FIRST® LEGO® League

TUT⚙RIALS

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WHEELS

SESHAN BROTHERS

LOTS TO CHOOSE FROM

- LEGO is the largest tire manufacturer in the world!
- LEGO has wheels of all sizes and also treads

43.2 X 22

56 X 28

68.8 X 36

81.6 X 15

56 X 26

62.4 X 20

94.2 X 22

SPIKE PRIME WHEELS

- The rubber tire is molded on to the rim. Therefore, they will not slip off the rim as many LEGO tires do.

- The small tire is 56 X14 (same size as the wheel in the EV3 Core set) and the large tire is 88 X 14

- In SPIKE Prime, you get four 56 X14 tires in the Core Set and an additional four 88 X 14 in the Expansion Set

- While these tires are firm, teams often complain that that they get dirty very easily and lack enough friction. Because these tires tend to slip on the challenge mat, teams who use these wheels have to clean the tires often.
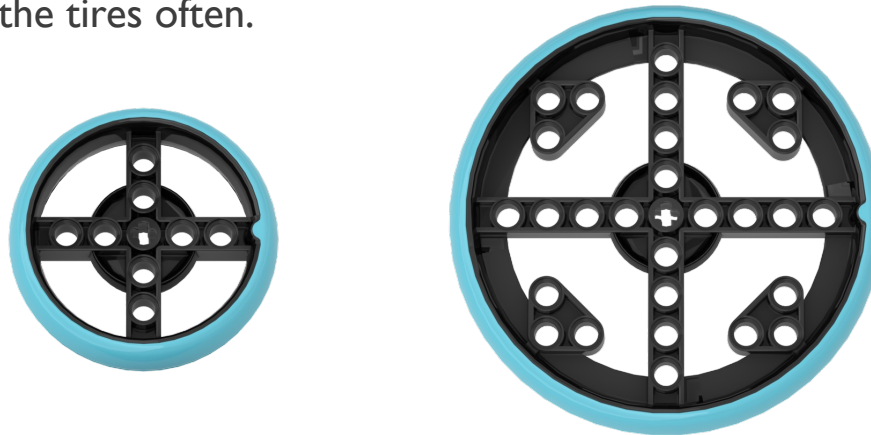
TIP: MEASURING THE SIZE OF A TIRE

1) Look for the size of the tire on the tire itself

   The first number is the diameter to of the tire in mm. The second is the width of the tire in mm.

2) Look up the tire on a LEGO catalogue (e.g. Brickowl.com and Bricklink.com), or using the LEGO wheels chart by Sariel (see page 12)

KNOWING YOUR WHEEL SIZE HELPS CONVERT DISTANCE TO DEGREES


https://ev3lessons.com/en/Resources/WheelConverter/

"BEST" WHEELS FOR *FIRST* LEGO LEAGUE

- There are many options for wheels on your competition robot. There is no "best" wheel.

1) Some wheels are better than others, but there is no one wheel that is perfect for every task or every surface your robot will run on.

2) Every wheel has a pro and a con

3) Do not make decisions on what wheel to use based on someone else's experience

   Create a set of tests to see if the wheels can hold the weight of the robot, drive straight and are fast enough for your tasks (see next page)

