

# **OVERVIEW**

# SIMPLE VEHICLE (Code: SIMPLE)

### DESCRIPTION

This project requires the student to design and build a *SIMPLE VEHICLE*. This is the most basic vehicle possible and is suitable to introduce students to Technology and Electrical components. After completion of the vehicle, it can be used for a variety of experiments (physics or otherwise) or even paired with another vehicle for racing and performance tests.

This is a basic four wheeled vehicle, with both front and rear wheels on fixed axles. This vehicle:



- Is capable of forward and reverse motion (the direction of travel being controlled by a three position switch).
- $\circ~$  Has a choice of gearbox ratios (at the construction stage).

LEVEL:	Intermediate
HOURS TO CONSTRUCT:	10 - 15 hours
SKILL DEVELOPMENT:	Planning and Design
	Manufacturing
	Soldering
	Mechanical
	Electrical





**TOOLS REQUIRED** The following tools are required. Several are available from Scorpio Technology, and

can be ordered separately if required (item codes in brack	ets):
REQUIRED TOOLS	ORDERING CODE
Assorted hand tools (depending on materials used)	-
Hammer	HAMMERCP/HAMMERCL
Ruler and pen	-
Craft knife	CRKNF
Soldering Iron and Soldering iron stand: – a good quality soldering iron, with a fine tip or	SOLDIRN SOLDIRNSTD
Soldering station	SOLDSTN
Solder: – 0.71mm 60/40 solder is recommended	SOLD500
Wire strippers	WIRESTR
Side cutters	SIDECUT or SIDECUTM
Drill Bit - 2.3mm for 2.6mm self tappers	DB2.3
Mini Bolt Cutters	BOLTCUTM

• all pinion and spur gears GEAR50/10/2.4, GEAR50/10/2.6)

The following material is to be supplied by the student / teacher: □ Material for the platform (PVC or acrylic sheet, plywood, etc.)

- (TAPEDS)
- (BH4AA) and 4 x Battery - AA
- $\Box$  If choosing to use 6V 4AA battery holder

WHAT ELSE IS NEEDED?

pack)

• Wheels - large

testing cars.

to be ordered separately:

□ 2 x Battery – AA

• Steel rod and plastic guide tube

- □ Hot glue (GLUESTK) **or** double-sided adhesive tape □ We recommend the following spares when buying class sets of kits to replace parts
- □ Multi strand hook-up wire (WIREHU10)

The following items are required and are available from Scorpio Technology, but need

- damaged or lost by students:
  - (SRGTW 5 of each per

(BATTAA or BATTALK40)

(W52C2 – pack of 40) (GEAR10/1.9, GEAR12/2.4,

(BATTAA or BATTALK40)

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WHAT'S IN THE KIT?

case, axles and switch. □ A detailed teaching unit with a complete parts list, design

□ All the mechanical and electrical components required to make the SIMPLE VEHICLE work including the motor, battery holder, gears, gear

suggestions, general construction guidelines and suggestions for



# ABOUT THE PROJECT

The major features of this project are the planning, design, construction and assembly stages of a simple vehicle.

#### DESIGN PHASE

□ Create your own unique *SIMPLE VEHICLE* design based on our drawings. Focus on component relationships, rather than dimensions. This provides scope for students to individualise their *SIMPLE VEHICLE* design and increase their engagement in the project.

During the **Design phase**, students will need to:

- □ Determine the planned usage of the vehicle
- □ Evaluate the suitability of various materials, such as PVC, acrylic, plywood or balsa wood
- □ Determine gearbox ratio (choice of 3) and which gears will be used from the selection of spur and pinion gears provided
- □ Investigate the possibility of adding steering (front wheel steering, radio control, etc.)
- □ Evaluate available technologies that can be used, for example:
  - 3D printer
  - laser cutter (which allows more interesting shapes than usual)
  - vacuum former
- □ Take into account weight distribution and ease of operation
- □ Consider the practical aspects of construction and assembly. For example, clearance for the wheels

#### MAKING / CONSTRUCTION

Once the Design process has been completed, the students will be able to start **building their design**. They will:

- □ Make and assemble the *SIMPLE VEHICLE* platform they have designed
- $\hfill\square$  Assemble gearbox
- $\hfill\square$  Mount the gearbox, switch, axles and wheels on to the platform
- □ Wire up and solder the gearbox, motor, battery holder and switch
- □ Test and adjust the *SIMPLE VEHICLE*
- □ Troubleshoot any problems!

# DOES THE TEACHING UNIT INCLUDE ANY THEORY?

The Teaching unit has a THEORY section that covers

- $\hfill\square$  Gears and Gear Ratios
  - Driver & Driven Gears
  - Gear Trains
  - Mechanical Advantage and Velocity Ratio
    - SCORPIO TECHNOLOGY VICTORIA PTY. LTD.

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