

Gears

From the set provided:

List the number of teeth of each pinion gear. _____

List the number of teeth from each spur gear. _____

In simplest form, work out all of the decimals for (spur gear teeth) / (pinion gear teeth).

Eg $60 \div 8 = 7.5$

The answers above tell us how many times faster the pinion wheel attached to the motor is rotating than the spur gear attached to the axel, and hence the wheels. Choose 2 gears for your car, one pinion gear and one spur gear. Circle the chosen gears above and the decimal number their division forms. The bigger the number, the slower the top speed, but the greater the acceleration.

Speed

The motor rotates at 1000 revolutions per minute (rpm) when free of a load. However, when attached to the wheels of the car via the gears, it will take time to reach maximum speed and that maximum speed may be lower than 1000 rpm. However, assuming the motor reaches 1000 rpm, calculate the maximum speed of your car by using the following steps.

Calculate $1000 \text{ rpm} \div$ the decimal found above for your two chosen gears. _____
This tells us revolutions per minute of the wheels if the motor turns at 1000 rpm.

Calculate the circumference of the wheels. The large wheels have a diameter of 52 mm and the circumference in mm can be found using the formula: $C = \pi D$

Multiple the rpm of the wheels by the circumference. This tells us the car speed in mm per minute.

Divide this answer by 60 to get the car speed in mm per second.

Divide this answer by 1000 to get the car speed in metres per second.

The metres per second speed is in our desired units. If you want the answer in kilometres per hour (km/h), multiply this answer by 3.6.