45560 EV3 Expansion

45544 EV3 Core

31313 EV3

9797 NXT

9695 NXT Resource
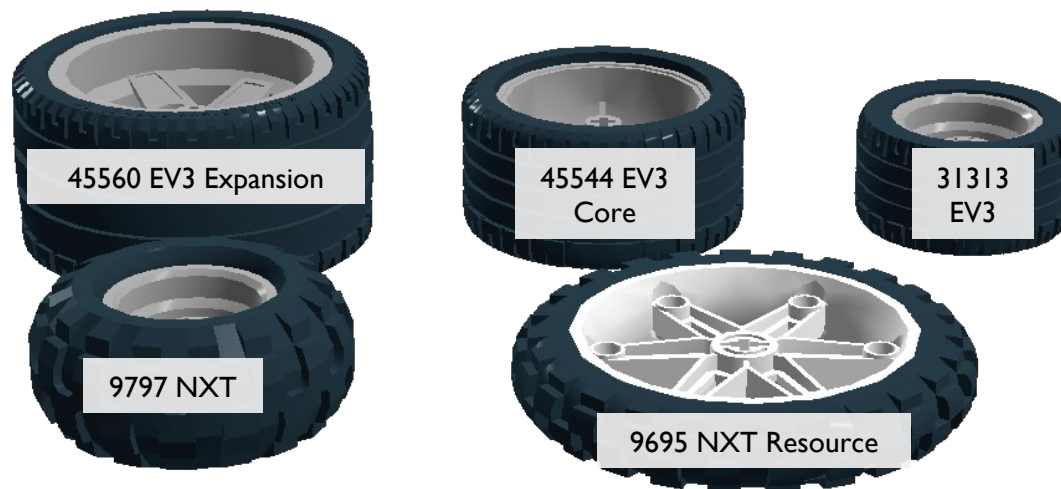
Common wheels found in MINDSTORMS sets

THINGS TO CONSIDER: SIZE, SPEED, ACCURACY, STABILITY...

- Large wheels make a robot taller and so might give you both greater ground clearance as well as a higher center of gravity

  - This might be positive as you might be able to to drive over obstacles, but might also make your robot unstable

- Large wheels allow your robot to travel further for each rotation, therefore, making your robot faster.

  - Speed can be a positive thing in a timed robotics contest, but your robot may not travel as accurately

- Smaller wheels are slower but can be more accurate than large wheels

- Wider wheels allow for more contact with the ground which might increase stability, but can also cause more friction.

See next page for sample tests

SAMPLE WORKSHEET

Tests	Results
Wheel used	*(List the wheel type and size)*
Accuracy Test: Move straight 20-30 inches	*(Does the robot veer?)*
Turn Test: Four 90 degree turns in a row	*(Are the turns accurate?)*
Traction Test: Push an object	*(Does the robot skid?)*
Speed Test: Time to go 70 inches, Turn 360 degrees	*(Is your robot fast?)*
Tire observations	*(Does the tire stay on the rim or come off easily?)*
Height and width of robot (when using these tires)	*(Does the tire make the robot narrower, wider, taller, or shorter?)*

You will have to weigh the plusses and minuses of each wheel for your robot.

BACK WHEELS: SKIDS, CASTER WHEELS….
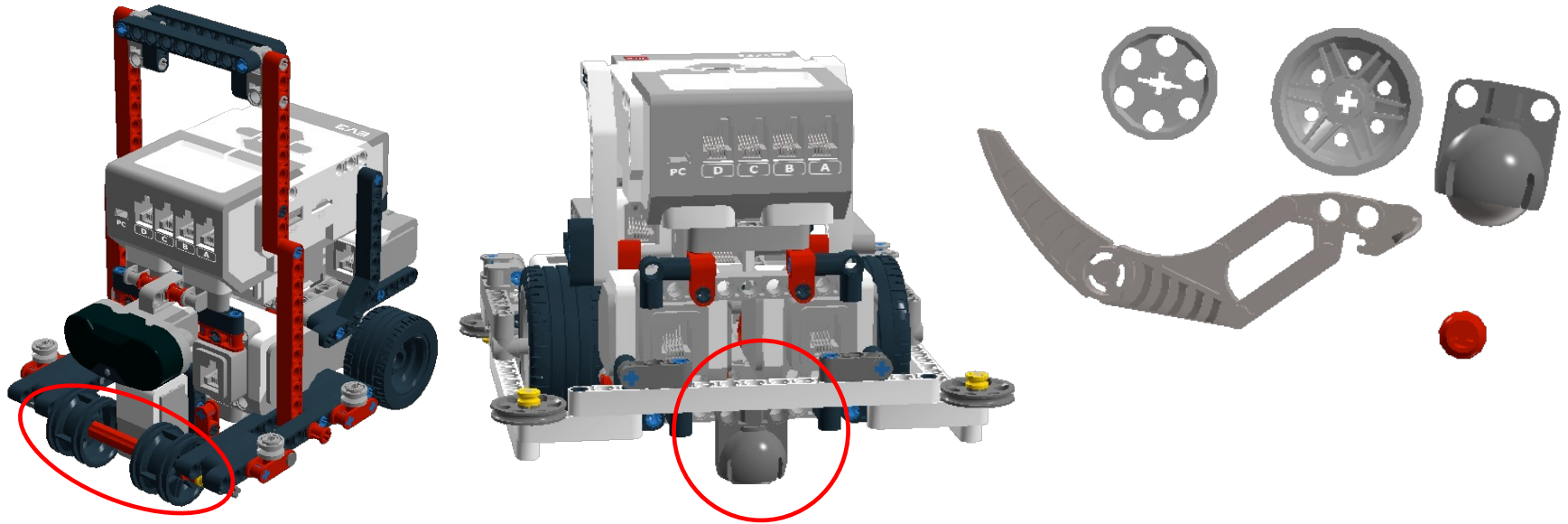
Back wheels or skids need to allow the robot to turn smoothly. You can create them out of many different LEGO elements including wheels without the tire, LEGO balls, EV3 caster wheels, etc. Here too, there are pros and cons. You should test your back wheels or skids.
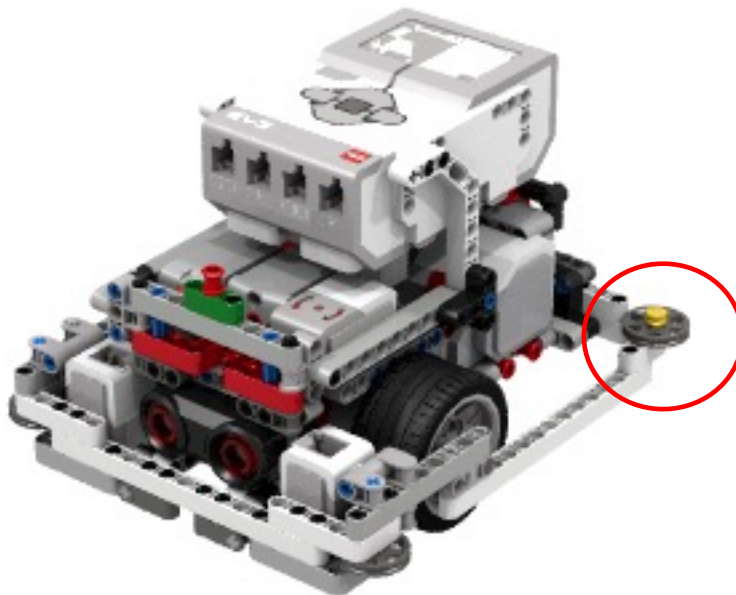
SPIKE PRIME CASTER

