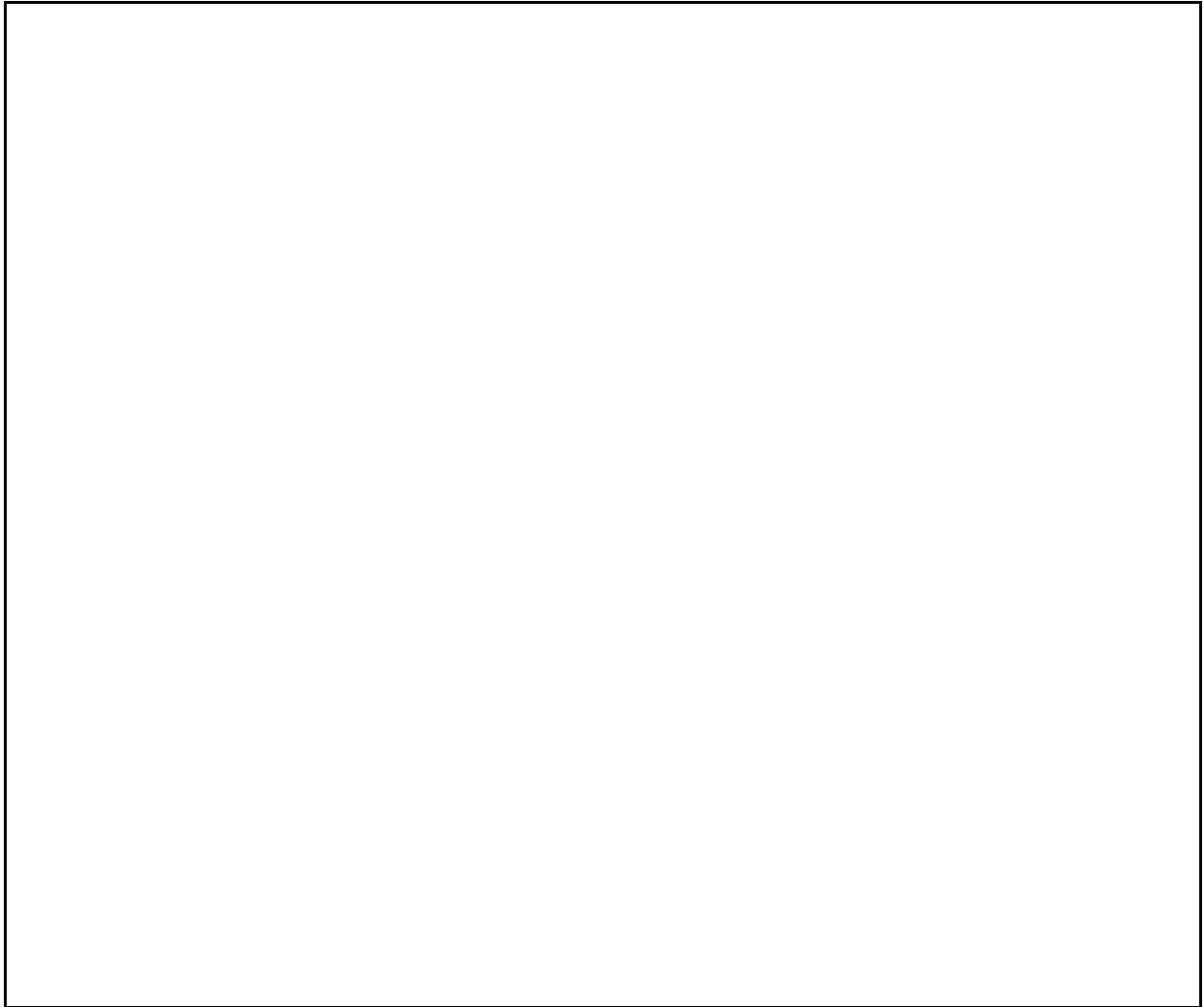
Where did you decide to place your drone obstacle course? Did you get your parents' approval? Tip: Large open spaces are BEST for drone flying, SEEK does NOT recommend that students or parents fly drones inside. When planning to fly your drone outside, you may need to wait for suitable conditions. Wind and other other factors may affect your flying!

_____

_____

_____

_____

Which challenge(s) do you think will be the most fun? Which do you think will be the hardest?

_____

_____

_____

_____

MODEL

Sketches

DIRECTIONS: Use the following space to sketch out your ideas or designs for the drone courses. Be sure to also create a material list for any items you'll need. TIP: use recycled materials you have around the house. Remember to use what you have available, and check with your parent or guardian before starting to build!

What special or unique elements did you include in your design(s)?

Extra Sketching Space:

Using your sketches, create a material list including all the items you'll need to complete your build.

Which feature(s) do you think will be the most fun? Which features do you think will be the hardest?

CREATE

Begin to Build

DIRECTIONS: Using the designs and material list from the IMAGINE and MODEL sections, you will now build the pieces necessary for your obstacle courses and complete any designs for the Creative Use Contest.

OBSERVATIONS:
How many different obstacle courses did you create? How many ideas for the Creative Use Contest did you think of?

_____

_____

_____

Which creative use do you think works best for your purpose? Why?

_____

_____

_____

Which course do you think works best for your purpose? Why?

_____

_____

_____

Do you have any tips to share?

_____

_____

TEST

DIRECTIONS: It's finally time to TEST! Use the following tables to keep track of your accomplishments. This will help you find out what's working well and what can be improved. Be sure to add any notes or tips for getting the best trial!

Challenge #1: Emergency Supply Delivery

Description: In emergency situations, drones can quickly deliver life-saving supplies to people in need. Your challenge is to design and navigate a drone course that has *at least* three landing pads or "drop-off locations." Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

Trial	Number of Landing Pads *(Try at least three.)*	Time
1		
2		
3		

How did the drone perform?

_____

_____

_____

Which setup do you think works best for you? Why?

_____

_____

Do you have any tips to remember for next time?

_____

_____

Challenge #2: Obstacle Course Race

Description: Drones are well-known for their speed and agility. In this challenge, you'll design and race through your very own obstacle course. Heads up: drone courses typically include a starting line, landing pads, gates, and finish line. Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

Trial	Time
1	
2	
3	

How did the drone perform? Were you inside or outside?

_____

_____

_____

Which obstacle course do you think works best for your purpose? Why?

_____

_____

Do you have any tips to remember for next time?

_____

_____

_____

_____

Challenge #3: Creative Use/Trick Contest

Description: Use the drone to perform a special/creative task or a trick move. The possibilities here are limitless. Feel free to do research online or elsewhere to see what others are doing. Check with your parents/guardian before flying your drone. **Be sure to record, and submit your best trial!**

Special Task/ Creative Use Title	Description
1	
2	
3	

How did the drone perform?

_____

_____

_____

Which configuration do you think works best for your purpose? Why?

_____

_____

Do you have any tips to remember for next time?

_____

_____

_____

IMPROVE

DIRECTIONS: Congrats, you've made it to the seventh step of SEEK's Engineering Design Process! You've just finished CREATING your design and TESTING it, so now it's time to IMPROVE! You'll be asking yourself questions about the performance of your design to see how you can make it better. This step is special, because even though it's the last step of the EDP, we can begin the cycle all over! Feel free to repeat the SEEK Engineering Design Process until you're happy with your design.

Did your design work perfectly? Why or why not?

_____

_____

_____

Now that you've tried to complete the challenges, which challenges were fun/easy? What parts were harder?

_____

_____

_____

If you could redo the challenges, is there anything you would change or study more to make it better/easier?

_____

_____

_____

Do you have any tips to share?

_____

_____

_____

Submit Your Showcase Challenge Videos

Directions: Now it's time to submit your Showcase Challenge videos. The purpose of the challenges is to encourage you to try something new and "think outside of the box." Use your video submissions to express your *creativity*, and talk about the *WHYs* behind your project. Be sure to share with the judges and sponsors everything you learned the past week. They are super excited to hear from you!

Additional Presentation Tips:
- You should explain how your design connects to competition themes or the real world.
- Describe how and why you developed your design. Explain why your design is fun, useful, and unique/special. The judges watch lots of videos. What makes yours different?
- Students should demonstrate in-depth understanding by using **vocabulary words and describing the science and engineering concepts** behind this week's challenge.

[CLICK HERE TO SUBMIT YOUR FINAL DESIGNS!!](#)

Math Worksheet Answer Keys

3rd Grade Math Answer Keys
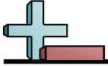
Identifying Irregular Shapes   Name: **Answer Key**

Identify the type of shape shown.

A n s w e r s

1)

2)

3)
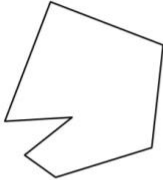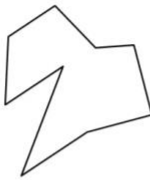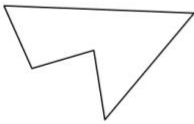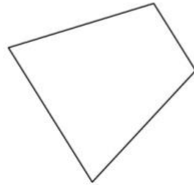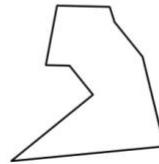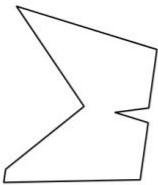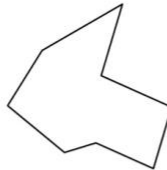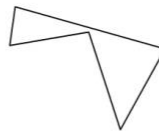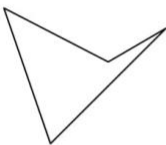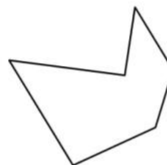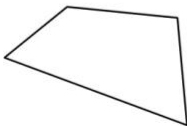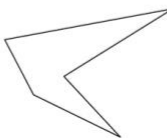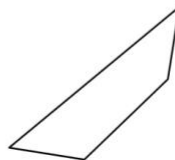
1. **heptagon**

2. **nonagon**

3. **octagon**

4. **pentagon**

4)

5)

6)

5. **quadrilateral**

6. **nonagon**

7. **nonagon**

8. **octagon**

7)

8)

9)

9. **pentagon**

10. **quadrilateral**

11. **hexagon**

12. **quadrilateral**

10)

11)

12)

13. **quadrilateral**

14. **pentagon**

15. **quadrilateral**

13)

14)

15)
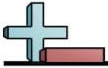
Use the numberline to solve each problem.

1) $10 \div 5 =$

2) $4 \div 2 =$
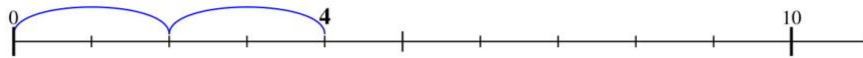
3) $24 \div 6 =$

4) $16 \div 8 =$

5) $45 \div 9 =$
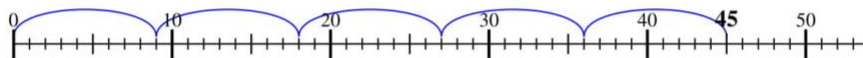
6) $15 \div 3 =$
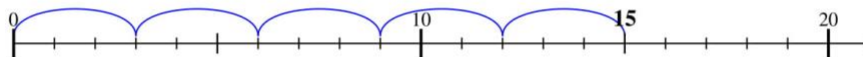
7) $12 \div 4 =$
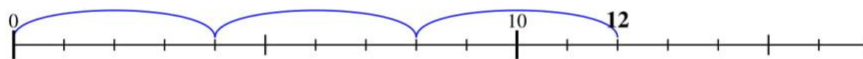
8) $40 \div 8 =$
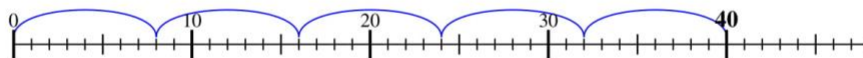
9) $9 \div 3 =$
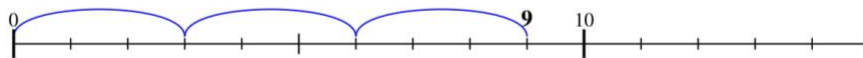
10) $20 \div 5 =$
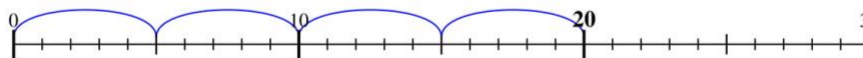
11) $12 \div 3 =$
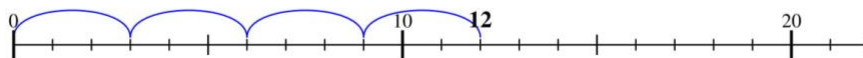
Answers

1. **2**
2. **2**
3. **4**
4. **2**
5. **5**
6. **5**
7. **3**
8. **5**
9. **3**
10. **4**
11. **4**

1-10	91	82	73	64	55	45	36	27	18	9
11	0									

Estimating Products

Name:

