



Tractor

PROJECT PLANNING GUIDE

OBJECTIVES OF THE 4-H TRACTOR PROJECT

1. To develop leadership talents and work towards achieving the broad objectives of character and effective citizenship.
2. To share new knowledge with other 4-H members and tractor owners.
3. To provide increasing opportunity for 4-H members to learn to operate and care for tractors skillfully, safely and economically.
4. To promote the efficient use of tractors and other farm machinery.

EXTENSION RESOURCE MATERIALS

1. Getting Acquainted With Your Tractor I, 4H C-3-8P
2. Improving Your Skills III, 4H C-3-10P
3. Machinery Care and Safety IV, 4H C-3-11P

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

Things to Learn	Things to Do
<u>SAFETY</u>	
<ol style="list-style-type: none"> 1. How many deaths and injuries are caused by tractor accidents 2. What age groups are more likely to be killed or injured 3. How to mount, dismount, and operate a tractor safely 4. How to hitch implements safely 5. How to use the PTO safely 	<ul style="list-style-type: none"> - Collect newspaper clippings of tractor accidents and make a Safety scrapbook. - List the gears and speeds for your tractor. - Check to see if all PTO safety shields are in place and not damaged. - Check the drawbar height, position, and locking device and determine if it is safe.
<u>WHAT MAKES AN ENGINE RUN</u>	
<ol style="list-style-type: none"> 1. Parts of an engine 2. Difference between 2-stroke and 4-stroke cycle engines 3. How a diesel engine is different from a gasoline engine 4. What is in the operator's manual 	<ul style="list-style-type: none"> - List all your tractor engines by types (Diesel or gasoline, 2- or 4-cycle). - Do you have any turbocharged engines? - List the firing order of all your tractor engines. - List the crankcase oil capacity of all your tractors. - List the grades of motor oil recommended for your tractor engines. - Check the air pressure in all tractor tires and correct if needed.
<u>TYPES OF FASTENERS</u>	
<ol style="list-style-type: none"> 1. Bolt sizes 2. Bolt types 3. Bolt grades 4. Bolt threads 5. Screw types 6. Types of nuts and washers 7. Rivets, keys and set screws 	<ul style="list-style-type: none"> - Make a display board with as many types of bolts, screws, nuts and washers as you can find. - Label each one completely and correctly. - Select a piece of machinery and go over it thoroughly making sure all bolts, nuts, screws and set screws are in place and tight. List all fasteners by kind, size, and type of wrench needed.

Things to Learn	Things to Do
<u>INSTRUMENT PANEL AND CONTROLS</u>	
<ol style="list-style-type: none"> 1. Instruments and how to read them 2. Controls for starting, stopping and operating the tractor and how they are used 	<ul style="list-style-type: none"> - Draw a diagram of the instrument panel on your tractor, showing all gauges and identifying them. Indicate normal readings. - List all the controls on your tractor, where each is located, and tell how it is operated.
<u>DAILY MAINTENANCE AND SAFETY CHECK</u>	
<ol style="list-style-type: none"> 1. Parts and systems of the tractor which need daily checks 2. How to make daily checks 	<ul style="list-style-type: none"> - Make up a daily or 10-hour service chart for each tractor. - Keep records of daily service checks.
<u>STARTING AND STOPPING PROCEDURES</u>	
<ol style="list-style-type: none"> 1. Starting a gasoline tractor 2. Starting a diesel tractor 3. Starting an LP gas tractor 4. Stopping a gas, diesel, LPG tractor 5. What to do if the tractor doesn't start 	<ul style="list-style-type: none"> - Read operator's manual to learn starting and stopping procedure. - Practice starting and stopping a tractor under supervision.
<u>AIR CLEANER OPERATION AND SERVICING</u>	
<ol style="list-style-type: none"> 1. Importance of clean air and fuel 2. How to check air cleaners 3. How to check for air leaks 4. How to clean air filters 	<ul style="list-style-type: none"> - List the number and types of air filters on your tractor. - Check all clamps and hoses for air leaks. - Service all air cleaners and breathers on your tractor.
<u>PERIODIC LUBRICATION</u>	
<ol style="list-style-type: none"> 1. Points which need lubrication 2. Frequency of lubrication 3. Type of lubrication required 	<ul style="list-style-type: none"> - Perform a daily lubrication on your tractor. - Make a chart showing all lubrication points, frequency of lubrication, and type of lubricant recommended.