- The ball in the caster wheel can be removed by using some floss

WHEELS FOR OTHER USES

- Riding wheels can help your robot drive along walls.

- FLL Tip: Make sure that they are installed at the correct height for your table (at home or at competition). You might have either 2X4 or 2X3 wood as walls.

USEFUL TOOL: LEGO WHEELS CHART

- http://wheels.sariel.pl/

LEGO™ Wheels Chart

Move your cursor over any item to see subparts: rim and tire (does not apply to single-piece wheels). When subparts are shown, move your cursor over a rim to see the tires it fits, or over a tire to see the rims it fits. Click any image to open respective Bricklink's catalog page in a new tab in your browser

You can sort the chart by clicking fields from 'Total diameter' to 'Weight'.

Total items: 50. Last updated: July 19th 2016.

Wheel:	Total diameter:	Tire width:	Rim diameter:	Rim width:	Weight:
	14 mm 0.55" 1.75 studs	6 mm 0.24" 0.75 studs	11 mm 0.43" 1.38 studs	8 mm 0.31" 1 studs	0.75g
	17 mm 0.67" 2.13 studs	6 mm 0.24" 0.75 studs	11 mm 0.43" 1.38 studs	8 mm 0.31" 1 studs	1.1g
	20 mm 0.79" 2.5 studs	no tire	20 mm 0.79" 2.5 studs	?	3g
	23 mm 0.91" 2.88 studs	no tire	23 mm 0.91" 2.88 studs	23 mm 0.91" 2.88 studs	4g
	24 mm 0.94" 3 studs	13.5 mm 0.53" 1.69 studs	17.5 mm 0.69" 2.19 studs	16 mm 0.63" 2 studs	3g
	24 mm 0.94" 3 studs	7 mm 0.28" 0.88 studs	17 mm 0.67" 2.13 studs	7 mm 0.28" 0.88 studs	3g
	30 mm 1.18" 3.75 studs	3 mm 0.12" 0.38 studs	24 mm 0.94" 3 studs	3 mm 0.12" 0.38 studs	2g

CREDITS

- This tutorial was created by Sanjay Seshan and Arvind Seshan

- More lessons at www.ev3lessons.com, www.primelessons.org and www.flltutorials.com

- LEGO Wheels Chart from http://wheels.sariel.pl/