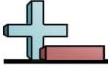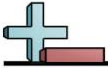**Determine which choice best answers each question.**

1) A teacher had 39 students in her classes. If each student completed 73 problems which expression shows about how many problems she'd have to grade?
   A. 40×80 B. 30×70 C. 30×80 D. 40×70

2) George had 32 music albums on his computer. If each album was 35 minutes long, which expression shows about how many minutes of music he had?
   A. 40×30 B. 40×40 C. 30×30 D. 30×40

3) A zoo used 12 pounds of food each day. Which expression shows the amount of food they'd have used after 36 days?
   A. 20×30 B. 10×30 C. 20×40 D. 10×40

4) Larry's Lawn Care charges 79 bucks to mow a customer's lawn for a year. If they have 37 customers which expression shows about how much money they'll make?
   A. 70×30 B. 80×30 C. 80×40 D. 70×40

5) Nancy was reading through her favorite book series. Each week she read 51 pages. Which expression shows about how many pages she would have read through after 12 weeks?
   A. 60×10 B. 50×10 C. 50×20 D. 60×20

6) A delivery company gave each of their 26 trucks 49 boxes each. Which expression shows about how many total boxes they had?
   A. 30×40 B. 30×50 C. 20×40 D. 20×50

7) An orchard owner was counting the number of apples he had. Each of their 27 trees had 54 apples in it. Which expression shows how many apples they had total?
   A. 20×50 B. 30×60 C. 30×50 D. 20×60

8) An industrial machine can make 24 shirts every minute. Which expression shows about how many shirts would it have made in 45 minutes?
   A. 30×40 B. 20×50 C. 20×40 D. 30×50

9) Will's school was collecting cans for recycling. They had 47 bags with 56 cans inside each bag. Which expression show about how many cans they collected?
   A. 40×50 B. 50×50 C. 50×60 D. 40×60

10) Billy was drawing on scrap paper. He could fit 97 drawings on each page. If he has 62 pieces of paper, which expression shows about how many drawings he could make?
    A. 90×60 B. 100×70 C. 90×70 D. 100×60

1. **D**
2. **D**
3. **D**
4. **C**
5. **B**
6. **B**
7. **C**
8. **B**
9. **C**
10. **D**

1-10	90	80	70	60	50	40	30	20	10	0

Name: **Answer Key**

Determine which choice best answers each question.

1) Which of the shapes below is shaded to represent 6/10?

A. 　　B.

C. 　　D.

2) Which of the shapes below is shaded to represent 2/8?

A. 　　B.

C. 　　D.

3) Which of the shapes below is shaded to represent 4/8?

A. 　　B.

C. 　　D.

4) Which of the shapes below is shaded to represent 3/7?

A. 　　B.

C. 　　D.

5) Which of the shapes below is shaded to represent 7/10?

A.　　B.

C.　　D.

6) Which of the shapes below is shaded to represent 5/10?

A.　　B.

C.　　D.

7) Which of the shapes below is shaded to represent 2/7?

A.　　B.

C.　　D.

8) Which of the shapes below is shaded to represent 5/8?

A.　　B.

C.　　D.

9) Which of the shapes below is shaded to represent 2/10?

A.　B.　C.　D.

10) Which of the shapes below is shaded to represent 5/7?

A.　B.　C.　D.
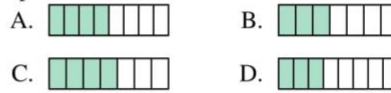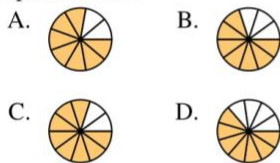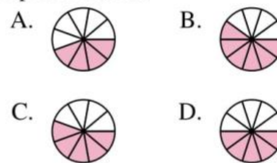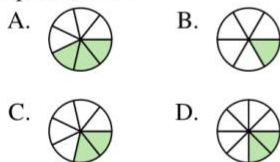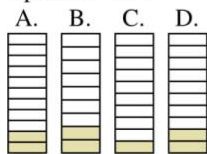
Answers

1. **D**

2. **C**

3. **D**

4. **B**

5. **B**

6. **D**

7. **C**

8. **C**

9. **D**

10. **C**

1-10 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0

THANK YOU
TO OUR
WEEK 2 SPONSORS

Welcome: Week 2

Dear Young Engineers,

Self-driving (autonomous) electric vehicles are the next big thing in tech! American car companies are trying to make the transition, but they need YOUR help. The American car industry has asked SEEK students to design several different types of autonomous vehicles that can navigate through different environments and accomplish tasks (such as saving people during emergencies). For this challenge, SEEK students will be using the mBot robotics kit to learn the fundamentals of mechanical engineering and autonomous vehicles, while solving real-life problems.

To ensure that SEEK students develop awesome, high-performing robots, the following challenges have been designed to highlight different aspects of the curriculum. The challenges are as follows:

Challenge #1: Delivery Route

Program your robot to transport objects from one location to another.

Challenge #2: Obstacle Course Race

Design your very own obstacle course, and program your autonomous robot to race through it.

Challenge #3: Creative Use/Trick Contest

Use the robot to perform a special/creative task or a trick move, and explain why it's helpful.
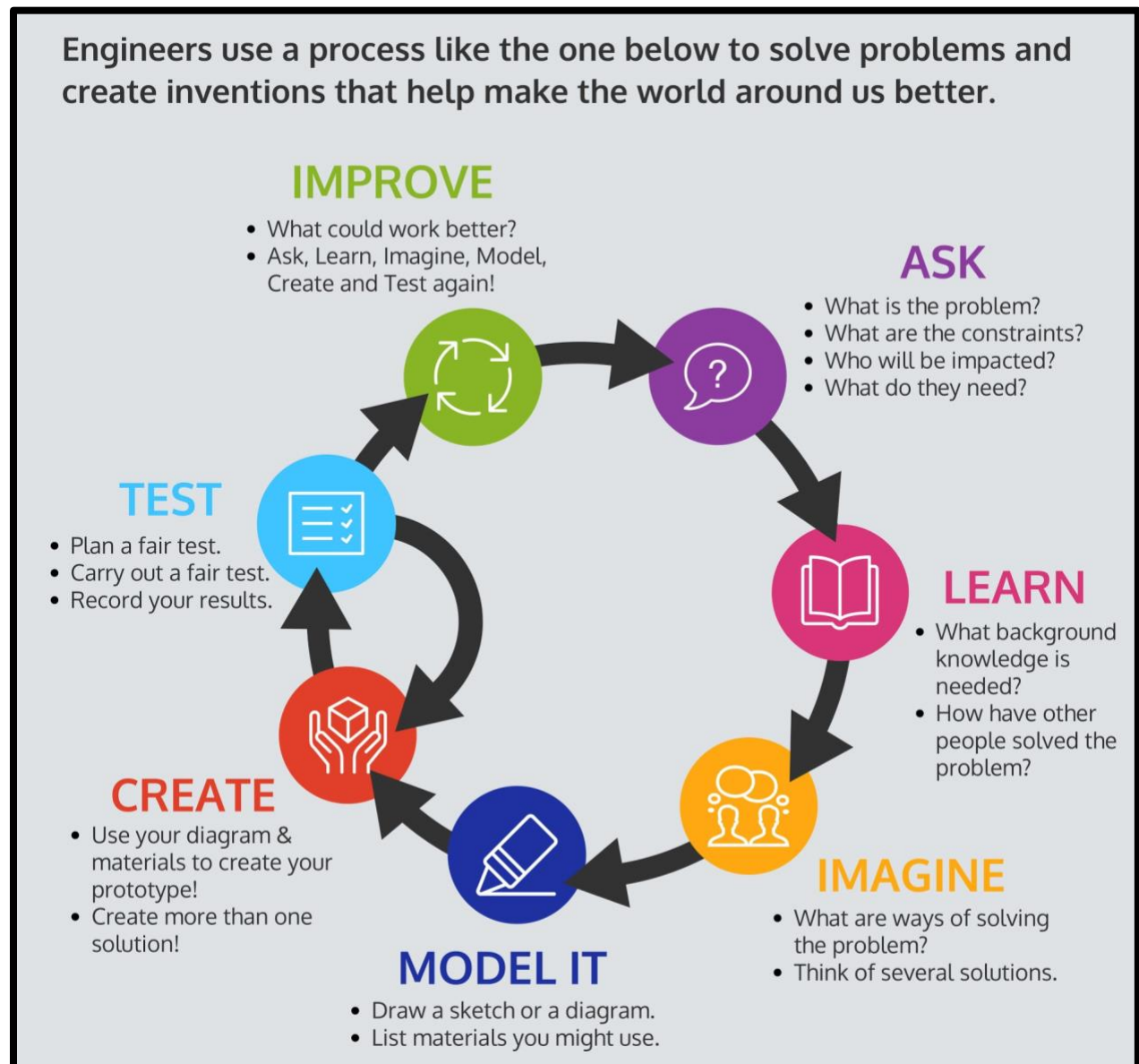
On behalf of the National Society of Black Engineers, we wish you the best of luck!

Sincerely,

The SEEK Team

The SEEK Engineering Design Process

DIRECTIONS: We'll be using the SEEK Engineering Design Process to explore our projects this week. The Engineering Design Process, or EDP, is a set of steps that engineers use to solve problems and create solutions to challenges. The steps follow the order: **ASK, LEARN, IMAGINE, MODEL, CREATE, TEST, AND IMPROVE.** Notice how the steps go around in a circle (below)? The EDP can be done *over and over again* until you feel your design is *perfect*! Try it out this week. Once you finish your initial design, ask, learn, imagine, model, create, and test it all over again to see how much better your design becomes.

Engineers use a process like the one below to solve problems and create inventions that help make the world around us better.

IMPROVE
- What could work better?
- Ask, Learn, Imagine, Model, Create and Test again!

ASK
- What is the problem?
- What are the constraints?
- Who will be impacted?
- What do they need?

LEARN
- What background knowledge is needed?
- How have other people solved the problem?

IMAGINE
- What are ways of solving the problem?
- Think of several solutions.

MODEL IT
- Draw a sketch or a diagram.
- List materials you might use.

CREATE
- Use your diagram & materials to create your prototype!
- Create more than one solution!

TEST
- Plan a fair test.
- Carry out a fair test.
- Record your results.

ASK

What Is Mechanical Engineering?

Mechanical engineering is one of the broadest engineering disciplines. Mechanical engineers design, develop, build, and test. They deal with anything that moves, from components to machines to the human body.
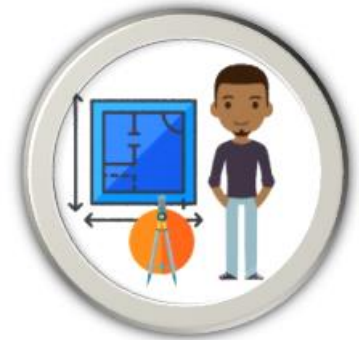
What is an autonomous car?
An autonomous car is capable of sensing its environment and operating without humans involved. An autonomous car can go anywhere a traditional car goes and do everything that an experienced human driver does.

What Is a Mechanical Engineer?

Mechanical engineers play an important role in the automotive, aerospace, biotechnology, computer and electronics, automation, and manufacturing industries. They can design and manufacture everything from small parts to large machine tools such as drill presses. Examples of products that mechanical engineers can design and develop are engine parts; aircraft engines; prosthetic devices; disk drives; printers; sensors; wind turbines; fuel cells; compressors; robots; and machine tools!

Some of the Key Skills for Mechanical Engineers
- The ability to work under pressure
- Problem-solving skills
- Creativity
- Interpersonal skills
- Verbal and written communication skills
- Team-working skills

Dr. Aprille Ericsson-Jackson works on NASA missions to bring dust from space back to Earth.

Focus: Mechanical Engineering

KWL Chart

DIRECTIONS: KWL charts are meant to help organize your thoughts. Use the following chart to write down what you already know about robotics and mechanical engineering as well as what you WANT TO KNOW. Then come back and fill in the last column with what you've LEARNED at the end of each day.