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

Things to Learn	Things to Do
<u>SAFETY</u>	
<ol style="list-style-type: none">1. Reaction time in emergencies2. How to adjust brakes evenly3. How to hitch to a drawbar4. How to prevent a tractor from tipping over5. How PTO shafts are shielded6. Safe ways to handle and store fuels7. Types of fire extinguishers and kinds of fires each is used on8. How to remove radiator cap	<ul style="list-style-type: none">- Check your reaction time.- Adjust brakes on your tractor to even pedal travel.- Replace or repair all PTO shields not operating properly.- Check your tractor for fuel leaks.- Make an inventory of fire extinguishers and list all places where one should be but isn't.
<u>ENGINE AND HYDRAULIC OILS</u>	
<ol style="list-style-type: none">1. Types of oil used in gasoline engines (API classifications)2. Types of oils used in diesel engines (API classifications)3. Types of oils used in hydraulic systems4. Oil viscosity ratings (SAE Grades)5. How to change crankcase and hydraulic system oil and filters6. When to change crankcase and hydraulic system oil and filters	<ul style="list-style-type: none">- Check owner's manual for grade and classification of oil recommended for your tractor.- Check to see when the next oil change for your tractor is due.- Change engine and hydraulic oil in your tractor (when due), and change filters if needed.- Make an oil and filter service interval chart for your tractor.
<u>CARBURETORS AND FUEL INJECTORS</u>	
<ol style="list-style-type: none">1. Air-fuel ratios for gasoline and diesel engines2. How a carburetor works3. How a fuel injector works4. How to adjust a carburetor5. Importance of clean fuel6. How a governor works7. How to operate a tractor to conserve fuel	<ul style="list-style-type: none">- Check the fuel system on your tractor for leaks.- Clean the sediment bowls and change the fuel filters on your tractor.- Check the carburetor and governor settings on your gasoline tractor and adjust if needed.

Things to Learn	Things to Do
<u>BATTERIES AND SPARK PLUGS</u>	
<ol style="list-style-type: none"> 1. How to use a battery hydrometer 2. How to clean a battery 3. How to recharge a battery 4. Types of spark plugs 5. How to clean and re-gap spark plugs 	<ul style="list-style-type: none"> - Check your batteries with a hydrometer. - Clean batteries and check fluid levels. - Remove, clean and set the gap on your tractor spark plugs.
<u>COOLING SYSTEMS</u>	
<ol style="list-style-type: none"> 1. How engine temperature affects power, fuel consumption, and wear 2. How a thermostat controls water temperature. 3. How to adjust fan belt tension 4. How to protect the cooling system from freezing. 	<ul style="list-style-type: none"> - Drain, flush, and add antifreeze to your tractor cooling system. - Adjust the fan belt tension. - Clean the radiator fins. - Remove shrouds and clean cooling fins on all your air-cooled engines.
<u>TIRES</u>	
<ol style="list-style-type: none"> 1. How to check tire pressure 2. Proper inflation pressure for tires 3. How weight affects traction 4. How to check tire slippage 5. Causes of tire wear and how to prolong tire life 	<ul style="list-style-type: none"> - Check inflation pressure on all tractor tires and adjust if necessary. - Measure the wheel slippage of your tractor when doing heavy work such as plowing. - Check your tractor tires for any type of damage, and try to determine the cause.
<u>GENERAL LUBRICATION</u>	
<ol style="list-style-type: none"> 1. Lubrication interval for various points on your tractor and equipment 2. How to grease bearings 3. How to fill a grease gun 4. Types and grades of greases and lubricants 	<ul style="list-style-type: none"> - Clean and repack front wheel bearings. - Wipe all grease fittings clean before lubricating. - Check lubricant levels in all gear boxes and add grease if needed.
<u>RECORDS</u>	
<ol style="list-style-type: none"> 1. How to use record forms and determine costs 2. How to prepare a service list 	<ul style="list-style-type: none"> - Keep a record of fuel, oil, and repairs for your tractor. - Determine the operating cost per hour. - Prepare a service list for periodic servicing your tractor.

