



Small Engines

PROJECT PLANNING GUIDE

OBJECTIVES OF THE 4-H SMALL ENGINES PROJECT

1. To become aware of the many uses of small engines.
2. To develop positive attitudes toward safety.
3. To acquire skills needed to operate equipment safely and economically.
4. To gain a working knowledge of internal combustion engines, their parts and functions.
5. To explore opportunities for careers in small engine sales and service.
6. To learn to appreciate the value of proper engine maintenance.

EXTENSION RESOURCE MATERIALS

1. 4-H Small Engines, Unit I, 4H C-3-13P
2. 4-H Small Engines, Unit II, 4H C-3-14P
3. Power Tool Safety, 4H M-3-17
4. Lawn and Garden Equipment Safety, 4H M-3-19
5. 4-H Lawn and Garden Power Equipment, 4H M-3-20P
6. 4-H Learn to Earn, 4H M-3-36P
7. Small Engines, Volume I, American Association for Vocational Instructional Materials

LEVEL 1
(9- to 11-year-olds)

Things to Learn	Things to Do
A. <u>Importance of Engines</u>	<ul style="list-style-type: none">- Survey the home and list the equipment and machines that are powered by small engines.- Talk with local dealers concerning sales of small engines.- List as many uses as you can for small engines.
B. <u>Safety</u>	<ul style="list-style-type: none">- Demonstrate the proper dress for operating a lawn mower or compact tractor. (Proper dress is basically the same.)- Demonstrate proper and safe refueling.- Make a collection of safe and unsafe containers for storing fuel.- List the storage location of fuels where you live (examples include basement, porch and garage).- By using the owner's manual, locate and make a list of all safety devices and decals.- Ask your leader or parent to make a piece of equipment, such as a lawn mower, compact tractor or roto tiller, unsafe by removing safety oriented parts (such as muffler, gas tank cap, or shields) and to let you point out these missing parts.- Collect newspaper clippings of accidents caused by small engines.
C. <u>Parts of an Engine</u>	<ul style="list-style-type: none">- Identify and list the visual parts and components of a small engine.
D. <u>Tool Identification, Use and Care</u>	<ul style="list-style-type: none">- Show other 4-H'ers what tools are in your Dad's tool box and explain the purpose of each.- Visit a hardware store and familiarize yourself with the different tools and sizes.- Study catalogues to learn about tools (names, sizes and approximate costs).

Things to Learn	Things to Do
	<ul style="list-style-type: none"> - Make a list of the tools you would like to own. Include the prices. - Provide a safe and convenient place for the storage and use of tools.
<p>E. <u>Types of Bolts, Screws and Fasteners</u></p>	<ul style="list-style-type: none"> - Observe and identify the more common types on available engines and equipment. - Study catalogues and visit hardware stores to learn about bolts, screws and other fasteners. - Make a collection of washers, bolts, cotter keys, set screws, nuts, spring clips, or similar items, to show at a club meeting. Your local hardware store may be willing to help.
<p>F. <u>Fuels and Lubricants</u></p>	<ul style="list-style-type: none"> - Handle and store fuels and lubricants properly. (See 2, 3 and 4 listed under Safety, Level 2.) - Demonstrate the proper procedure for mixing gasoline and oil for a two-stroke cycle engine. (This is usually 1/2 pint of oil to 1 gallon of gasoline.) Be sure to check the owner's manual for exact mixture. - Show how to check fuel and oil level on a four-stroke cycle engine. - Refill fuel and oil to proper level. (Handle fuel and oil safely; use proper funnel, pouring spout, rags, and utensils. Cleanliness is important.) - Seal and store unused oil and fuel. Clean and store utensils. Properly dispose of oily rags.
<p>G. <u>Two-stroke vs. Four-stroke Cycle Engines</u></p>	<ul style="list-style-type: none"> - Identify two-stroke and four-stroke cycle engines by listing the visual differences on engines that are assembled (example, no filler plug for oil on two-stroke cycle).

LEVEL 2
(12- to 14-year-olds)

Things to Learn	Things to Do
A. <u>Engine Parts</u>	<ul style="list-style-type: none">- Tear down a (discarded) worn out four-stroke cycle engine and identify all parts.- Tear down a (discarded) worn out two-stroke cycle engine and identify all parts.- Mount the parts on a board and label each part.
B. <u>Use of Operator's and Service Manual</u>	<ul style="list-style-type: none">- Read the operator's manual for one or more small engines. Did you learn anything?- Look through service manuals. (These will be needed in Level 3.) For example, what is the recommended valve clearance for your engine?
C. <u>Safety</u>	<ul style="list-style-type: none">- Learn all safety rules in the operator's manual. Give a demonstration on the safe operation of a small engine.- Explain the meaning of all decals and symbols found on the engine and equipment.- Make a collection of safety decals and explain the meaning of each to your club.- Demonstrate proper and improper dress for operating and using small engines.- Locate the points or area of greatest danger.- Replace any missing symbols or decals.- Give a demonstration on servicing a battery. Dress properly. (Eye protection is important.)- Demonstrate proper procedure for stopping an engine (switch off, brake set and all moving parts stopped).
D. <u>Operation of Power Equipment</u>	<ul style="list-style-type: none">- Identify and operate all equipment controls. (Keep the equipment stationary.)- Demonstrate the correct procedure for starting and stopping an engine.- Show other 4-H'ers how to dress properly for the operation of your equipment.

Things to Learn	Things to Do
	<ul style="list-style-type: none">- Keep spectators a safe distance from equipment.- Begin driving (operation) in a large open area.- Demonstrate the proper procedure for starting an engine. (Check oil level, fuel, air cleaner and overall maintenance, such as missing or loose parts or bolts.)- Practice operating the equipment until you feel comfortable and at ease. (This might be a meeting in which several participate.)- Demonstrate the preparation of an area for mowing. (Remove foreign objects, such as bottles, cans, wire and rocks.)- Get your leader to check your operational skills.

(11-16-15)
LEVEL 3
(15- to 19-year-olds)

Things to Learn	Things to Do
A. <u>Engine Trouble Shooting</u>	<ul style="list-style-type: none">- Identify operation problems.- Check for compression.- Check for fuel in tank.- Check for fuel at carburetor.- Check for fuel at plug.- Check for switch in "on" position.- Check for spark at plug.- Check for spark plug firing.- Check air filter.- Clean fuel filter.- Check for water in fuel.- Adjust carburetor according to owner's manual.
B. <u>Engine Overhaul</u>	<ul style="list-style-type: none">- Clean exterior of engine.- Disassemble engine.- Clean and inspect all parts.- Make a list of all parts needing replacement.- Identify all needed parts by the manufacturer's parts list.- Order all parts.- Assemble engine.

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