What you KNOW about robotics and mechanical engineering	**What you WANT TO KNOW** about robotics and mechanical engineering	**What you've LEARNED** about robotics and mechanical engineering

LEARN

3rd Grade Vocabulary List

LED
A light-emitting diode

Force
A natural power or effect that can change the speed or direction of something

Motor
A machine that supplies power for a vehicle or for some other device with moving parts

Gear
A toothed wheel that can change the speed of an engine

Axle
A pin, bar, or shaft that a pair of wheels can rotate on

Frame
The basic structure and shape of an object

Wheel
A circular object that revolves on a straight rod, the axle, to make it move easily

Battery Holder
The part of the machine where the battery sits

Receiver
A device that receives electrical signals and waves
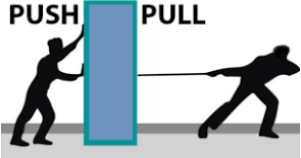
Sensor
A device that detects heat, light, sound, motion, etc., and then reacts to it in a particular way
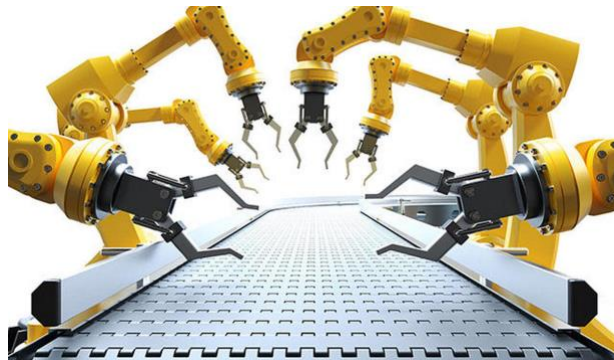
3rd Grade Fill-in-the-Blank Worksheet

DIRECTIONS: Using your vocabulary knowledge, fill in each blank square in the following table. In the image column, draw a picture that best represents what the vocabulary word means to you.

TERM	DEFINITION	PICTURE
	A light-emitting diode	
	The part of the machine where the battery sits	
Force		
	A circular object that revolves on a straight rod, the axle, to make it move easily	

Motor		
	A device that receives electrical signals and waves	
Frame		
	A toothed wheel that can change the speed of an engine	
Axle	A pin, bar, or shaft that a pair of wheels can rotate on	
Sensor		

3rd Grade Match Activity

DIRECTIONS: Match the vocabulary word with the correct description.

Definition	Term
1 ____ A light-emitting diode	A. Wheel
2 ____ The part of the machine where the battery sits	B. Gear
3 ____ A natural power or effect that is able to change the speed or direction of something	C. Sensor D. Axle E. LED
4 ____ A circular object that revolves on a straight rod, the axle, to make it move easily	F. Battery Holder G. Receiver
5 ____ A machine that supplies power for a vehicle or for some other device with moving parts	H. Force I. Frame
6 ____ A device that receives electrical signals and waves	J. Motor
7 ____ The basic structure and shape of an object	
8 ____ A toothed wheel that can change the speed of an engine	
9 ____ A pin, bar, or shaft that a pair of wheels can rotate on	
10 ____ A device that detects heat, light, sound, motion, etc., and then reacts to it in a particular way	

Cultural Connection

Directions: The amazing contributions from Black and Brown people throughout history and even today are helping shape the modern, high-tech world as we know it. Read more below to learn more about these amazing Black and Brown leaders.

Silas Adekunle
A Nigerian inventor and entrepreneur, known for creating the world's first intelligent gaming robot, has become the highest-paid robotics engineer in the world after signing a new deal with Apple Inc. in 2018.

The SpelBots
The goal of SpelBots, Spelman College's robotics team, was to encourage students and young women of African descent to explore robotics and computer science. The SpelBots, founded in 2004 by Andrew Williams, Ph.D., made history in 2005 as the first all-female, all African-American undergraduate team to qualify for and compete in the International RoboCup four-legged robot soccer competition. In another history-making moment, the SpelBots tied for first place in the RoboCup Japan 2009 Standard Platform League Nao League humanoid soccer championship.

Lonnie Johnson
Lonnie Johnson (born in 1949) used to build robots and cook up batches of rocket fuel in his kitchen when he was a boy. As an adult, he worked on NASA's Mars Observer project and on the mission to Saturn. Later in his life, Dr. Johnson used his training in astrophysics to invent fun tools and toys. He connected one of his inventions to the bathroom sink, which made a powerful stream of water squirt across the room. He called his invention the Power Drencher but later changed the name to Super Soaker!

Ayanna Howard, Ph.D.
Dr. Howard is the founder and chief technology officer of Zyrobotics, a company that uses machine learning and robots to make educational toys for kids, with a particular emphasis on helping those with special needs. Dr. Howard is dean of the College of Engineering at The Ohio State University, where she is also a professor of electrical and computer engineering and a professor of computer science and engineering. She holds three patents.

Did You Know...
Madam C.J. Walker had an electric vehicle? That's right, Electric vehicles are NOT a new thing. Madam C.J. Walker (America's first self-made female millionaire) was known to drive around in a Waverley automobile, one of the many EV brands at the time.

Review Questions:

What was the name of Spelman College's robotics team?

_____

_____

_____

Dr. Ayanna Howard is the chief technology officer of which robotics company?

_____

_____

_____

Who is the highest-paid robotics engineer?

_____

_____

_____
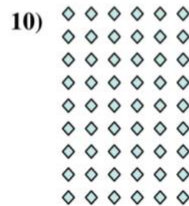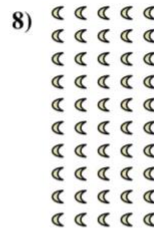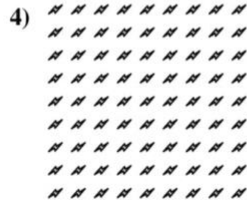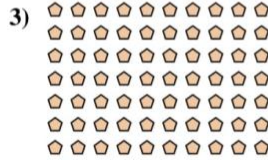
Name the African-American engineer who created the Super Soaker.

_____

_____

_____

What brand of electric vehicle did Madam C.J. Walker drive?

_____

_____

_____

3rd Grade Math Worksheet #1 – Rewriting Multiplication Problems

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Write each array as a multipication problem and solve.

Ex)

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

11)
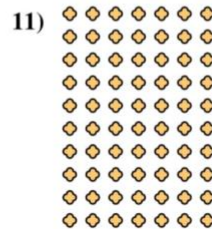
Answers

Ex. _____ 8 • 3 = 24 _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

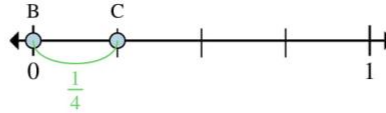8. _____

9. _____

10. _____

11. _____

3rd Grade Math Worksheet #2 – Fractions and Numberlines

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Solve each problem.

Ex) This numberline is divided into how many pieces?

Ex) What is the location of A (written as a fraction)?

Ex) On this numberline what is the value of 0 written as a fraction?

Ex) On this numberline from B to C is how far (written as a fraction)?

1a) This numberline is divided into how many pieces?

1b) What is the location of A (written as a fraction)?

2a) On this numberline what is the value of 0 written as a fraction?

2b) On this numberline from B to C is how far (written as a fraction)?
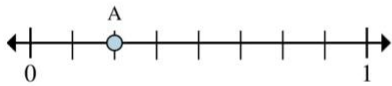
3a) This numberline is divided into how many pieces?

3b) What is the location of A (written as a fraction)?

4a) On this numberline what is the value of 1 written as a fraction?

4b) On this numberline from B to C is how far (written as a fraction)?

5a) This numberline is divided into how many pieces?

5b) What is the location of A (written as a fraction)?

6a) On this numberline what is the value of 1 written as a fraction?

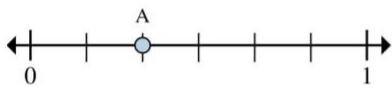**6b)** On this numberline from B to C is how far (written as a fraction)?
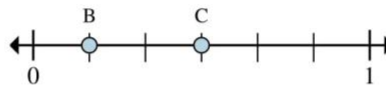
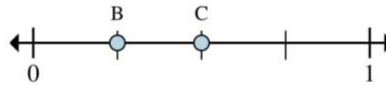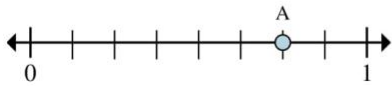## Answers

Ex. _____ 3 _____

Ex. _____ $2/3$ _____

Ex. _____ $0/4$ _____

Ex. _____ $1/4$ _____

1a. _____

1b. _____

2a. _____

2b. _____

3a. _____

3b. _____

4a. _____

4b. _____

5a. _____

5b. _____

6a. _____

6b. _____

3rd Grade Math Worksheet #3 – Matching Graphs

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Determine which graph (A, B or C) best represents the information in the table.

1)

Favorite Color	blue	green	orange	yellow	red
People	10,000	2,000	8,000	3,000	4,000

A

B

C

2)

Name	Adam	Bill	Cody	Dan	Ed
Points	10	45	30	40	25

A

B

C

3)

Name	Faye	Greg	Hannah	Jane	Kelly
States Lived In	5	8	9	10	2

A

B

C

4)

Sales	Jan	Feb	Mar	Apr	May
Month	1,500	2,500	5,000	4,500	3,500

A

B

C

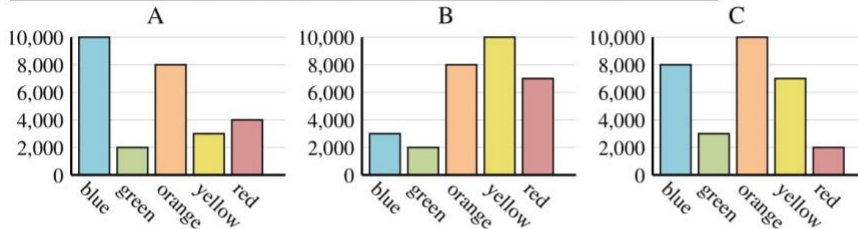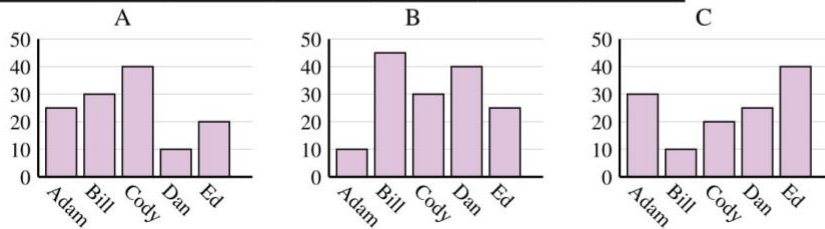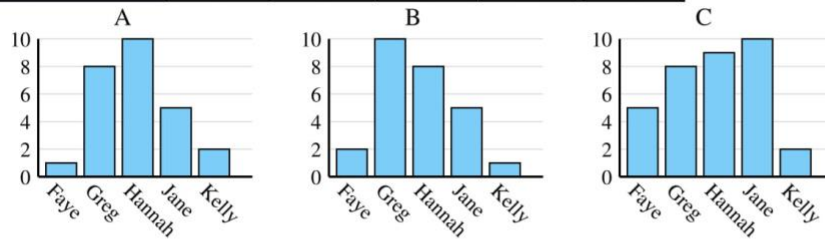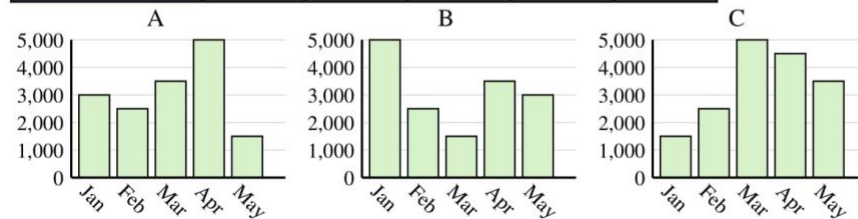1. _____

2. _____

3. _____

4. _____

3rd Grade Math Worksheet #4 – Determining 90° Angles

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Determine if the angle shown is 'less', 'more' or 'equal' to 90°.