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

Things to Learn	Things to Do
<u>SAFETY</u>	
1. State laws relating to operation of farm equipment on public roads	- Repair or replace any safety equipment on your tractor or equipment which does not meet requirements.
2. Safety equipment required for daytime and nighttime operation of tractors and farm equipment on highways	
3. Safety rules for working around farm machinery	
<u>IGNITION SYSTEMS</u>	
1. Components of ignition system	- Check breaker points and re-set or replace if necessary.
2. How to adjust, repair or replace ignition components	- Check timing and re-set if necessary.
3. How to adjust timing	- Clean the commutator on your generator.
4. How to service generators and alternators	
5. How to service the starter motor	
<u>TRANSMITTING POWER</u>	
1. How belt and pulley speeds are determined	- Demonstrate proper PTO hitching.
2. PTO hitches and speeds	- Check the clutch adjustment on your tractor and correct if needed.
3. How to operate PTO drives	
4. Gear speed relationships	
5. How clutches work	
<u>STEERING, BRAKES AND FRONT WHEELS</u>	
1. How to lubricate and adjust steering	- Check steering on your tractor for looseness and adjust if needed.
2. How to adjust and service brakes	- Remove front wheels, inspect and repack bearings.
3. How to service front wheels	
<u>VALVES</u>	
1. How valves work	- Adjust valve tappet clearance on your tractor.
2. How to check compression	- Check for proper lubrication of valves.
3. Valve arrangements	
4. How to adjust valves	
5. How to avoid valve trouble	

Things to Learn	Things to Do
<u>TRANSMISSIONS AND DIFFERENTIALS</u>	
<ol style="list-style-type: none"> 1. How transmissions work 2. How to service power transmissions 3. How differentials work 4. How to service differentials 	<ul style="list-style-type: none"> - Service the transmission of your tractor as directed in owner's manual. - Check fluid level in the differential. Drain and service at the interval specified in the owner's manual.
<u>WINTER CARE</u>	
<ol style="list-style-type: none"> 1. How to store a tractor 2. How to prepare a tractor for winter use 3. How to remove a tractor from storage and place in use 	<ul style="list-style-type: none"> - Prepare your tractor for winter storage when you have finished using it.
<u>TILLAGE TOOLS AND METHODS</u>	
<ol style="list-style-type: none"> 1. Types of implements used for tillage 2. Fuel requirements for various types of tillage 3. How to adjust tillage implements 4. How to hitch and operate tillage implements 	<ul style="list-style-type: none"> - Check your plow for sprung frame, worn shares, or other defects. - Determine the line of draft and center of pull for your plow.
<u>CHEMICAL APPLICATION</u>	
<ol style="list-style-type: none"> 1. Parts of the sprayer 2. How to get uniform application 3. How to calibrate a sprayer 4. How to adjust and calibrate granular applicators 	<ul style="list-style-type: none"> - Calibrate your sprayer with water. - Calibrate your granular applicator.
<u>PLANTERS</u>	
<ol style="list-style-type: none"> 1. Types of planters and adjustments 2. How to obtain the proper seeding rate 3. How to adjust planting depth 4. How to check planting rates 	<ul style="list-style-type: none"> - Study the methods for changing seeding rate on your planting implements.
<u>GRAIN HARVESTING</u>	
<ol style="list-style-type: none"> 1. How combines work 2. How to adjust combines for minimum losses and crop damage 3. How to check field losses 	<ul style="list-style-type: none"> - Check field losses for all your harvesting equipment, and make adjustments to reduce losses.
<u>MACHINERY MANAGEMENT</u>	
<ol style="list-style-type: none"> 1. How to compute machine capacity 2. How to estimate fixed and operating costs 	<ul style="list-style-type: none"> - Make a chart giving capacity of all your machines at different speeds. - Estimate fixed and operating costs per hour for your tractor and machinery.

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