Worksheet: Get in Gear

Introduction to Mobile Robotics > Get in Gear

This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.

Construct: Motor Power Level

Observations:

1. Did the robot appear to move faster than it had when the motors were set at 75% power?
2. Why did increasing motor power make the robot go faster?

Construct: Gears

Check your understanding

3. Do you think the robot's speed will increase if you change the gears? Why or why not?

Construct: Gears II

Observations:

4. Did your robot move faster than it did with the old gears and 100% power? How did you determine this?

Construct: Gears III

Observations:

5. How fast did your robot go this time, compared to the other runs?

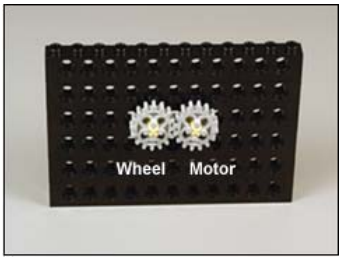
Contemplate: Get in Gear

6. List two ways to make the robot go faster.

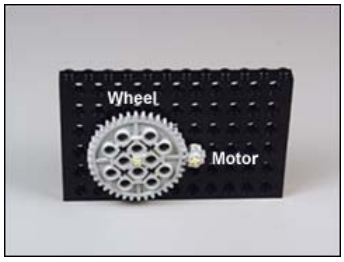
7. List two ways to make the robot go slower.

8. When you want the robot to go faster by changing its gears, do you put the larger gear on the wheel or on the motor?

9. Think about exactly why the robot goes faster or slower when you change the gears. Your robot starts with these gears:



i. Compared to the original, would the robot go faster, slower, or the same speed with these gears? Explain your answer.



ii. Would the robot go faster, slower, or the same speed as the original robot with these gears? Explain your answer.

iii. Describe, in your own words, why changing gears will sometimes make the robot go faster, and why it will sometimes go slower or the same speed instead.

iv. Describe a simple rule that will tell you whether a certain pair of gears will make a robot go faster, slower, or the same speed as the standard pair of 16-tooth gears.

10. When you ran your robot with the modified gearing, did you notice where it stopped?

i. The second robot went farther than the first robot even though they were both set to go for the same number of motor rotations. How is this possible?

ii. The third robot didn't go as far as either of the other two, even though it too was set to go for the same number of motor rotations. How is this possible?

iii. In the Wheels and Distance Investigation, you found a way to convert the number of centimeters you want the robot to go into the number of degrees the motors need to turn to make it go that far. Will this still work once you have changed the gear ratio? Explain why or why not.

Continue: Tradeoffs

Observations:

11. Which gear order…

i. Made the robot move fastest with no books?

ii. Could push the most books?

iii. Would you use for a bulldozer robot?

iv. Would you use for a race car robot?

12. Explain how the tradeoff you found is a good reason for real-world vehicles to be able to choose different gear settings when pulling a trailer, versus driving down the highway without one.