Ex)

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

11)

12)

13)

14)

15)

16)

17)

18)

19)

20)

Answers

Ex. _____less_____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

Crossword – 3rd Grade

DIRECTIONS: Use the definitions at the bottom of the page to fill in the crossword puzzle.
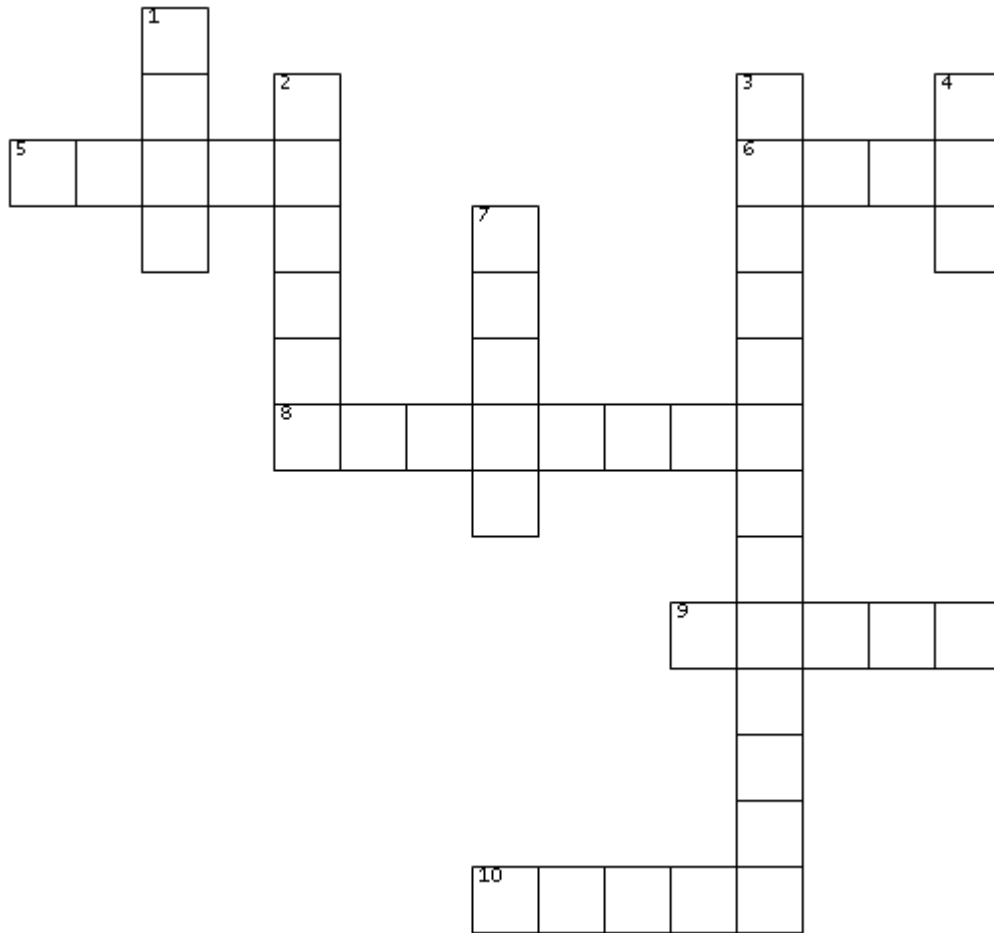
ACROSS

5. The basic structure and shape of an object

6. A pin, bar, or shaft that a pair of wheels can rotate on

8. A device that receives electrical signals and waves

9. A natural power or effect that is able to change the speed or direction of something

10. A machine that supplies power for a vehicle or for some other device with moving parts

DOWN

1. A toothed wheel that can change the speed of an engine

2. A device that detects heat, light, sound, motion, etc., and then reacts to it in a particular way

3. The part of the machine where the battery sits

4. A light-emitting diode

7. A circular object that revolves on a straight rod, the axle, to make it move easily

Word Search – 3rd Grade

DIRECTIONS: Search through the scramble below to locate all the words in the word bank at the bottom of the page.

```
R  B  Q  H  N  Y  I  Z  A  Z  Z  X  W  Q  R  H  E  E  Z  G
R  N  A  X  G  Q  R  Y  Q  M  X  P  W  Y  E  H  I  K  S  I
H  W  L  T  A  D  A  L  T  D  H  G  P  N  C  E  Z  R  H  E
T  T  Q  X  T  F  X  U  Z  B  D  I  T  G  E  U  L  D  A  S
Y  U  F  Q  D  E  Y  W  A  M  P  Z  R  M  I  G  D  C  E  S
A  R  F  X  H  R  R  O  D  Q  O  U  H  U  V  B  P  N  L  G
C  V  U  K  R  S  P  Y  R  R  O  T  O  M  E  D  S  X  V  C
X  O  K  Y  Y  A  Z  F  H  B  H  X  P  W  R  O  X  Z  E  L
D  C  L  F  J  S  O  Z  G  O  V  D  I  I  R  U  C  V  O  H
L  X  Q  B  F  R  N  K  Z  J  L  T  O  E  I  B  M  G  W  J
G  V  N  M  C  A  L  H  R  U  J  D  R  X  W  E  B  W  D  B
C  R  I  E  E  D  S  N  P  C  M  L  E  E  B  M  I  E  O  G
M  R  U  U  B  I  J  P  Y  G  A  M  M  R  J  Q  P  L  C  Y
Q  R  W  P  U  Q  D  T  B  G  G  E  D  F  L  K  O  X  M  B
C  E  Y  Y  D  W  B  I  O  C  K  O  I  R  I  U  B  A  M  B
W  X  A  O  Z  S  C  M  N  T  T  W  K  B  L  X  X  W  E  Q
R  B  A  O  S  Y  T  C  X  M  C  A  I  A  E  I  B  M  P  W
X  A  W  H  E  E  L  B  S  S  T  S  V  T  D  C  A  O  K  U
L  C  E  Z  Q  T  D  I  Z  M  I  C  X  M  L  R  N  Z  S  X
U  I  G  G  Q  U  Y  Q  H  E  D  A  Y  G  F  R  O  G  J  P
```

WORD BANK

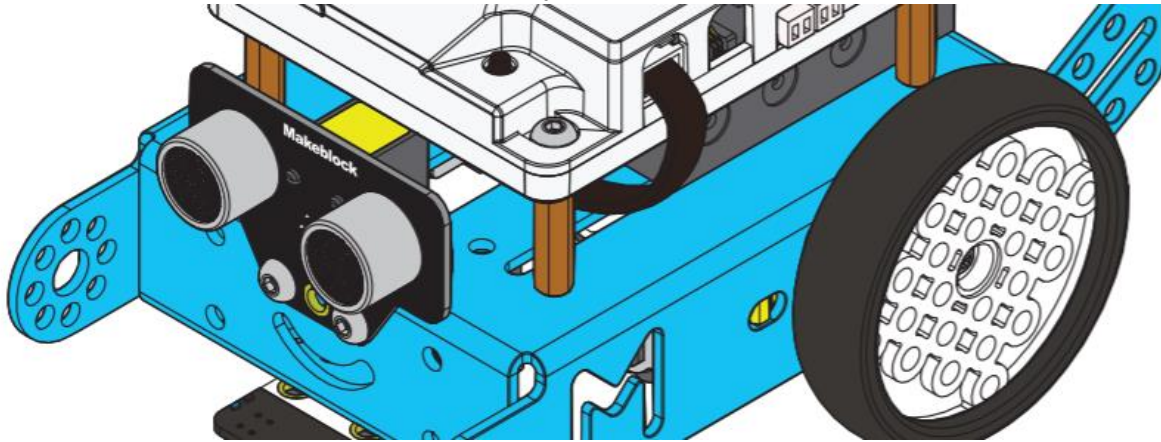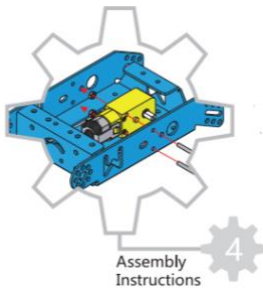|		
Axle	BatteryHolder	Force
Frame	Gear	LED
Motor	Receiver	Sensor
Wheel		

Robotics User Manual

DIRECTIONS: Now that we've learned about mechanical engineering, robotics, and autonomous cars, we'll learn how to properly assemble and use our mBots.

Look over the Instruction booklet. This will help familiarize you with how your mBot works.

Step 1: Assembly Instructions
Before using the mBot, we have to put it all together! Be sure to ask for your parents' permission when building. Follow the steps listed on **pages 4–11** of your User Manual.

Contents

Children should be accompanied by adults.

mBot is an educational robot for beginners to learn STEM (Science, Technology, Engineering, Mathematics) and experience the charms of mechanics, electronics, control systems and computer science.

Lesson 2: Basic Controls and Graphical Programming
Review **pages 11–12** to learn how to operate the mBot using the remote/onboard controls.

Then turn to **page 13** for an introduction to graphical programming.

Parts List 2   mCore Layout 3   Assembly Instructions 4   Wiring Instructions 9
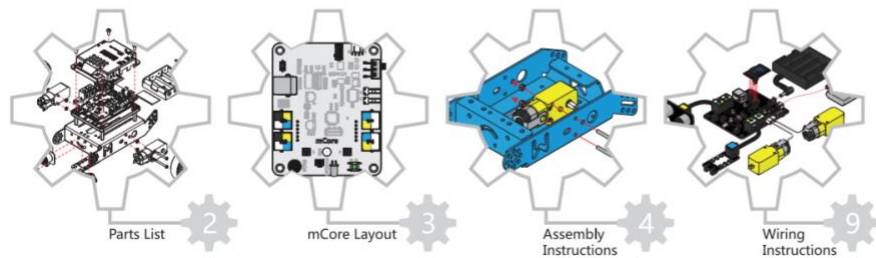
Fire Tablet & mBot Setup

DIRECTIONS: Let's set up our Fire Tablet to be ready to operate the mBot. The mBot can be connected to PC, iOS, orAndroid. Please follow the instructions that apply to the device you are using. Since our mentors will be working with their Amazon Fire Tablets, we recommend you do the same.

| Fire Tablet Installation Steps:	Android Installation Steps:	iOS Installation Steps:

1. **Visit m.apkpure.com, and download the APKPure app to your device, if you haven't already.**
   a. **Click here to download.**
2. **Launch the APKPure app.**
   a. **Use the search bar to search for "Makeblock", or click here to install.**
3. **Use the search bar to search for "mblock", or click here to install.**
4. **Follow these steps to connect your mBot to your device**
   a. **How to Connect mBot**
	1. **Follow these steps.**	1. **Follow these steps.**

Watch this video to connect your mBot to your device!!

Let's Practice!
Now that we've set up our mBot, let's begin to experiment. Our mBot has different buttons and sensors, and we can control how our robot responds to those. Follow the instructions on the following cards to learn how your mBot can be used.
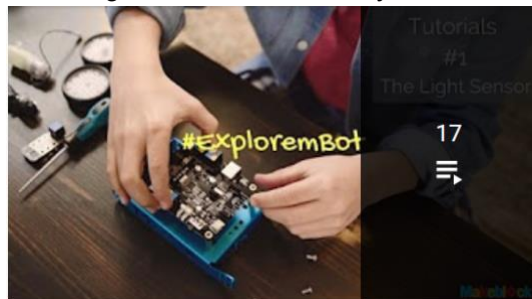
Watch these tutorial videos to get comfortable with your mBot device!

IMAGINE

Begin to Plan for the Week's Challenges

DIRECTIONS: Use your time to imagine the ideas you have for this week's challenges: **Target Course, Obstacle Course, and the Creative Use Contest**. Remember to use whatever extra materials you have available, and check with your parent or guardian before working on your projects!

Challenge #1: Target Course
Description: Program your robot to transport objects from one location to another. Whether it's delivering packages or moving objects, create a vehicle that can move something from Point A to Point B. As always, exercise caution, and check with your parent/guardian before any activity. **Be sure to record, and submit your best trial!**

Challenge #2: Obstacle Course
Description: Design your very own course full of obstacles (such as twists and turns, ramps, tunnels, or bridges, to name a few), and program your robot to race through it. Use this opportunity to show the judges your creativity and coding abilities! As always, exercise caution, and check with your parent/guardian before any activity. **Be sure to record, and submit your best trial!**

Challenge #3: Creative Use/Trick Contest
Description: Use the mBot to perform a special/creative task or a trick move. The possibilities here are limitless. Feel free to do research online or elsewhere to see what others are doing. As always, exercise caution, and check with your parent/guardian before any activity. **Be sure to record, and submit your best trial!**

Targets: Small, easy to move objects that can be used for the Target Challenge
Obstacles: This can be a ramp, a bridge, or something partially blocking the path. Get creative, and show your coding expertise!
Creative Use: This is up to you.
Starting/Finish Line: A mark to signal the beginning and end of the race

Pro-Tip: Use these printable Line Following tiles to help construct your courses!

There are multiple ways to complete the challenges. Do you plan to use the robots' sensors to complete the challenges? Which sensors do you plan to use and why?

_____

_____

_____

Are there any items you already have that you can use in the target/obstacle course or the creative-use competition (e.g., cardboard or other recycled materials)?

