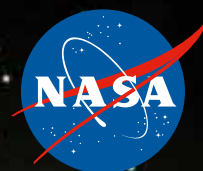




education



MINDSTORMS® GyroBot

In collaboration with NASA

Age 10+

Student Worksheet



MINDSTORMS® GyroBot

Name

Date

STEP 1

Build the GyroBot and program with Gyro On. The Gyro On program should have your GyroBot turn on for 15 seconds at 50% power and then stop with a brake – not a coast.



To download the program, please return to the website www.legospace.com. Choose Download program under the GyroBot video



How does a gyroscope work on Earth? You will make a prediction and then test your GyroBot. Remember to make at least three tests to confirm your data when you complete each step.

1. Describe what you think the GyroBot will do when you run Gyro On

2. Run the Gyro On program. What did you observe?

Watch the first part of the video that shows the GyroBot using the Gyro On program to turn on for 15 seconds and stop with a “hard” brake.

3. Were there any differences in how your model performed on Earth and how the astronaut’s model performed in microgravity? Please explain.

MINDSTORMS® GyroBot

Name _____

Date _____

STEP 2

Program your GyroBot to use the program Gyro Touch. The program will make the GyroBot turn on for 15 seconds at 50% power when the touch sensor is pressed. The GyroBot will then coast to a stop.



To download the program, please return to the website www.legospace.com. Choose Download program under the GyroBot video



1. Describe what you think the GyroBot will do when you run Gyro Touch.

2. Run the Gyro Touch program. What did you observe?

Watch the next segment of the video that shows the GyroBot using the Gyro Touch program.

3. Were there any differences in how your model performed on Earth and how the astronaut's model performed in microgravity? Please explain.

4. What did you notice about the coast brake as opposed to the hard brake in microgravity?

5. Why do you think the GyroBot spun in the opposite direction of the spinner in microgravity?

MINDSTORMS® GyroBot

Name

Date

STEP 3

Program your GyroBot to use the program Gyro Ultrasonic. The program will start the GyroBot when the touch sensor is pressed. The bot will run until an object is placed less than six inches away from the ultrasonic sensor. Then, the GyroBot will coast to a stop.



To download the program, please return to the website www.legospace.com. Choose Download program under the GyroBot video



1. Describe what you think the GyroBot will do when you run Gyro Ultrasonic.

2. Run the Gyro Ultrasonic program. What did you observe?

Watch the next segment of the video that shows the GyroBot using the Gyro Ultrasonic program.

3. Were there any differences in how your model performed on Earth and how the astronaut's model performed in microgravity? Please explain.

MINDSTORMS® GyroBot

Name

Date

STEP 4

Program your GyroBot to use the program Gyro Light. The program will make the GyroBot start at 25% power when the touch sensor is pressed. When the touch sensor is pressed again, the power will increase to 50%. When the touch sensor is pressed a third time, the power will increase to 75%. When the touch sensor is pressed a fourth time, the power will increase to 100%. When the touch sensor is pressed a fifth time, the GyroBot will coast to a stop.

Classroom Observations			ISS Observations	
Power Level	NXT display (rpm)	Description of gyroscope at each power level	NXT display (rpm)	Description of gyroscope at each power level
25%				
50%				
75%				
100%				

To download the program, please return to the website www.legospace.com. Choose Download program under the Gyrobot video



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MINDSTORMS® GyroBot

Name

Date

STEP 4

1. Run the Gyro Light program. Complete the first two columns of the chart. Make sure you use details about what you observe.

2. Watch the next segment of the video that shows the GyroBot using the Gyro Light program.

3. Complete the last two columns of the chart. Make sure you use details about what you observe.

4. How does the power of the motors affect the stability of the gyro? Explain if it is more or less stable at higher power levels and what causes the change in stability.

5. Did the rpms differ between your model and the one on the ISS?

MINDSTORMS® GyroBot

Name

Date

STEP 4

6. Newton's third law states for every action, there is an equal and opposite reaction. How can we observe this law in the gyro in orbit and on Earth?

7. How can you prove Newton's third law of motion using the LEGO® bricks GyroBot model?

EXTENSION

Change the location of the weights or remove one set of weights on the GyroBot to make the GyroBot unbalanced.

1. Describe what you think will happen when the GyroBot uses the Gyro Light program. Be specific about what you will see at each power level.

2. Run the Gyro Light program. Describe what you observe at each power level. Was that what you predicted?