_____

_____

_____
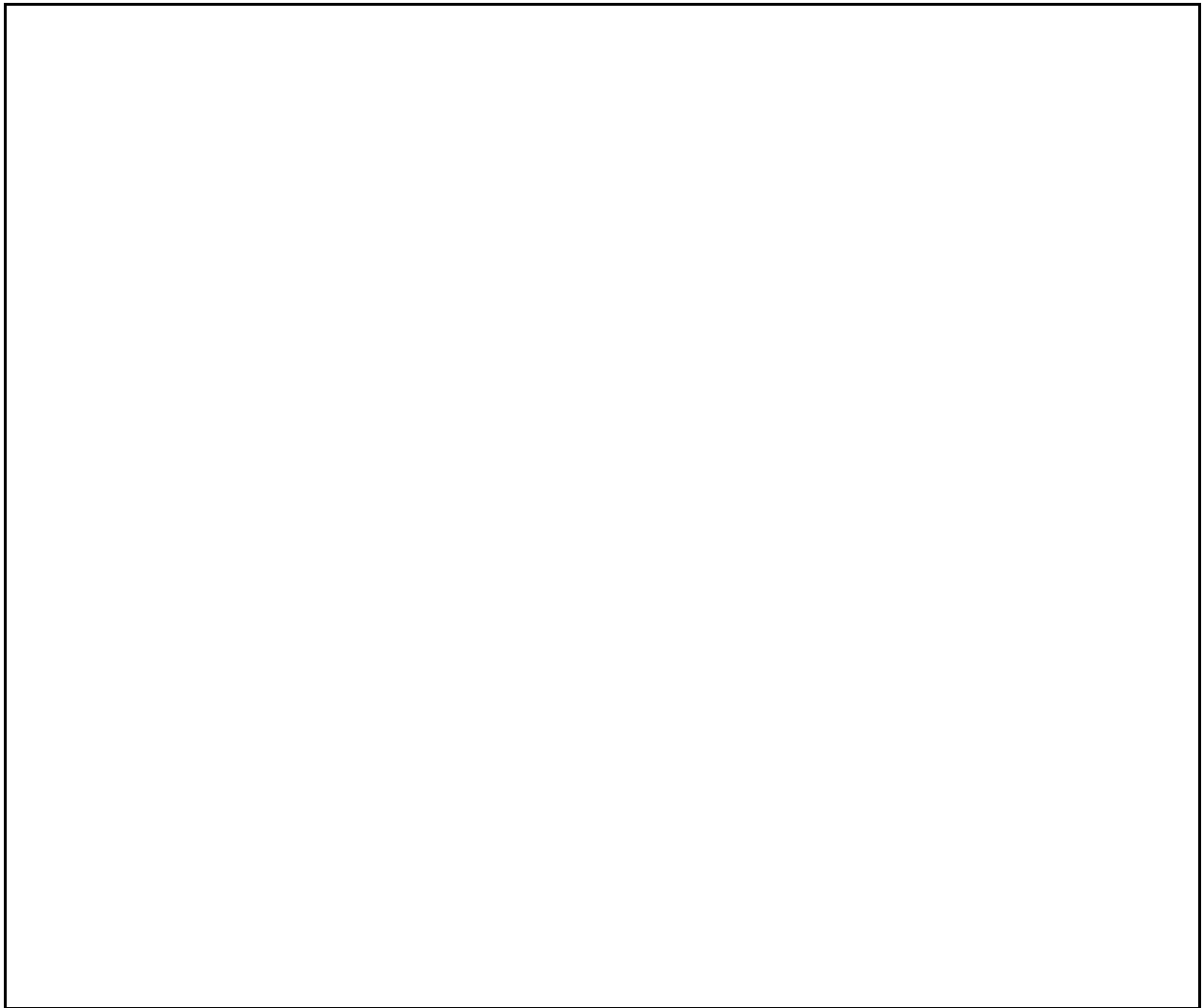
Where did you decide to place your obstacle course? Did you get your parents' approval?

_____

_____

_____

_____

Which challenge(s) do you think will be the most fun? Which do you think will be the hardest?

_____

_____

_____

_____

MODEL

Sketches

DIRECTIONS: Use the following space to sketch out your ideas or designs for the autonomous vehicle courses. Be sure to also create a material list for any items you'll need. TIP: use recycled materials you have around the house. Remember to use what you have available, and check with your parent or guardian before starting to build!

What special or unique elements did you include in your design(s)?

Extra Sketching Space:

Using your sketches, create a material list including all the items you'll need to complete your build.

_____

_____

_____

Which feature(s) do you think will be the most fun? Which features do you think will be the hardest?

_____

_____

_____

CREATE

Begin to Build

DIRECTIONS: Using the designs and material list from the IMAGINE and MODEL sections, you will now build the pieces necessary for your Obstacle cCourse and Target Course and complete any designs for the Creative Use Contest. Use these printable Line Following tiles to help construct your courses!

OBSERVATIONS:

How many different courses did you create? How many ideas for the creative use challenge did you think of?

_____

_____

_____

Which creative use do you think works best for your purpose? Why?

_____

_____

_____

Which obstacle course best displays your coding abilities? Why?

_____

_____

_____

Do you have any coding tips to share?

_____

_____

TEST

DIRECTIONS: It's finally time to TEST! Use the following tables to keep track of your accomplishments. This will help you find out what's working well and what can be improved. Be sure to add any notes or tips for getting the best trial!

Challenge #1: Target Course

Description: Program your robot to transport objects from one location to another. Whether it's delivering packages or moving objects, create a vehicle that can move something from Point A to Point B. As always, exercise caution, and check with your parent/guardian before any activity. **Be sure to record, and submit your best trial!**

Trial	# of Successful Deliveries ___ / out of ____	Time
1		
2		
3		

How did the mBot perform?

_____

_____

_____

Which setup do you think works best for you? Why?

_____

_____

Do you have any tips to remember for next time?

_____

_____

Challenge #2: Obstacle Course

Description: Design your very own course full of obstacles (such as twists and turns, ramps, tunnels, or bridges, to name a few), and program your robot to race through it. Use this opportunity to show the judges your creativity and coding abilities! As always, exercise caution, and check with your parent/guardian before any activity. **<u>Be sure to record, and submit your best trial!</u>**

Trial	Time
1	
2	
3	

How did the mBot perform?

_____

_____

_____

Which setup do you think works best for you? Why?

_____

_____

_____

Do you have any tips to remember for next time?

_____

_____

_____

Challenge #3: Creative Use/Trick Contest

Description: Use the robot to perform a special/creative task, and explain why it's helpful. Design your very own obstacle course, and program your robot to race through it. **Be sure to record, and submit your best trial!**

Special Task/Creative Use Title	Description
1	
2	
3	

How did the mBot and code perform?

_____

_____

_____

Which configuration do you think works best for your purpose? Why?

_____

_____

Do you have any tips to remember for next time?

_____

_____

IMPROVE

DIRECTIONS: Congrats, you've made it to the seventh step of SEEK's Engineering Design Process! You've just finished CREATING your design and TESTING it, so now it's time to IMPROVE! You'll be asking yourself questions about the performance of your design to see how you can make it better. This step is special, because even though it's the last step of the EDP, we can begin the cycle all over! Feel free to repeat the SEEK Engineering Design Process until you're happy with your design.

Did your design work perfectly? Why or why not?

_____

_____

_____

Now that you've tried to complete the challenges, which challenges were fun/easy? What parts were harder?

_____

_____

_____

If you could redo the challenges, is there anything you would change or study more to make it better/easier?

_____

_____

_____

Do you have any tips to share?

_____

_____

_____

Submit Your Showcase Challenge Videos

Directions: Now it's time to submit your Showcase Challenge videos. The purpose of the challenges is to encourage you to try something new and "think outside of the box." Use your video submissions to express your *creativity*, and talk about the *WHYs* behind your project. Be sure to share with the judges and sponsors everything you learned the past week. They are super excited to hear from you!

[CLICK HERE TO UPLOAD YOUR FINAL DESIGNS](#).

Additional Presentation Tips:
- You should have a theme for your designs and explain how your design connects to competition themes or the real world.
- Describe how and why you developed your design. Explain why your design is fun, useful, and unique/special. The judges watch lots of videos. What makes yours different?
- Students should demonstrate in-depth understanding by using **vocabulary words and describing the science and engineering concepts** behind this week's challenge.
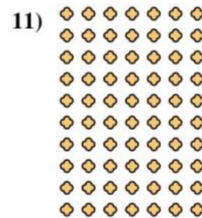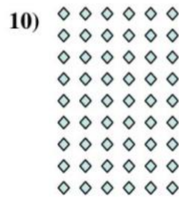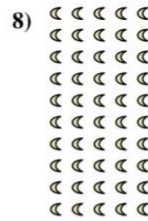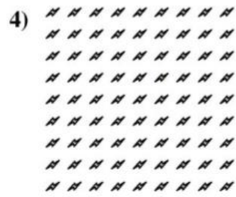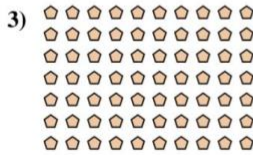
Math Worksheet Answer Key

3rd Grade Answer Keys
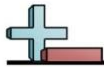
Rewriting Multiplication Problems (visual)   Name: **Answer Key**

Write each array as a multipication problem and solve.

Answers

Ex. $8 \cdot 3 = 24$

1. $2 \cdot 9 = 18$

2. $8 \cdot 2 = 16$

3. $7 \cdot 10 = 70$

4. $9 \cdot 9 = 81$

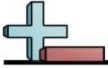5. $5 \cdot 7 = 35$

6. $4 \cdot 3 = 12$

7. $5 \cdot 9 = 45$
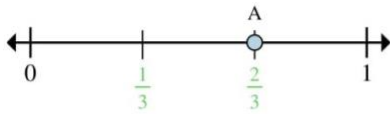
8. $10 \cdot 5 = 50$
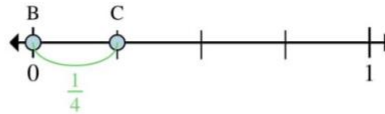
9. $2 \cdot 8 = 16$

10. $9 \cdot 6 = 54$

11. $10 \cdot 7 = 70$

1-10	91	82	73	64	55	45	36	27	18	9
11	0									

Solve each problem.

A

0    $\frac{1}{3}$ $\frac{2}{3}$ 1

Ex) This numberline is divided into how many pieces?

Ex) What is the location of A (written as a fraction)?

B   C

0    $\frac{1}{4}$ 1

Ex) On this numberline what is the value of 0 written as a fraction?

Ex) On this numberline from B to C is how far (written as a fraction)?

Ex. ____ **3**

Ex. ____ $\frac{2}{3}$

Ex. ____ $\frac{0}{4}$

Ex. ____ $\frac{1}{4}$

A

0    $\frac{1}{6}$ $\frac{2}{6}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{5}{6}$ 1

1a) This numberline is divided into how many pieces?

1b) What is the location of A (written as a fraction)?

B   C

0    $\frac{1}{6}$ $\frac{1}{6}$ 1

2a) On this numberline what is the value of 0 written as a fraction?

2b) On this numberline from B to C is how far (written as a fraction)?

1a. ____ **6**

1b. ____ $\frac{2}{6}$

2a. ____ $\frac{0}{6}$

2b. ____ $\frac{2}{6}$

A

0    $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

3a) This numberline is divided into how many pieces?

3b) What is the location of A (written as a fraction)?
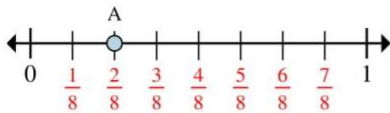
B   C

0    $\frac{1}{4}$ 1

4a) On this numberline what is the value of 1 written as a fraction?

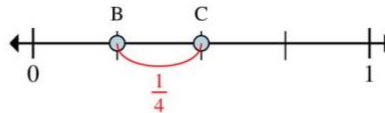**4b)** On this numberline from B to C is how far (written as a fraction)?

3a. ____ **8**

3b. ____ $\frac{2}{8}$

4a. ____ $\frac{4}{4}$

4b. ____ $\frac{1}{4}$

A

0    $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

5a) This numberline is divided into how many pieces?

5b) What is the location of A (written as a fraction)?
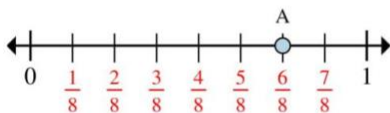
B   C

0    $\frac{1}{3}$ 1

6a) On this numberline what is the value of 1 written as a fraction?

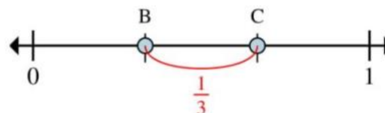**6b)** On this numberline from B to C is how far (written as a fraction)?

5a. ____ **8**

5b. ____ $\frac{6}{8}$

6a. ____ $\frac{3}{3}$

6b. ____ $\frac{1}{3}$

1-10	92	83	75	67	58	50	42	33	25	17
11-12	8	0								

Name: **Answer Key**

Determine which graph (A, B or C) best represents the information in the table.

Answers

1)

Favorite Color	blue	green	orange	yellow	red
People	10,000	2,000	8,000	3,000	4,000

A

B

C

2)

Name	Adam	Bill	Cody	Dan	Ed
Points	10	45	30	40	25

A

B

C

3)

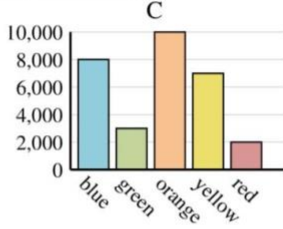| Name	Faye	Greg	Hannah	Jane	Kelly
States Lived In	5	8	9	10	2

A

B

C

4)

Sales	Jan	Feb	Mar	Apr	May
Month	1,500	2,500	5,000	4,500	3,500

A

B

C

1. **A**

2. **B**

3. **C**

4. **C**

1-4 | 75 | 50 | 25 | 0 |

Determine if the angle shown is 'less', 'more' or 'equal' to 90°.

Answers

Ex)   57°

1)   134°

2)   90°

3)   162°

4)   90°

5)   90°

6)   103°

7)   90°

8)   90°

9)   54°

10)   149°

11)   42°

12)   54°

13)   90°

14)   127°

15)   59°

16)   90°

17)   100°

18)   44°

19)   148°

20)   68°

Ex.	**less**
1.	**more**
2.	**equal**
3.	**more**
4.	**equal**
5.	**equal**
6.	**more**
7.	**equal**
8.	**equal**
9.	**less**
10.	**more**
11.	**less**
12.	**less**
13.	**equal**
14.	**more**
15.	**less**
16.	**equal**
17.	**more**
18.	**less**
19.	**more**
20.	**less**

1-10	95	90	85	80	75	70	65	60	55	50
11-20	45	40	35	30	25	20	15	10	5	0

Welcome: Week 3

Dear Young Engineers,

The National Society of Black Engineers has partnered with Scratch to host the very first SEEK Hack-a-thon! What's a Hack-a-thon? It's a series of challenges that test your coding abilities. This week, students will learn how to code and use their skills to build a game, design wearable technology, and even come up with their own unique creation using code!

The SEEK students who present the most interesting solution to the challenges below will win a chance to be featured on NSBE social media, as well as bragging rights! Be sure to do your best and show the judge what you've learned. The student who exhibits the most knowledge about coding in this week's competitions will have their game shared with the masses!

Challenge #1: Mobile Game

Design and code your very own game playable on the micro:bit.

Challenge #2: Wearable Tech

Design your very own wearable technology device.

Challenge #3: Creative Use Contest

Use the micro:bitkit to perform an innovative,special or creative task.

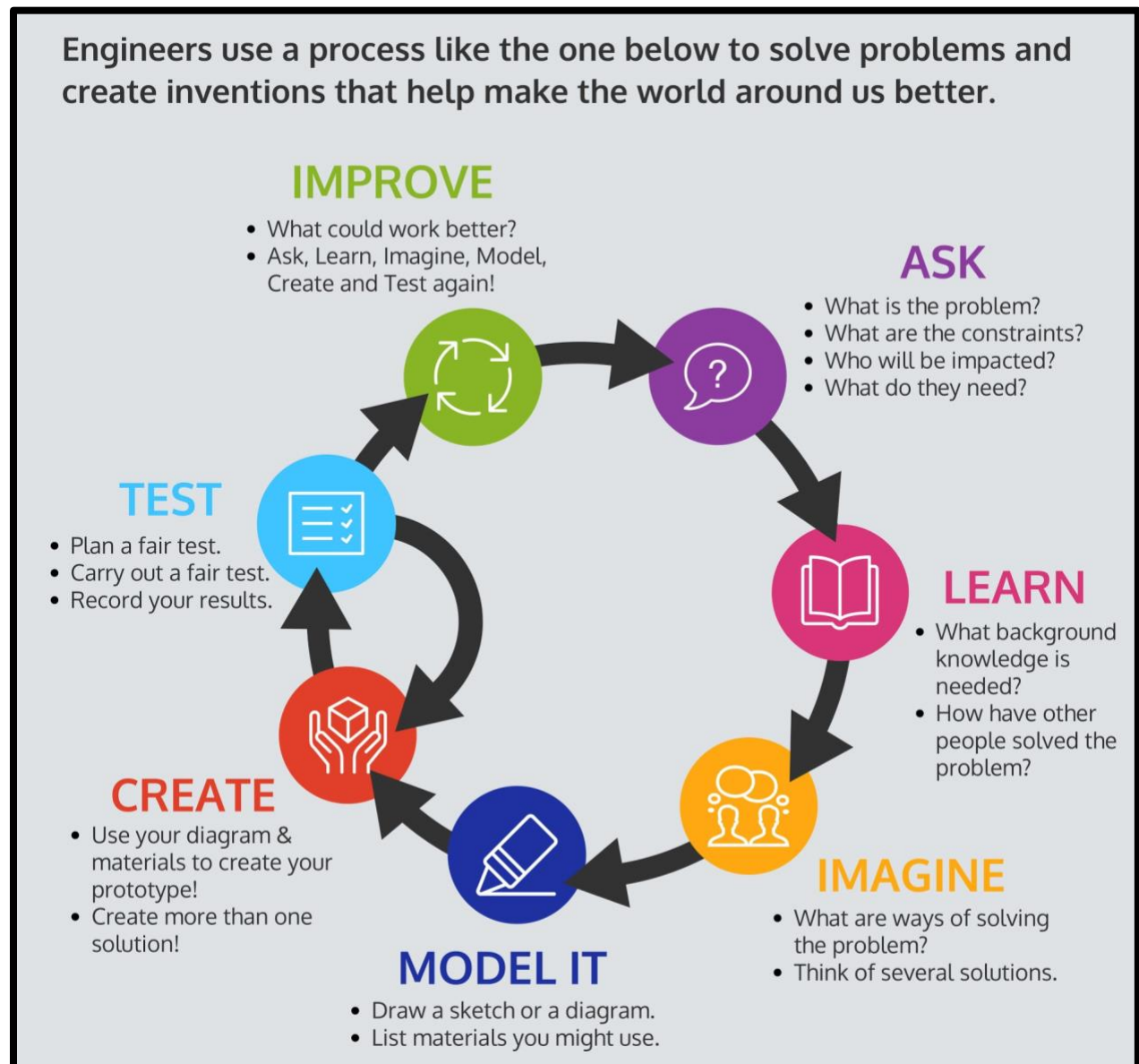On behalf of the National Society of Black Engineers, we wish you the best of luck!

Sincerely,

The SEEK Team

The SEEK Engineering Design Process

DIRECTIONS: We'll be using the SEEK Engineering Design Process to explore our projects this week. The Engineering Design Process, or EDP, is a set of steps that engineers use to solve problems and create solutions to challenges. The steps follow this order: **ASK, LEARN, IMAGINE, MODEL, CREATE, TEST, AND IMPROVE.** Notice how the steps go around in a circle (below)? The EDP can be done *over and over again* until you feel your design is *perfect!* Try it out this week. Once you finish your initial design, ask, learn, imagine, model, create and test it all over again to see how much better your design becomes.

Engineers use a process like the one below to solve problems and create inventions that help make the world around us better.

IMPROVE
- What could work better?
- Ask, Learn, Imagine, Model, Create and Test again!

ASK
- What is the problem?
- What are the constraints?
- Who will be impacted?
- What do they need?

LEARN
- What background knowledge is needed?
- How have other people solved the problem?

IMAGINE
- What are ways of solving the problem?
- Think of several solutions.

MODEL IT
- Draw a sketch or a diagram.
- List materials you might use.

CREATE
- Use your diagram & materials to create your prototype!
- Create more than one solution!

TEST
- Plan a fair test.
- Carry out a fair test.
- Record your results.

ASK

What is Computer Engineering?

Computer science is the study of computers and computing concepts. It includes both hardware (computer mouse, monitors, game controllers) and software (programs like Minecraft, Overwatch, and Fortnite), as well as networking and the internet.

The hardware aspect of computer science overlaps with electrical engineering. It covers the basic design of computers and the way they work. For example, understanding how a computer operates in binary enables you to understand how computers add, subtract, and perform other operations.

The software side of computer science covers programming concepts as well as specific programming languages. Programming concepts include functions, algorithms, and source code design.

What Is Programming?

Computer programming is writing a list of instructions for a computer to complete, it enables you to express yourself, create something, and innovate. There are many different ways to write code but this summer we'll be learning a really easy block-based coding language.

What Is a Computer Engineer?

Computer engineers evaluate, design, and maintain computer hardware and software systems. They develop, test, and design computers and network systems. They resolve problems that occur with computer hardware or software and aid in the advancement of computer technology.

Alan Emtage invented the world's first search engine.

His idea led to Google and Yahoo!

Focus: Computer Engineering

KWL Chart

DIRECTIONS: KWL charts are meant to help organize your thoughts. Use the following chart to write down what you already know about coding, computer engineering, etc., as well as what you WANT TO KNOW. Then come back and fill in the last column with what you've LEARNED at the end of each day.

What you KNOW about coding, computer engineering, etc.	**What you WANT TO KNOW** about coding, computer engineering, etc.	**What you've LEARNED** about coding, computer engineering, etc.

LEARN

3rd Grade Vocabulary List

Algorithm
A list of steps a machine follows to finish a task

Bug
An error in a program that prevents the program from running as expected

Coding
To control devices with a set of instructions

Code Blocks
Visual representations of source code

Command
An instruction for the computer

Data
Information

Variable
A placeholder for a piece of information that can change

Workspace
The area where you drag and drop commands to build your program

Program
An algorithm that has been coded into something that can be run by a machine

Loop
The action of doing something over and over again

3rd Grade Fill-in-the-Blank Worksheet

DIRECTIONS: Using your vocabulary knowledge, fill in the missing squares on the table below. Write the vocabulary word in the first column and the definitions in the second. In the last column, draw a picture that best represents what the vocabulary word means to you.

TERM	DEFINITION	PICTURE
Algorithm	A list of steps a machine follows to finish a task	
Bug		
Coding		
	An instruction for the computer	

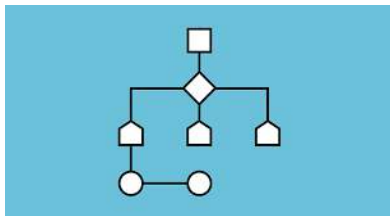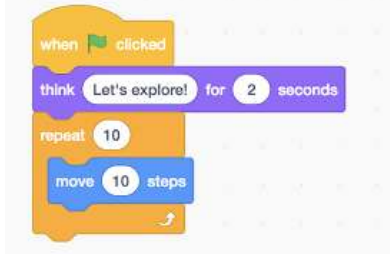|	Information	
Loop		
Program	An algorithm that has been coded into something that can be run by a machine	
Variable		
	The area where you drag and drop commands to build your program	

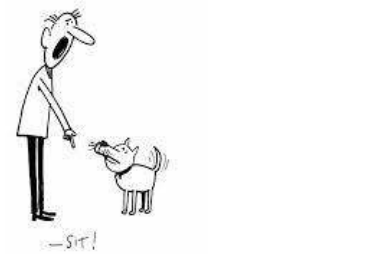# 3rd Grade Vocabulary Match Worksheet

DIRECTIONS: Using your vocabulary knowledge, match the vocabulary word with the correct description.

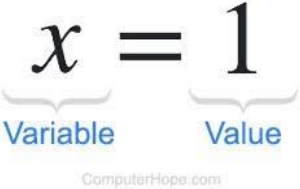| Definition	Term
1 ____ To control devices with a set of instructions	A. Algorithm
2 ____ An algorithm that has been coded into something that can be run by a machine	B. Bug
3 ____ The area where you drag and drop commands to build your program	C. Coding
4 ____ Visual representations of source code	D. Code Blocks
5 ____ An instruction for the computer	E. Command
6 ____ An error in a program that prevents the program from running as expected	F. Data
7 ____ A list of steps a machine follows to finish a task	G. Loop
8 ____ Information	H. Program
9 ____ The action of doing something over and over again	I. Variable
10 ____ A placeholder for a piece of information that can change	J. Workspace

Cultural Connection

DIRECTIONS: Read through the following timeline to learn about the incredible accomplishments of trailblazing men and women who made substantial contributions to the development of modern computer technology.
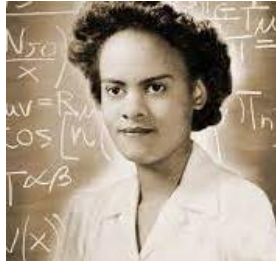
Evelyn Boyd Granville

1949
Evelyn Boyd Granville became one of the first African-American women to earn a Ph.D. in mathematics from Yale.

Katherine Johnson

1953
Katherine Johnson while working at NASA earned the nickname "the Human Computer" for doing calculations essential to the success of many early space missions.

Mark Dean

1981
Mark Dean co-creates and debuts the IBM personal computer (PC).

Kimberly Bryant

2011
Kimberly Bryant founded Black Girls Code, a nonprofit organization that teaches programming to young girls of color.

Review Questions:

Who founded Black Girls Code, and what year was it founded?

_____

_____

_____

_____

What was Katherine Johnson's nickname at NASA?

_____

_____

_____

_____

Name one of the first African-American women to earn a Ph.D. in mathematics from Yale.

_____

_____

_____

_____

How many years ago did Mark Dean co-create the IBM personal computer?
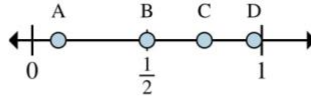
_____

_____

_____

_____

3rd Grade Math Worksheet #1 – Fractions and Number Lines

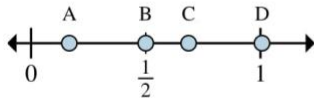**DIRECTIONS:** Complete the following worksheets by writing your answer on the line provided.

Determine which letter best shows the location of the fraction.
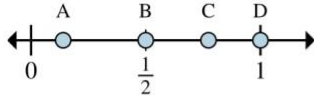
1) Which letter best shows $\frac{2}{2}$?

2) Which letter best shows $\frac{1}{2}$?

3) Which letter best shows $\frac{3}{4}$?

4) Which letter best shows $\frac{2}{4}$?

5) Which letter best shows $\frac{3}{6}$?

6) Which letter best shows $\frac{1}{6}$?

7) Which letter best shows $\frac{2}{3}$?

8) Which letter best shows $\frac{1}{3}$?

9) Which letter best shows $\frac{4}{8}$?

10) Which letter best shows $\frac{8}{8}$?

11) Which letter best shows $\frac{0}{3}$?
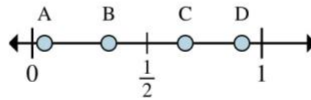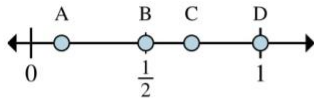
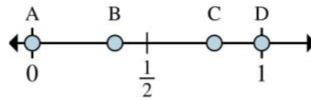12) Which letter best shows $\frac{3}{3}$?

13) Which letter best shows $\frac{6}{8}$?

14) Which letter best shows $\frac{5}{8}$?

15) Which letter best shows $\frac{0}{8}$?
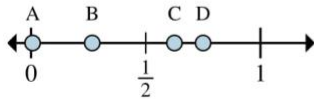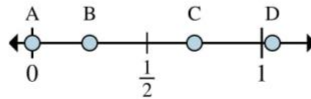
16) Which letter best shows $\frac{2}{8}$?

Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

3rd Grade Math Worksheet #2 – Multiplication Word Problems

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Solve each problem.

1,561	2,736	1,268	1,973	1,762
1,822	1,106	2,171	1,516	2,331

Answers

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

1) A farmer was planting vegetables in a garden. He planted 623 corn seeds, 519 turnip seeds and 831 potato seeds. How many seeds did he plant total?

2) At Isabel's school there are 971 students in 3rd grade, 281 students in 4th grade and 919 students in 5th grade. How many students were there in all three grades?

3) For a new year's party 911 red balloons, 910 green balloons and 915 white balloons were used. What is the total number of balloons used?

4) A zoologist was checking the weights of three gorillas. Gorilla A weighed 559 pounds, gorilla B weighed 827 pounds and gorilla C weighed 130 pounds. What is the combined weight of all three gorillas?

5) While working on his car, Kaleb spent 584 bucks on a new paint job, $309 on the transmission and 213 dollars on the interior. How much money did he spend total?

6) Carl, Amy and Ed were collecting cans for recycling. Carl collected 178 cans, Amy collected 498 and Ed collected 592. What is the total number of cans all three friends collected?

7) While building a house, an architect used 956 nails on the first floor, 351 on the second and 515 on the third floor. How many nails did he use on all three floors?

8) A donation center received 479 cans of corn, 887 cans of peas and 396 cans of green beans. How many cans did they receive total?

9) A school had 945 red pens, 393 blue pens and 993 black pens. How many pens did they have total?

10) In a month, a video store rented out 509 action movies, 747 comedies and 305 other types of movies. What is the sum of the movies they rented in a month?
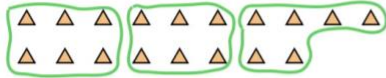
3rd Grade Math Worksheet #3 – Visual Division

DIRECTIONS: Complete the following worksheets by writing your answer on the line provided.

Use the shapes provided to answer the questions.

Answers

Ex) How many groups of 6 can you make with the 18 shapes below?

1) How many groups of 6 can you make with the 18 shapes below?

Ex. _____ **3** _____

1. _____

2. _____

2) How many groups of 5 can you make with the 25 shapes below?

3) How many groups of 2 can you make with the 8 shapes below?

3. _____

4. _____

5. _____

4) How many groups of 2 can you make with the 16 shapes below?

5) How many groups of 5 can you make with the 35 shapes below?

6. _____

7. _____

8. _____

9. _____

6) How many groups of 3 can you make with the 39 shapes below?

7) How many groups of 7 can you make with the 14 shapes below?
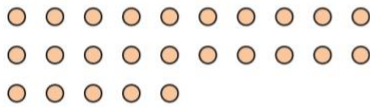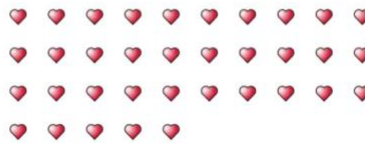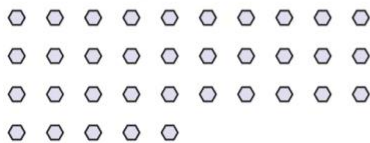
10. _____

11. _____

8) How many groups of 7 can you make with the 28 shapes below?

9) How many groups of 4 can you make with the 40 shapes below?

10) How many groups of 7 can you make with the 35 shapes below?

11) How many groups of 3 can you make with the 18 shapes below?

Micro:Bit Setup

DIRECTIONS: Let's begin to experiment with the micro:bit! The microbit can be connected to PC, iOS, Android, or Fire Tablet devices. Please follow the instructions that apply to the device you are using. Since our mentors will be working with their Amazon Fire Tablets, we recommend you do the same.

Fire Tablet Installation Steps:	Android Installation Steps:	iOS Installation Steps:

1. **Download the APKPure app to your device.**
    a. **Click here to download.**
2. **Click here to install the micro:bit app.**
3. **Follow these steps to connect your micro:bit to your device.**
    a. **How to Connect Micro:Bit**
	1. **Follow these steps.**	1. **Follow these steps.**

Watch this video to connect your micro:bit to your device!!

Let's Practice!

Now that we've set up our micro:bit, let's begin to experiment. Our micro:bit has different buttons and sensors that can control what our program does. Follow the instructions on the following cards to learn how your micro:bit can be used in coding.

Micro:Bit Cards

micro:bit Cards

Try these cards in any order:

- Cast a Spell
- Squeak
- Move Around
- Press a Button
- Jump
- Move Back and Forth
- Create an Emoji

Review Questions

How can you make an object move faster?

_____

_____

_____

How can you make an actor move using the micro:bit buttons?

_____

_____

_____

Describe how to create an actor that switches between three colors (examples: red, green, and yellow)

_____

_____

_____

Write code to say "ouch" for each time the micro:bit is moved.

_____

_____

_____

BONUS: Describe how to create a function that makes an actor dance.

_____

_____

_____

3rd Grade Crossword

DIRECTIONS: Use the definitions at the bottom of the page to fill in the crossword puzzle.
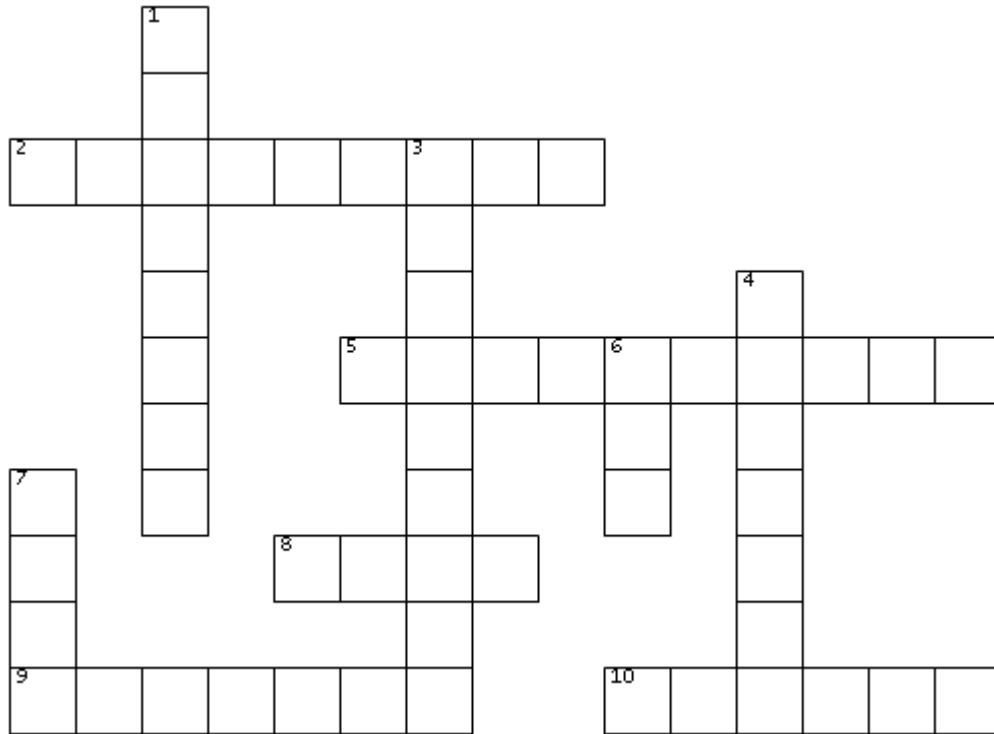
ACROSS
2. The area where you drag and drop commands to build your program
5. Visual representations of source code
8. Information
9. An algorithm that has been coded into something that can be run by a machine
10. To control devices with a set of instructions

DOWN
1. A placeholder for a piece of information that can change
3. A list of steps a machine follows to finish a task
4. An instruction for the computer
6. An error in a program that prevents the program from running as expected
7. The action of doing something over and over again

3rd Grade Word Search

DIRECTIONS: Search through the scramble below to locate all the words in the word bank at the bottom of the page.

```
C  O  D  E  B  L  O  C  K  S  Q  P  W  J  B
N  M  U  V  Q  H  M  V  O  H  Z  O  J  R  O
F  O  R  P  C  Z  A  A  F  M  D  O  V  C  P
M  C  Y  D  J  R  S  D  R  T  M  L  S  C  L
U  H  Q  K  I  D  N  T  O  G  X  A  H  R  K
V  D  T  A  A  E  A  A  Q  S  O  R  N  O  M
D  B  B  I  R  S  G  Y  J  J  B  R  T  D  J
I  L  X  M  R  N  U  B  E  V  K  U  P  Z  C
E  P  Z  L  I  O  B  V  D  O  X  F  Y  G  I
M  X  R  D  Q  O  G  H  A  W  H  C  L  A  U
C  H  O  H  G  H  Q  L  T  T  B  L  C  C  Q
Y  C  M  M  J  I  E  C  A  P  S  K  R  O  W
V  P  X  C  C  Z  D  X  I  N  C  E  H  E  I
X  V  T  X  N  X  L  I  D  Q  I  O  I  Y  E
Q  X  X  V  R  O  A  B  G  N  L  F  Q  H  T
```

WORD BANK

Algorithm	Bug	CodeBlocks
Coding	Command	Data
Loop	Program	Variable
Workspace		

IMAGINE

Begin to Plan for the Week's Challenges

DIRECTIONS: Use your time now to imagine the ideas you have for this week's challenges: Mobile Game Design, Wearable Tech Design, and the Creative Use Contest. Remember to use whatever extra materials you have available and check with your parent or guardian before working on your projects!
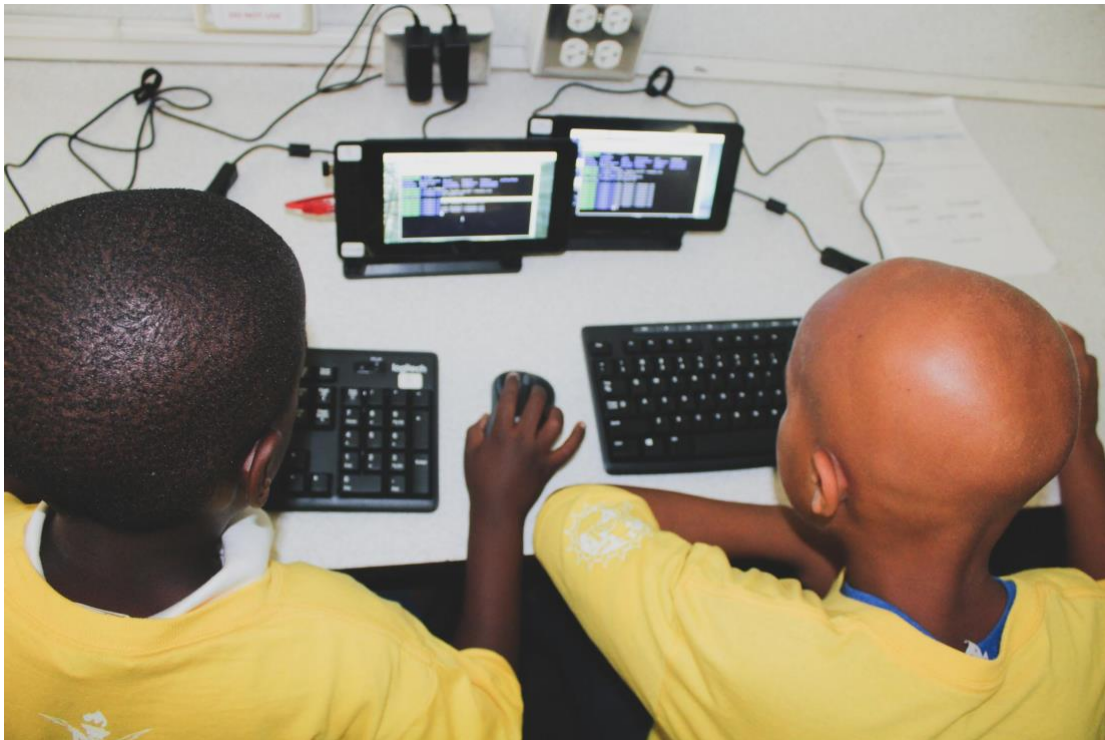
Challenge #1: Mobile Game
Description: Design and code a game that can be played on micro:bit. Using your coding skills, design and code a game that you can play using your micro:bit kit

Challenge #2: Wearable Tech
Description: Design your very own wearable technology device using the micro:bit kit.

Challenge #3: Creative Use Contest
Description: Use your creative imagination to use the micro:bit kit in a way it hasn't been used before. It should perform an innovative, special, or creative task.

DIRECTIONS: Put on your engineer thinking caps! To complete this week's challenges, we'll need to be extra creative. Using the link below, brainstorm the game you'll create, the wearable tech design you plan to make, as well as your creative-use idea for the micro:bit.

---

https://makecode.microbit.org/
*Scroll through this page for project inspiration.

What are your ideas for the Mobile Game Challenge?

_____

What are your ideas for the Wearable Tech Challenge?

_____

What are your ideas for the Creative Use Contest?

_____

Are there any materials you already have that you can use to create your game device, wearable tech, or creative project, (e.g., cardboard or other recycled materials)?

_____

_____

_____

What materials did you choose? Did you get your parents' approval?

_____

_____

_____

Which challenge(s) do you think will be the most fun? Which do you think will be the hardest?

_____

_____

_____

_____

MODEL

Sketches

DIRECTIONS: Use the following space to sketch out your ideas, designs, or lines of code for this week's challenges. Wherever possible, try to use paper or other recycled materials around the house to create your prototype designs. Also, don't forget to create a material list using these sketches!

What special or unique elements did you include in your design(s)?

Extra Sketching Space:

Using your sketches, create a material list including all the items you'll need to complete your build.

_____

_____

_____

Which feature(s) do you think will be the most fun? Which features do you think will be the hardest?

_____

_____

_____

CREATE

Begin to Build

DIRECTIONS: Use the ideas and designs from the IMAGINE and MODEL sections to begin constructing the pieces you need. (Depending on your ideas, you may be writing code or building a physical object for your micro:bit.)

OBSERVATIONS:
Did you think of multiple ideas or designs? How did you narrow down your ideas?

_____

_____

_____

What inspired your creative-use design?

_____

_____

_____

Has the coding been easy or hard? Have you been studying the code blocks?

_____

_____

_____

Do you have any tips to share?

_____

_____

TEST

DIRECTIONS: It's finally time to TEST! Use the following tables to keep track of your accomplishments. This will help you find out what's working well and what can be improved. Be sure to add any notes or tips for getting the best trial!

Challenge #1: Mobile Game Design Challenge

Description: Design and code your very own game that can be played on the micro:bit. Visit this link, and scroll to the Games Section.

Game (We recommend trying multiple games to find your favorite.)	Notes (Write any notes about why you like or dislike the game here.)
1	
2	
3	

How did the game(s) perform? Did they run successfully? What **bugs** did you come across?

_____

_____

Can your game be played by others with simple, easy to understand instructions?

_____

_____

Are there any ways to improve the game? Or maybe make it more challenging?

_____

_____

Challenge #2: Wearable Tech

Description: Design your very own wearable technology device using the micro:bit kit.
Visit this link, and go to the Fashion Section.

Devices (We recommend trying multiple devices to find your favorite.)	Notes (Write any notes about why you like or dislike the game here.)
1	
2	
3	

How did the wearable tech devices perform? What **bugs** did you come across?

_____

_____

_____

Which device did you find to be the most useful for you? Why?

_____

_____

_____

Do you have any coding tips to remember for next time?

_____

_____

Challenge #3: Creative Use Contest

Description: Put your imagination to work and use the micro:bitkit to perform an innovative, special, or creative task. Feel free to use any section.

Creative Use (We recommend trying multiple uses to find your favorite.)	Notes (Write any notes about why you like or dislike the game here.)
1	
2	
3	

How did your program perform? What were the **bugs**?

_____

_____

_____

Which device did you find to be the most useful for you? Why?

_____

_____

Do you have any coding tips to remember for next time?

_____

_____

_____

IMPROVE

DIRECTIONS: Congrats, you've made it to the seventh step of SEEK's Engineering Design Process! You've just finished CREATING your design and TESTING it, so now it's time to IMPROVE! You'll be asking yourself questions about the performance of your design to see how you can make it better. This step is special, because even though it's the last step of the EDP, we can begin the cycle all over! Feel free to repeat the SEEK Engineering Design Process until you're happy with your design.

Did your design work perfectly? Why or why not?

_____

_____

_____

Now that you've tried to complete the challenges, which challenges were fun/easy? What parts were harder?

_____

_____

_____

If you could redo the challenges, is there anything you would change or study moreto make it better/easier?

_____

_____

_____

Do you have any tips to share?

_____

_____

_____

Submit Your Showcase Challenge Videos

Directions: Now it's time to submit your Showcase Challenge videos. The purpose of the challenges is to encourage you to try something new and "think outside of the box." Use your video submissions to express your *creativity*, and talk about the *WHYs* behind your project. Be sure to share with the judges and sponsors everything you learned during the past week. They are super excited to hear from you!
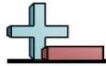
Additional Presentation Tips:
- You should have a theme for your designs and explain how your design connects to competition themes or the real world.
- Describe how and why you developed your design. Explain why your design is fun, useful, and unique/special. The judges watch lots of videos. What makes yours different?
- Demonstrate in-depth understanding by using **vocabulary words and describing the science and engineering concepts** behind this week's challenge.

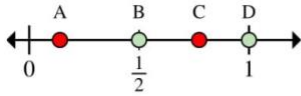[**CLICK HERE TO UPLOAD YOUR FINAL DESIGNS**](#).
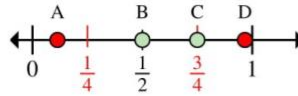
Math Worksheet Answer Key

3rd Grade Answer Keys

Determine which letter best shows the location of the fraction.

A   B   C   D

0    $\frac{1}{2}$ 1

A   B   C   D

0   $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1

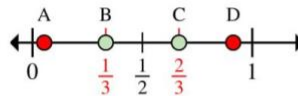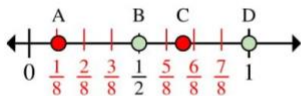1.   **D**

2.   **B**

1) Which letter best shows $\frac{2}{2}$?

3) Which letter best shows $\frac{3}{4}$?

2) Which letter best shows $\frac{1}{2}$?
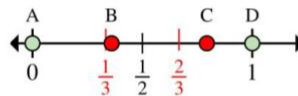
4) Which letter best shows $\frac{2}{4}$?

3.   **C**

4.   **B**

5.   **B**

A   B   C   D

0   $\frac{1}{6}$ $\frac{2}{6}$ $\frac{1}{2}$ $\frac{4}{6}$ $\frac{5}{6}$ 1

A   B   C   D

0   $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{3}$ 1

6.   **A**

5) Which letter best shows $\frac{3}{6}$?

7) Which letter best shows $\frac{2}{3}$?

7.   **C**

6) Which letter best shows $\frac{1}{6}$?

8) Which letter best shows $\frac{1}{3}$?

8.   **B**

9.   **B**

A   B   C   D

0   $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

A   B   C   D

0   $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{3}$ 1

10.   **D**

11.   **A**

9) Which letter best shows $\frac{4}{8}$?

11) Which letter best shows $\frac{0}{3}$?

12.   **D**

10) Which letter best shows $\frac{8}{8}$?

12) Which letter best shows $\frac{3}{3}$?

13.   **D**

14.   **C**

A   B   C D

0   $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1

A   B   C   D

0   $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1
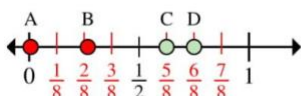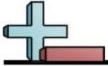
15.   **A**

16.   **B**

13) Which letter best shows $\frac{6}{8}$?

15) Which letter best shows $\frac{0}{8}$?

14) Which letter best shows $\frac{5}{8}$?

16) Which letter best shows $\frac{2}{8}$?

1-10	94	88	81	75	69	63	56	50	44	38
11-16	31	25	19	13	6	0				

Name: **Answer Key**

Solve each problem.

Answers

1) A farmer was planting vegetables in a garden. He planted 623 corn seeds, 519 turnip seeds and 831 potato seeds. How many seeds did he plant total?

2) At Isabel's school there are 971 students in 3rd grade, 281 students in 4th grade and 919 students in 5th grade. How many students were there in all three grades?

3) For a new year's party 911 red balloons, 910 green balloons and 915 white balloons were used. What is the total number of balloons used?

4) A zoologist was checking the weights of three gorillas. Gorilla A weighed 559 pounds, gorilla B weighed 827 pounds and gorilla C weighed 130 pounds. What is the combined weight of all three gorillas?

5) While working on his car, Kaleb spent 584 bucks on a new paint job, $309 on the transmission and 213 dollars on the interior. How much money did he spend total?

6) Carl, Amy and Ed were collecting cans for recycling. Carl collected 178 cans, Amy collected 498 and Ed collected 592. What is the total number of cans all three friends collected?

7) While building a house, an architect used 956 nails on the first floor, 351 on the second and 515 on the third floor. How many nails did he use on all three floors?

8) A donation center received 479 cans of corn, 887 cans of peas and 396 cans of green beans. How many cans did they receive total?

9) A school had 945 red pens, 393 blue pens and 993 black pens. How many pens did they have total?

10) In a month, a video store rented out 509 action movies, 747 comedies and 305 other types of movies. What is the sum of the movies they rented in a month?
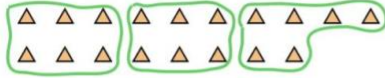
1. __**1,973**__

2. __**2,171**__

3. __**2,736**__

4. __**1,516**__

5. __**1,106**__

6. __**1,268**__

7. __**1,822**__

8. __**1,762**__

9. __**2,331**__

10. __**1,561**__
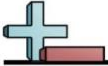
| 1-10 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 |

Name: **Answer Key**
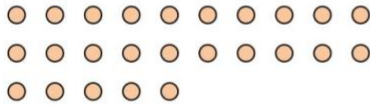
Use the shapes provided to answer the questions.

Answers

Ex) How many groups of 6 can you make with the 18 shapes below?

1) How many groups of 6 can you make with the 18 shapes below?

Ex. _____ **3**

1. _____ **3**

2) How many groups of 5 can you make with the 25 shapes below?

3) How many groups of 2 can you make with the 8 shapes below?

2. _____ **5**

3. _____ **4**

4) How many groups of 2 can you make with the 16 shapes below?

5) How many groups of 5 can you make with the 35 shapes below?

4. _____ **8**

5. _____ **7**

6. _____ **13**

6) How many groups of 3 can you make with the 39 shapes below?

7) How many groups of 7 can you make with the 14 shapes below?

7. _____ **2**

8. _____ **4**

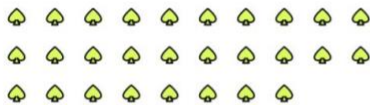**8)** How many groups of 7 can you make with the 28 shapes below?

9) How many groups of 4 can you make with the 40 shapes below?

9. _____ **10**

10. _____ **5**

10) How many groups of 7 can you make with the 35 shapes below?

11) How many groups of 3 can you make with the 18 shapes below?

11. _____ **6**

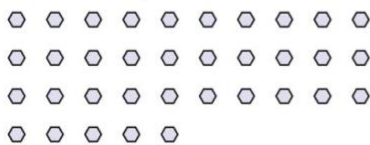| 1-10	91	82	73	64	55	45	36	27	18	9
11	0									